CITY OF LONG BEACH

# CAAP

## CLIMATE ACTION + ADAPTATION PLAN

**PROPOSED**

**November 2020**

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# CLIMATE ACTION AND ADAPTATION PLAN VISION

Preparing Long Beach for climate change presents both daunting challenges and extraordinary opportunities. It will require changes to many things we take for granted—how we power our homes, how we get around, how businesses and industry are run, how and where buildings get built, what we consume, and what we throw away. But rather than just an inconvenient necessity, adapting Long Beach to climate change and reducing our contribution to its causes also presents an unprecedented opportunity to improve quality of life for all Long Beach residents and remedy long-standing inequities.

Through implementing a coordinated response to climate change, we can address public health disparities, foster economic opportunities, and realize a vision of Long Beach where everyone can live in thriving communities built on sustainability and resilience. Here we summarize the vision and actions for the Climate Action and Adaptation Plan (CAAP) that the City of Long Beach has developed through extensive stakeholder and community input.

## VISION

**The vision of the Long Beach CAAP is to create a more sustainable, resilient and equitable city by addressing climate change in a way that remedies existing environmental health disparities while also improving health,quality of life, and enhancing economic vitality throughout Long Beach.**

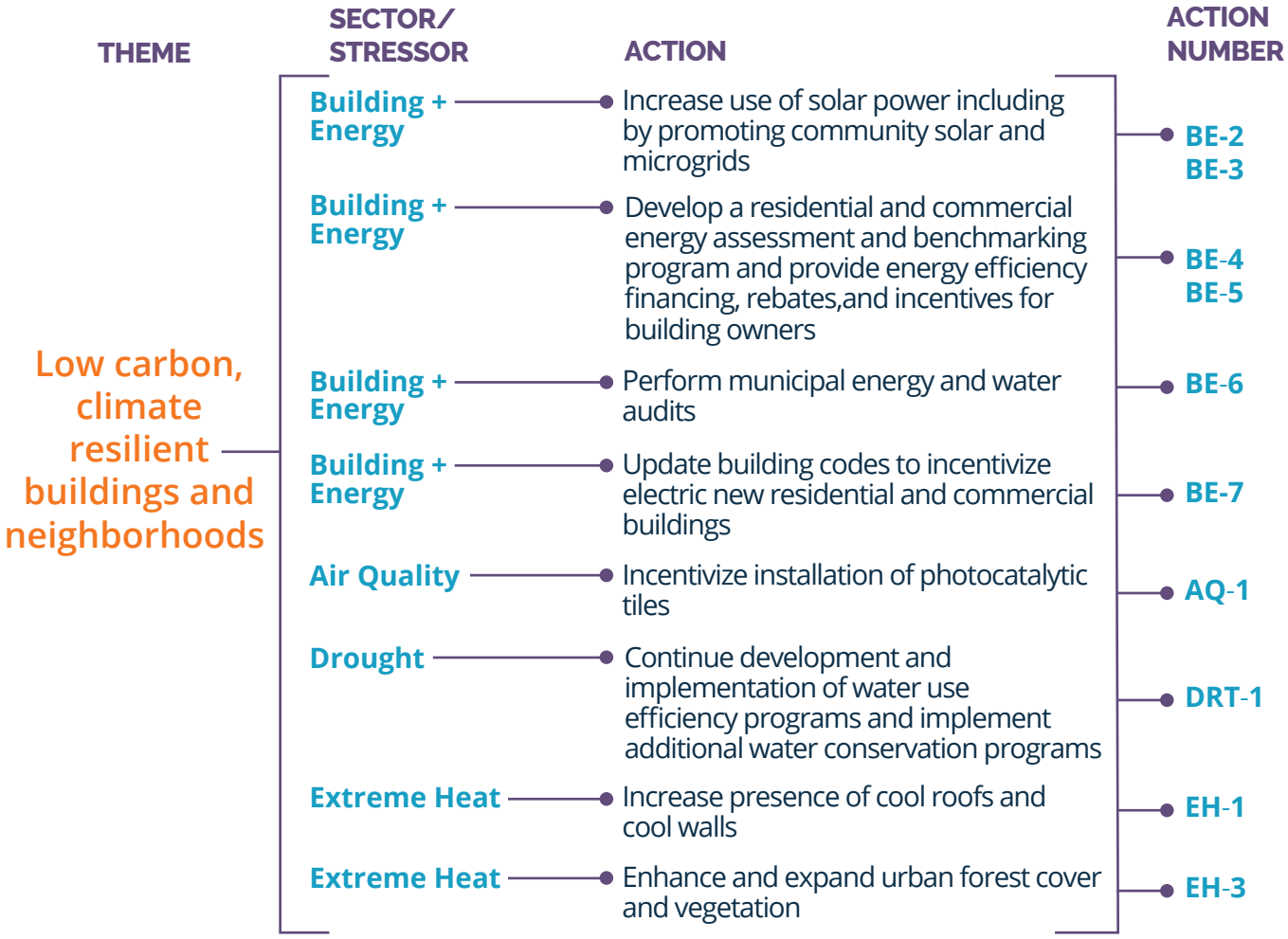
The implementation of the CAAP will help Long Beach realize:

1. **Low carbon, climate resilient buildings and neighborhoods**
2. **Safe and adaptable infrastructure**
3. **Protected and enhanced natural systems**
4. **A healthy, resilient and ready population**
5. **Residents and businesses with minimized carbon footprints**

The City, in conjunction with relevant partners, will implement a range of actions to reduce greenhouse gas (GHG) emissions and adapt to climate change impacts. The actions the City will take are organized overleaf by desired outcomes that represent the underlying values of the CAAP.

# HOW LONG BEACH WILL ACHIEVE THE CAAP OUTCOMES

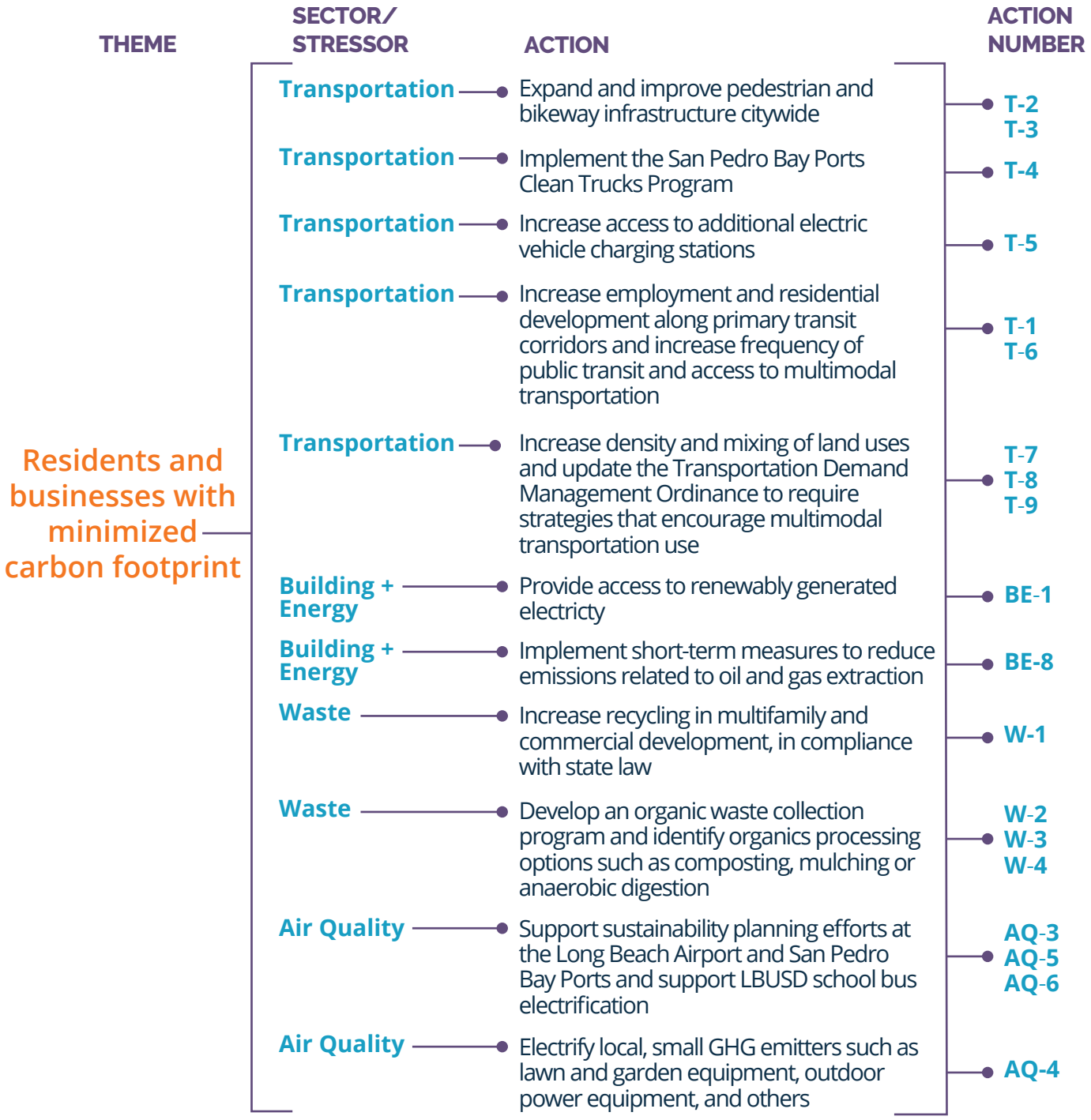
These themes are desired high level outcomes of the plan, and what will be done generally to achieve them. However, it is not an exhaustive list of all the actions, please see p20 through p23 for the full list.



| THEME | SECTOR/ STRESSOR | ACTION | ACTION NUMBER |
|---|---|---|---|
| Safe and adaptable infrastructure | Extreme Heat | Increase presence of reflective streets, surfaces, shade canopies, and bus shelter amenities | EH-2<br>EH-7 |
| | Drought | Expand usage of green infrastructure and green streets | DRT-3 |
| | Sea Level Rise + Flooding | Address sea level rise in citywide plans, policies, and regulations and incorporate adaptation strategies into City lease negotiations | FLD-2<br>FLD-4 |
| | Sea Level Rise + Flooding | Update the City's existing Stormwater Management Plan | FLD-5 |
| | Sea Level Rise + Flooding | Relocate/elevate critical infrastructure, including elevating riverine levees and flood proofing vulnerable sewer pump stations | FLD-9<br>FLD-10<br>FLD-11 |
| | Sea Level Rise + Flooding | Elevate streets/pathways and retreat/ realign beach parking lots | FLD-14<br>FLD-15<br>FLD-17 |
| | Sea Level Rise + Flooding | Retrofit/extend sea walls and storm surge barriers as appropriate | FLD-16<br>FLD-18<br>FLD-20 |

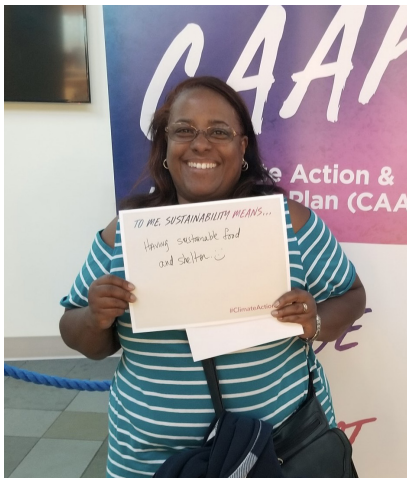
| THEME | SECTOR/ STRESSOR | ACTION | ACTION NUMBER |
|---|---|---|---|
| Protected and enhanced natural systems | Drought | Incorporate increased rainfall capture and other actions to maximize local water supplies and offset imported water | DRT-5 |
| | Sea Level Rise + Flooding | Review and conduct studies on the effects of combined riverine/coastal flooding and increased severity of rainfall events on watershed flooding | FLD-7 |
| | Sea Level Rise + Flooding | Conduct a citywide beach stabilization study, enhance dunes, expand beach nourishment based on study findings | FLD-6<br>FLD-8<br>FLD-12<br>FLD-13 |

| THEME | SECTOR/ STRESSOR | ACTION | ACTION NUMBER |
|---|---|---|---|
| A healthy, resilient and ready population | Extreme Heat | Install additional water fountains and undertake other actions to increase public access to water | EH-4 |
| | Extreme Heat | Identify future vulnerability potential for power outages related to extreme heat and develop plans to prevent outages | EH-5 |
| | Extreme Heat | Enhance and expand accessibility to cooling centers | EH-6 |
| | Extreme Heat | Improve beach and coastal transit access during extreme heat events | EH-6 |
| | Air Quality | Encourage urban agriculture practices that reduce air quality pollution | AQ-2 |
| | Air Quality | Increase monitoring and regulation of the oil extraction and refining process | AQ-7 |
| | Drought | Enhance outreach and education related to water conservation | DRT-2 |
| | Drought | Expand use of recycling water and grey water for non-potable use | DRT-4 |
| | Sea Level Rise + Flooding | Update the floodplain ordinance | FLD-1 |
| | Sea Level Rise + Flooding | Establish a flood impacts monitoring program | FLD-3 |
| | Sea Level Rise + Flooding | Investigate feasibility of managed retreat in the longer term | FLD-19 |


THEME
SECTOR/ STRESSOR
ACTION
ACTION NUMBER
Residents and businesses with minimized carbon footprint
Transportation
Expand and improve pedestrian and bikeway infrastructure citywide
T-2
T-3
Transportation
Implement the San Pedro Bay Ports Clean Trucks Program
T-4
Transportation
Increase access to additional electric vehicle charging stations
T-5
Transportation
Increase employment and residential development along primary transit corridors and increase frequency of public transit and access to multimodal transportation
T-1
T-6
Transportation
Increase density and mixing of land uses and update the Transportation Demand Management Ordinance to require strategies that encourage multimodal transportation use
T-7
T-8
T-9
Building + Energy
Provide access to renewably generated electricty
BE-1
Building + Energy
Implement short-term measures to reduce emissions related to oil and gas extraction
BE-8
Waste
Increase recycling in multifamily and commercial development, in compliance with state law
W-1
Waste
Develop an organic waste collection program and identify organics processing options such as composting, mulching or anaerobic digestion
W-2
W-3
W-4
Air Quality
Support sustainability planning efforts at the Long Beach Airport and San Pedro Bay Ports and support LBUSD school bus electrification
AQ-3
AQ-5
AQ-6
Air Quality
Electrify local, small GHG emitters such as lawn and garden equipment, outdoor power equipment, and others
AQ-4

# HOW WE DEVELOPED THE PLAN – LISTENING TO YOU


Stakeholder engagement was key to the process and had two main components – first, working with a series of stakeholder working groups, and second, extensive public outreach. The City is grateful to all those who provided input. Input from the scientific community input is reflected in the climate science, vulnerability assessment, and other technical appendices. Community input is reflected in the plan's vision and goals, the policies and strategies that have been included and prioritized, and the way in which various actions are anticipated to be implemented.




Early in the engagement process, staff set out to create an inclusive, community-centered planning process to broadly engage the Long Beach community, but with particular attention to those most affected by climate change. The community engagement strategy for the CAAP was based on an equity assessment conducted in partnership with other City departments, including Long Beach Parks, Recreation, and Marine, and the Health and Human Services Department.

# 10,260
**TOTAL estimated participants**

**1,395** sign-ins

**67** events

## #1 OPEN HOUSE

**200** ESTIMATED PARTICIPANTS
**98 sign-ins**

- Validate the project methodology;
- Provide feedback and input on local data;
- Review results and early actions.

## #2 OPEN HOUSE

**200** ESTIMATED PARTICIPANTS
**97 sign-ins**

- Provide input on climate-related; their concerns
- Review existing actions;
- Recommend future opportunities.

## #3 OPEN HOUSE
**Long Beach ClimateFest**

**500** ESTIMATED PARTICIPANTS
**107 sign-ins**

- Input on the public engagement approach;
- Provide input on Climate-related concerns;
- Review proposed actions.

## SCIENTIFIC WORKING GROUP

**13** Independent Experts

**3 meetings**

California State University, Long Beach; Long Beach Community College; the University of California, Los Angeles; the Aquarium of the Pacific, the South Coast Air Quality Management District, and RAND Corporation.

## BUSINESS WORKING GROUP

**24** Businesses

**2 meetings**

Including architecture, engineering, utilities, sustainability consultants, business association leaders and the Chamber of Commerce.

## COMMUNITY WORKING GROUP

**20** Local Community Groups

**2 meetings**

Neighborhood associations, environmental justice organizations, church and religious organizations, clean energy advocates, community assets and open space organizations, and health and wellbeing organizations.

## ENGAGED YOUTH LEADERS

**13** Educational Institutes

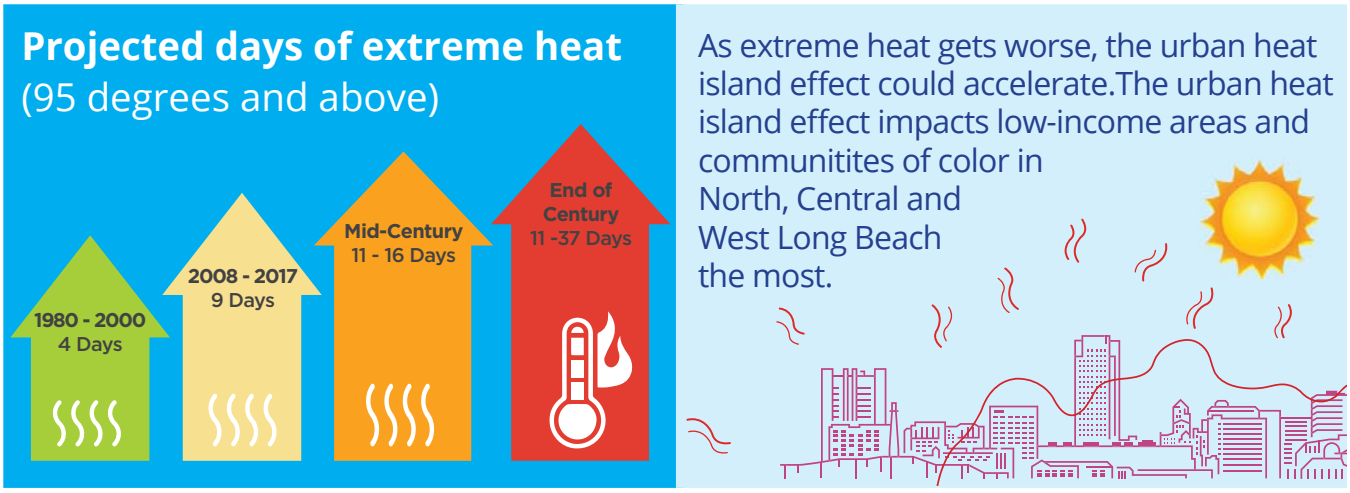
**multiple meetings**

California State University, Long Beach; Long Beach City College; Long Beach Unified School District; St. Anthony's High School; Youth Leadership Long Beach; and Aquarium of the Pacific youth volunteers

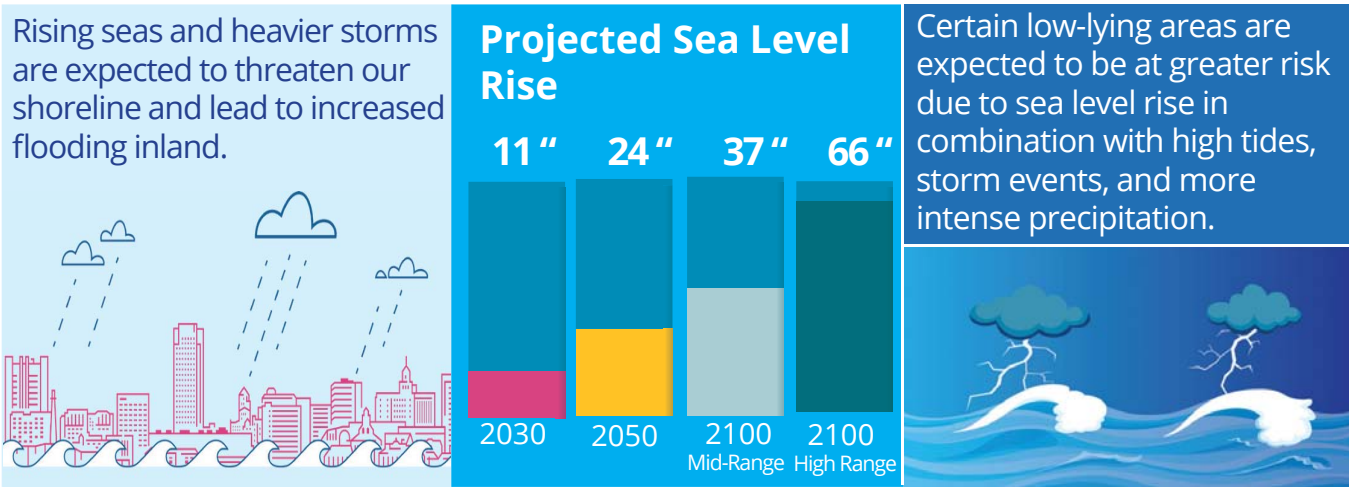
# HOW CLIMATE CHANGE WILL IMPACT LONG BEACH

As part of the CAAP process, the most up-to-date science and local climate projections for the main climate change impacts—extreme heat, sea level rise, and precipitation—and two secondary impacts relating to air quality and drought were reviewed. The City used this information to carry out a Climate Vulnerability Assessment, which explored how these climate stressors will impact different types of city assets (see the graphic below). As climate models and projections are improved and updated with new data and observations, they will be used to inform future updates of the CAAP.

## Extreme Heat




## Sea Level Rise and Increased Precipitation

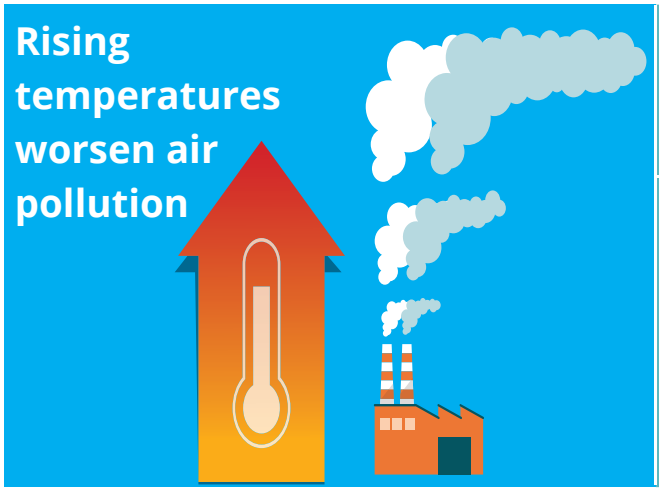


Although climate change is impacting the entire city, some communities within Long Beach already experience disproportionate environmental health burdens and have the highest social vulnerability to climate change. As Long Beach prepares for an uncertain climate future, the City will support these communities to make sure they can thrive.

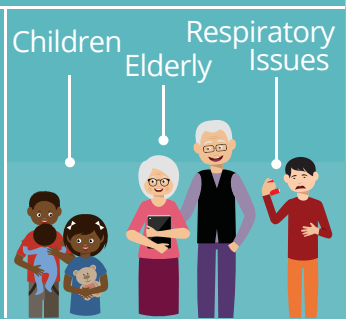
## Drought

Temperature and precipitation changes are expected to worsen droughts and reduce snowpack and access to imported water, all while increasing demand for water.

## Air Quality




Air quality varies greatly in Long Beach. Impacts will be felt most by people sensitive to poor air quality and communities adjacent to emissions sources.

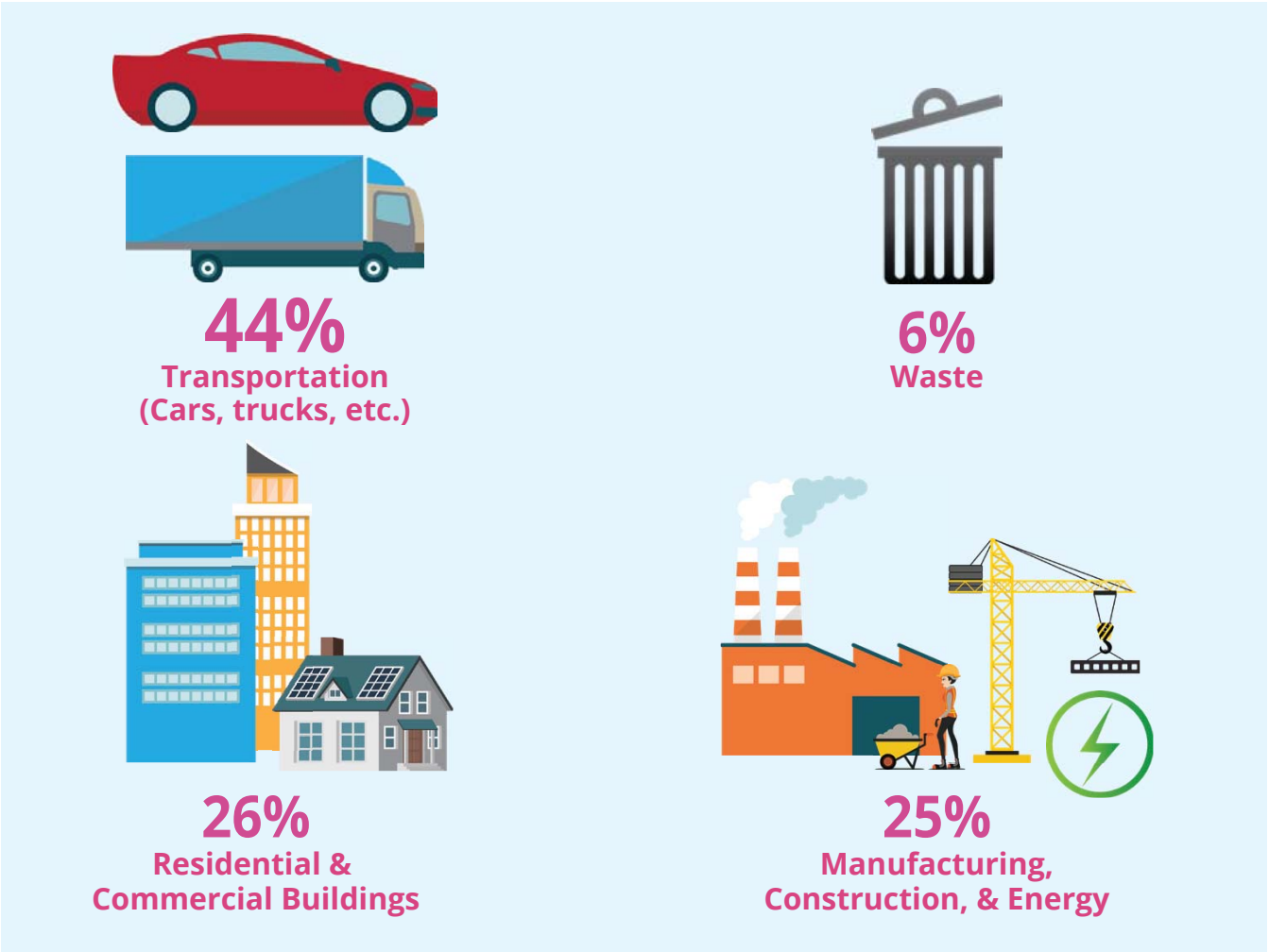


# HOW LONG BEACH IMPACTS CLIMATE CHANGE

The reduction of GHG emissions is one of the primary objectives of the CAAP, and the goal is net zero emissions by 2045. An interim target for 2030 has been identified to help the City achieve this goal. Developing meaningful reduction strategies and evaluating their ability to meet a GHG target first requires an understanding of the community's baseline and projected future emissions levels.

The City developed a production inventory that analyzes emissions from local activities such as vehicle travel, building energy use, and waste disposal. Emissions occurring from vessel operations at the Port of Long Beach are, in part, regulated at the state level by the California Air Resources Board (CARB), and the City of Long Beach does not have the direct authority to dictate emissions reduction policies for private shipping companies that operate from the port. For this reason, port waterborne activity is not considered for GHG target-setting purposes.

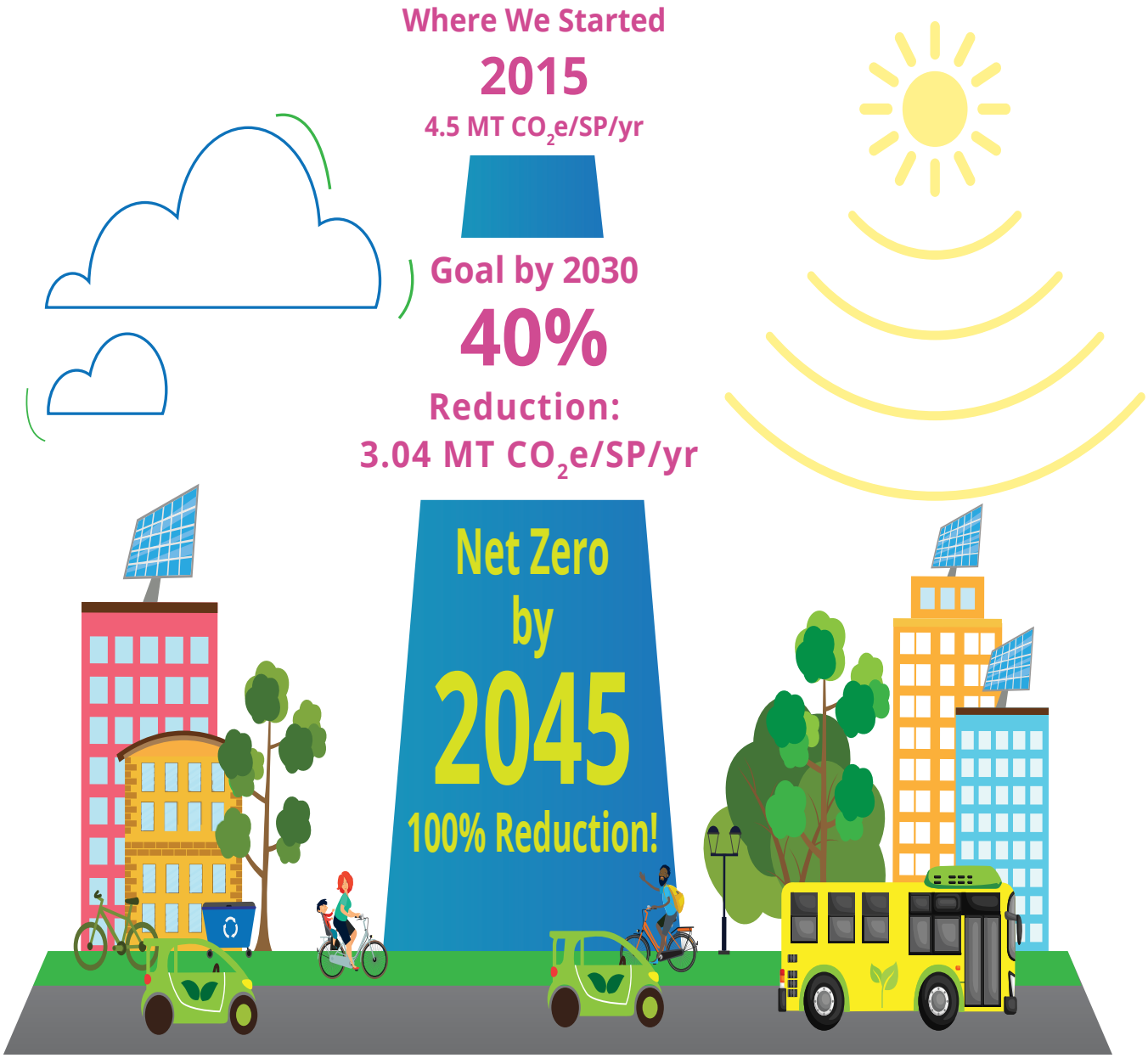
## Where do Our Emissions Come From?




Notes: Residential & commercial buildings and manufacturing, construction and energy are consolidated as "stationary energy" in the Production Inventory. The Total Production Inventory also includes port waterborne activity emissions. (chapter 5)

The City developed a high-level consumption-based inventory to understand emissions resulting from the consumption of goods and services by city residents (for information purposes only). The City also analyzed the life cycle emissions associated with oil and gas extraction activities in Long Beach to present a holistic view of the City's total contribution to global emissions and to help identify possible reductions in the long term. The City can most directly influence emissions related to the production-based inventory, and CAAP actions will aim at reducing emissions from this inventory.

## Our Carbon Challenge




MT $CO_2e$/SP/yr = Metric tons of carbon dioxide equivalent per service population (population + employment)

# HOW WE ARE GOING TO REDUCE OUR VULNERABILITY TO CLIMATE IMPACTS

## EH Extreme Heat

**Goal: Long Beach buildings, neighborhoods, and infrastructure are climate resilient, reduce the urban heat island effect, and are set up to ensure and improve public health and safety in the face of extreme heat events**

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| New and existing buildings, streets, and public spaces reduce extreme heat through incorporation of cool surfaces and green infrastructure | EH-1 | Increase presence of cool roofs and cool walls |
| | EH-2 | Increase the presence of reflective streets, cool surfaces, and shade canopies |
| | EH-3 | Enhance and expand urban forest cover and vegetation |
| All residents have access to services and programs to withstand extreme heat events | EH-4 | Install additional water fountains and other actions to increase public access to water |
| | EH-5 | Identify future vulnerability potential for power outages related to extreme heat and develop plans to prevent such outages |
| | EH-6 | Enhance and expand the accessibility of cooling centers |
| Public transit is a comfortable and viable mobility option during extreme heat events, especially for transit-dependent populations | EH-7 | Provide bus shelter amenities |
| | EH-8 | Improve beach and coastal transit access during extreme heat events |

## AQ Air Quality

**Goal: All Long Beach communities have clean air and improved public health**

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| Buildings and facilities actively reduce air pollution as a component of a broader energy reduction strategy. | AQ-1 | Incentivize installation of photocatalytic tiles |
| | AQ-2 | Encourage urban agriculture practices that reduce air quality pollution |
| Emissions are reduced by shifting to cleaner equipment and vehicles. | AQ-3 | Support the development of the Long Beach Airport Sustainability Plan |
| | AQ-4 | Electrify small local emitters, such as lawn and garden equipment, outdoor power equipment, and others |
| | AQ-5 | Work with Long Beach Unified School District (LBUSD) to support school bus electrification |
| | AQ-6 | Implement the Port of Long Beach Clean Air Action Plan |
| Air quality impacts from local oil and gas operations are minimized. | AQ-7 | Increase monitoring and regulation of oil extraction and refining process |

# DRT Drought

**Goal: Long Beach has a more sustainable and diverse water supply that reduces dependence on imported water and improves long-term water security**

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| Maximize water efficiency and conservation. | DRT-1 | Continue development and implementation of water use efficiency programs and implement additional water conservation programs |
| | DRT-2 | Enhance outreach and education related to water conservation |
| Maximize water that is captured and reused locally. | DRT-3 | Expand usage of green infrastructure and green streets |
| | DRT-4 | Expand usage of recycled water and greywater for non-potable use |
| | DRT-5 | Incorporate increased rainfall capture and other actions to maximize local water supplies and offset imported water |

# FLD Sea Level Rise + Flooding

**Goal: Long Beach understands and is prepared for its future flood risk**

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| Short-Term Actions (to 2030) | | |
| City plans and policies are forward-looking and ensure projects and investments account for projected sea level and flooding impacts | FLD-1 | Update and augment floodplain regulations as necessary |
| | FLD-2 | Incorporate sea level rise language into citywide plans, policies, and regulations |
| | FLD-3 | Establish a flood impacts monitoring program |
| | FLD-4 | Incorporate adaptation into City lease negotiations |
| | FLD-5 | Update the City's existing Stormwater Management Plan |
| Clear and sufficient information is on hand to identify and prioritize near-term adaptation needs and best practices | FLD-6 | Conduct citywide beach stabilization study |
| | FLD-7 | Review and conduct studies of combined riverine/coastal flooding and increased severity of rainfall events on watershed flooding |
| Adaptation strategies are implemented to protect vulnerable shoreline areas and wastewater infrastructure | FLD-8 | Enhance dunes |
| | FLD-9 | Inventory and flood-proof vulnerable sewer pump stations |

For Medium and Long Term Actions - see main plan document.

# HOW WE ARE GOING TO ACHIEVE OUR GREENHOUSE GAS REDUCTION TARGETS

## BE Building + Energy

**Goal: Long Beach buildings are energy-efficient and our communities run on affordable, renewable electricity**

GHG Reductions 247,700 MT $CO_2e$

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| Transition to a carbon-free, more resilient electricity system | BE-1 | Provide access to renewably generated electricity |
| | BE-2 | Increase use of solar power |
| | BE-3 | Promote community solar and microgrids |
| Increase the energy efficiencyof existing buildings/facilities | BE-4 | Develop a residential and commercial energy assessment and benchmarking program |
| | BE-5 | Provide access to energy efficiency financing, rebates, and incentives for building owners |
| | BE-6 | Perform municipal energy and water audits |
| Ensure new buildings are low-carbon or carbon-neutral | BE-7 | Update building codes to incentivize electric new residential and commercial buildings |
| Reduce emissions from local oil and gas extraction | BE-8 | Implement short-term measures to reduce emissions related to oil and gas extraction |

## T Transportation

**Goal: Affordable, safe, carbon-free transportation choices connect all Long Beach communities to opportunity, clean air, and improved health**

GHG Reductions 30,480 MT $CO_2e$

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| Decrease reliance on personal motor vehicles and increase transit, biking, andwalking trips | T-1 | Increase the frequency, speed, connectivity, and safety of transit options |
| | T-2 | Expand and improve pedestrian infrastructure citywide |
| | T-3 | Increase bikeway infrastructure citywide |
| Shift to low- and zero-emissions vehicles to move people and freight | T-4 | Implement the Port of Long Beach Clean Trucks Program |
| | T-5 | Develop an Electric Vehicle Infrastructure Master Plan |
| Prioritize the development of transit-oriented neighborhoodswith a mix of jobs, services, and housing | T-6 | Increase employment and residential development along primary transit corridors |
| | T-7 | Update the Transportation Demand Management Ordinance |
| | T-8 | Increase the density and mixing of land uses |
| | T-9 | Integrate SB 743 planning with the CAAP process |

# W Waste

## Goal: Long Beach is a zero-waste city

GHG Reductions 85,070 MT $CO_2e$

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| Materials that can be recycled are recycled | W-1 | Ensure compliance with state law requirements for multifamily and commercial property recycling programs |
| | W-2 | Develop an organic waste collection program for City-serviced accounts |
| Collect all organic waste for composting or clean energy generation | W-3 | Partner with private waste haulers to expand organic waste collection community-wide |
| | W-4 | Identify organic waste management options |

# WHAT CAN YOU DO?

- Upgrade to energy-efficient lighting and appliances and improve building insulation. Seek programs and rebates for conducting energy assessments, installing solar panels, etc.
- Take public transit, bicycle, and walk instead of driving when possible.
- Conserve water by installing water-saving fixtures and adopting behavioral changes, such as reducing shower length, reducing flush frequency, and reusing greywater (e.g., sink to garden).
- Reduce the use of single-use disposables and compost food scraps at home to reduce the waste sent to landfills.
- Replace lawns with native and drought-tolerant gardens and landscaping.
- Use blackout curtains to keep your home cool and be aware of local air-conditioned locations such as cooling centers.
- Prepare your home for flooding by storing sandbags and elevating equipment off the ground or floor. Sign up for Alert Long Beach for flood alert notifications.
- Shop locally at farmers markets, local businesses, and thrift stores to reduce transportation emissions and support the local economy.
- Learn a nutritious, plant-based recipe. Commit to more meatless meals to help reduce the contribution of meat and dairy production to climate change.
- Create an emergency plan with your household. Get to know your neighbors so that all can be better connected in case of an emergency.
- Keep a journal recording your observations of plants and animals near your home. Cultivate a practice of observing the effects of climate change impacts and witness how nature is responding.[1]
- Join an environmental organization that participates in advocacy, community service such as local tree plantings and cleanups, environmental education, and other activities.

[1]Hineline, Mark L. Ground Truth: A Guide to Tracking Climate Change at Home. University of Chicago Press, 2018.

CITY OF LONG BEACH

1

# What is the Climate Action and Adaptation Plan?

# INTRODUCTION



The City of Long Beach's Climate Action and Adaptation Plan (CAAP) is a comprehensive planning document outlining the City's proposed approach both to address climate impacts on the city and to reduce the city's impact on the climate by reducing greenhouse gas (GHG) emissions. Climate change is already affecting Long Beach residents, businesses, and neighborhoods through extreme weather events like heat waves and flooding, and climate change impacts, such as poor air quality, are projected to worsen in the coming years. Adapting Long Beach to climate change and reducing the City's contribution to its causes are necessary. Planning for climate change is also an opportunity to address structural and systemic inequities that have led to disproportionate environmental burdens on low-income communities and communities of color in the city. Through a coordinated response to climate change that includes addressing public and environmental health disparities, investing in youth, and fostering jobs and economic opportunity, Long Beach can move to a more equitable, low-carbon, climate-resilient future where everyone can live in thriving communities that are built on sustainability and resilience.

This CAAP will guide the City in preparing for and protecting the city and its residents from future climate impacts. At the same time, the CAAP will ensure that the City, all its residents and businesses, and the greater Long Beach community contribute towards both the State of California's climate goals and global efforts to address the climate crisis that the world is facing. The role of cities has never been more important, as cities account for more than 70 percent of GHG emissions globally. The CAAP is an important next step in furthering the City's leadership in sustainability. Through this plan, the City is demonstrating its continued commitment to and leadership in climate action.

By addressing both mitigation and adaptation together, the City has been able to consider how actions can synergistically produce multiple co-benefits. For example, by addressing existing environmental health disparities, the City can improve the quality of life and health of all its residents. The CAAP includes the City's first community-wide GHG inventory and climate vulnerability assessment, which provided the fundamental local data and information from which the CAAP's actions were developed.

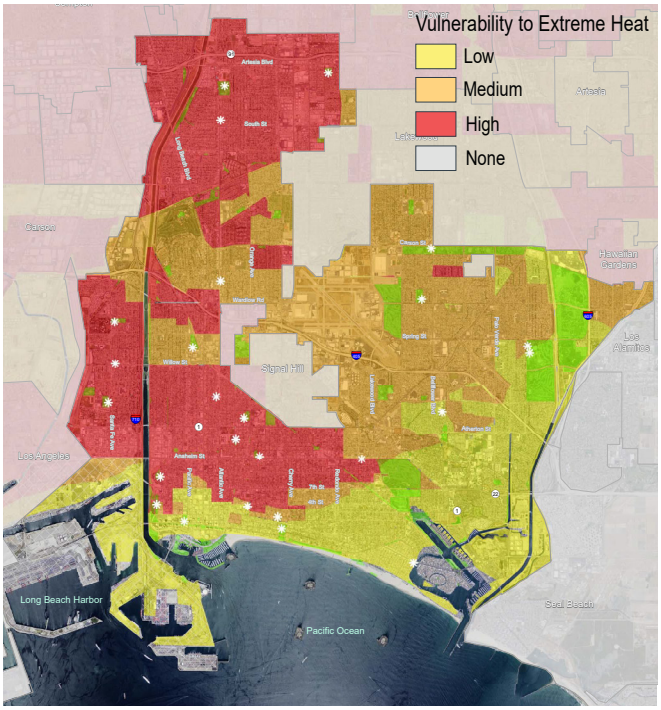
The CAAP includes a roadmap for implementing new polices, programs, incentives, requirements, projects, and initiatives in the immediate future, as well as longer-term actions that will need to be studied further while monitoring how the climate continues to change and evaluating the effectiveness of actions taken.

## WHAT IS CLIMATE ACTION?
## WHAT IS CLIMATE ADAPTATION?
## WHAT IS SUSTAINABLE PLANNING?

Climate action (sometimes referred to as mitigation) refers to actions taken to address the causes of climate change and reduce the impacts we (people) have on the climate system by reducing our future GHG emissions. Climate change is already taking place, and climate adaptation refers to adjusting our behaviors, systems, and infrastructure to reduce the impact that the effects of climate change, such as heat waves, worsening air quality, and flooding, will have on infrastructure, services, and the well-being of the community. In addition to addressing these challenges, the CAAP will enable the City to continue to be at the forefront of sustainable planning. Sustainable planning is about meeting the needs of the present without compromising the future.

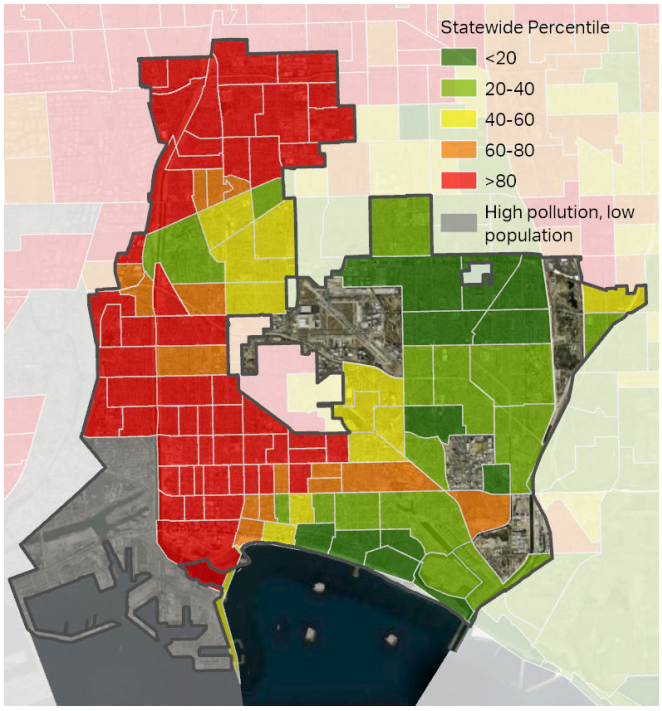
# Sustainable Planning in an Environmental Justice Context:

Although climate change will impact all of Long Beach, some of the city's communities already experience disproportionate environmental health burdens today. Long Beach is very diverse, which can be a source of strength, vibrancy, and resilience. However, it also has racial and economic disparities that are manifested spatially across the city. Tools such as CalEnviroScreen help identify the California communities that are most affected by many sources of pollution and the areas where people are often especially vulnerable to pollution's effects. For Long Beach, CalEnviroScreen shows how Central, West and North Long Beach experience some of the highest pollution impacts in California. It reveals that many areas are worse off than 95 percent of the state. Only 2.2 miles away, communities in eastern Long Beach face a less cumulative burden than 85 percent to 90 percent of the state. Extreme heat stemming from climate change is expected to affect the greatest number of people in Long Beach, and its impacts are more concentrated in Central, West, and North Long Beach.

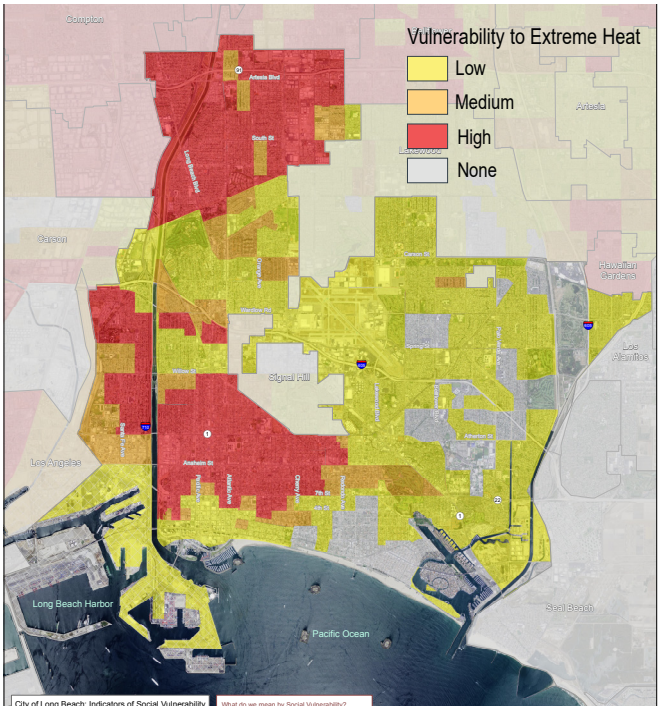



Sensitivity to extreme heat related to the Urban Heat Island Effect from Climate-Smart Cities Los Angeles Project

**Figure 1: Maps showing social vulnerability**




Output from CalEnviroScreen 3.0




Social Vulnerability from Climate-Smart Cities Los Angeles Project

It is no coincidence that the populations living in these areas tend to be low-income communities of color. Low-income communities and communities of color in Long Beach are more likely to live in areas with poor air quality, in regions with little green space, and along the Los Angeles River channel where the risk of urban flooding is expected to increase. These geographic patterns exist due to socioeconomic inequality caused by long-standing discriminatory practices in education, housing, employment, local political representation, and access to resources. Low-income communities of color were historically excluded from neighborhoods with less environmental pollution and greater public investment, and these practices partly explain why low-income communities of color today are still concentrated in the portions of the city with the poorest air quality and environmental health indicators. Looking further back, it is important to acknowledge that the land that became the city of Long Beach, like other cities throughout the region, state, and the country, was originally occupied by Indigenous Peoples, in particular, the Tongva/Gabrieleño and Acjachemen/Juaneño Nations. We should recognize them as the first stewards and traditional caretakers of this area we now call Long Beach.

Inclusive planning is based on meaningful community engagement and strategies to address social inequities. While the CAAP development process reached out to people throughout the city, it placed a significant focus on reaching those communities most impacted by climate change, including young people and communities of color. The CAAP's strategies for inclusive planning included:

- Partnering with youth groups, schools, and community-based organizations to engage and solicit input from the communities most impacted by climate change
- Providing healthy and sustainable food at events and giveaways that raise environmental awareness and promote sustainability, including the use of reusable straws and bags, air filters and emergency kits
- Providing health and dental screenings and access to the wide-ranging resources and services of government and educational institutions at CAAP events
- Acknowledging native lands at CAAP events
- Facilitating co-learning processes to identify issues, priorities, and solutions, such as best practices from people's lived experiences
- Conducting CAAP outreach in the places where people already gather, including health fairs and community and cultural events
- Drawing from and identifying culturally relevant examples of best practices locally and globally from Latin America and Asia
- Using iterative and two-way, culturally competent and multilingual engagement
- Using art and other creative strategies for engaging a broader audience for both in-person and online engagement opportunities

For more details, see the Community Engagement section of this chapter and the Community Engagement appendix.

This plan is based on the knowledge and insight gained from the community and these inclusive planning strategies, and every action in the CAAP includes an Equity Strategy or strategies for guiding equitable implementation of CAAP actions. To ensure successful implementation of the CAAP, continued engagement, co-learning, and assessment of equity strategies are ongoing objectives.

# WHY DO WE NEED THE CAAP?



According to research compiled by the UCLA Fielding School of Public Health, climate change is not only already impacting our health in Los Angeles County, but will continue to impact our social, cultural, and natural resources as extreme climate events—heat waves, floods, storms, and droughts—become more frequent and powerful. That meta-analysis showed that 97 percent of climate experts agree that humans are causing climate change.i Therefore, the CAAP is needed to help prepare and protect Long Beach from climate change while reducing future GHG emissions.

The CAAP will also help the City comply with various local, regional, state, and federal regulations to significantly reduce emissions. The City is obligated under the California Environmental Quality Act, Assembly Bill 32 (The California Global Warming Solutions Act of 2006), Senate Bill (SB) 375 (The Sustainable Communities and Climate Protection Act of 2008), and various California Executive Orders to do its part to reduce GHG emissions. Generally, statewide targets aim to reduce emissions to 1990 levels by 2020, to 40 percent below 1990 levels by 2030, and to 80 percent below 1990 levels by 2050. California SB 379 requires cities and counties to include climate adaptation and resiliency strategies in their General Plans to ensure the safety and protection of their communities in the future.

Finally, the CAAP will help the City meet its various voluntary climate commitments. In November 2015, Long Beach Mayor Robert Garcia signed an official commitment to the Compact of Mayors (now called the Global Covenant of Mayors for Climate and Energy), a global coalition to collectively reduce GHG emissions and enhance resilience to climate change. In order to comply with the Global Covenant's requirements, the City of Long Beach must establish a plan for climate action and a plan for adaptation. In addition, in 2017 Mayor Garcia joined 406 mayors across the United States in pledging to continue the goals of the Paris Climate Agreement to make sustainable changes to limit global temperature rise to well below 2 degrees Celsius (2°C), and in 2019 Mayor Garcia encouraged the City to achieve a 2045 carbon neutrality goal.

The CAAP is an important next step in furthering the City's leadership in sustainability. Environmental sustainability entails understanding the limitations of our finite resources (e.g., water, fossil fuel, natural gas), and adopting practices that limit or eliminate waste and pollution. Long Beach has already adopted significant green and sustainable approaches to improve the health of residents, businesses, neighborhoods, and the natural environment.

The CAAP will provide a roadmap for Long Beach to continue towards its goal of a more environmentally healthy, economically prosperous, and equitable city. The plan will include a prioritized list of policy, infrastructure, and programmatic needs that will be pursued to reduce the city's carbon footprint and prepare for the impacts of climate change.

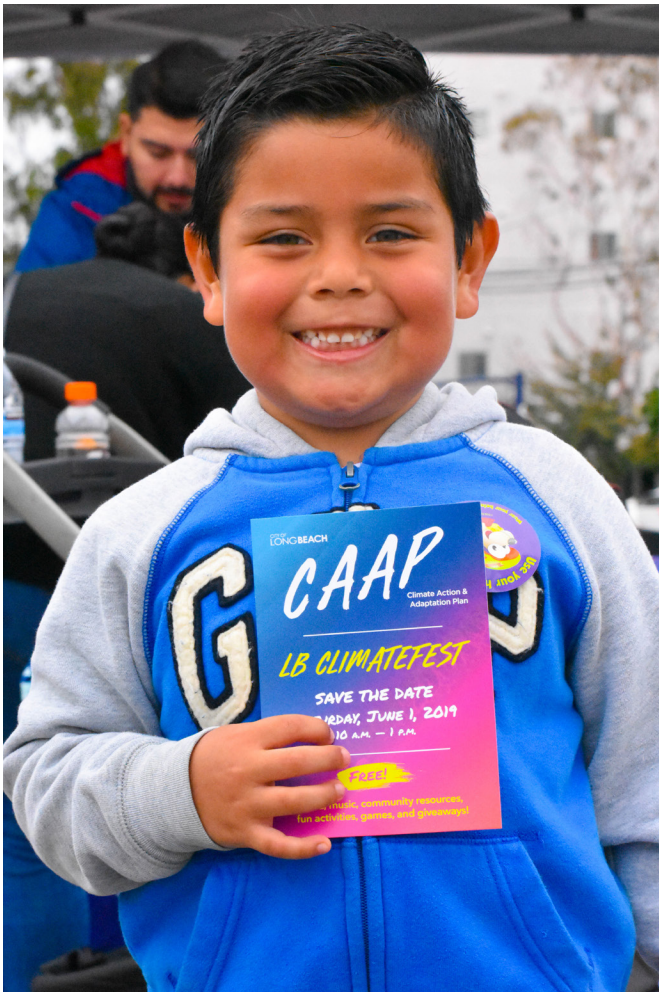
# WHAT IS OUR COMMUNITY VISION AND MISSION FOR THE CAAP?

The vision of the Long Beach CAAP is to create a more sustainable, resilient, and equitable city by addressing climate change in a way that also addresses existing environmental health disparities while improving health and quality of life and enhancing economic vitality throughout Long Beach.

The CAAP process has been driven by a mission to:

- **Create** an inclusive, community-centered planning process to broadly engage the Long Beach community, paying particular attention to those most affected by climate change, including low-income communities and people of color, youth, and older adults.
- **Communicate** climate change impacts in Long Beach by meeting residents and community members where they already gather, such as community events, cultural festivals, senior centers, schools, and trusted community organizations.
- **Build capacity** to co-define solutions and priorities to inform the CAAP.
- **Collaborate** with internal (City departments) and external stakeholders (community members, business community, neighborhood associations, the scientific community).
- **Commit** to ensuring that the Long Beach community and its physical assets are better protected from the impacts of climate change.

Long Beach has already taken a significant green and sustainable approach to improving the health of residents, businesses, neighborhoods and the natural environment. For example, Long Beach was one of the first cities to create a Port Clean Air Action Plan (the 2006 San Pedro Bay Ports Clean Air Action Plan), a Sustainable City Commission (2007), an Office of Sustainability (2008), a Sustainable City Action Plan (2010), and a commitment to the Compact of Mayors (2015). As a result, the City has been in the process of incorporating sustainability in all major policies to build resilience and ensure Long Beach thrives for the next 100 years and beyond. The City has also focused on creating sustainable land use and transportation systems. The City's Mobility Element, adopted in 2013, focuses on providing active transportation options throughout Long Beach neighborhoods. The City has made significant investments in bicycle, pedestrian, and transit-supporting infrastructure in recent years. The City's General Plan Land Use Element update, adopted in 2019, supports this progress by promoting land use patterns that concentrate density around transit and promote active transportation through a mix of uses and careful urban design.



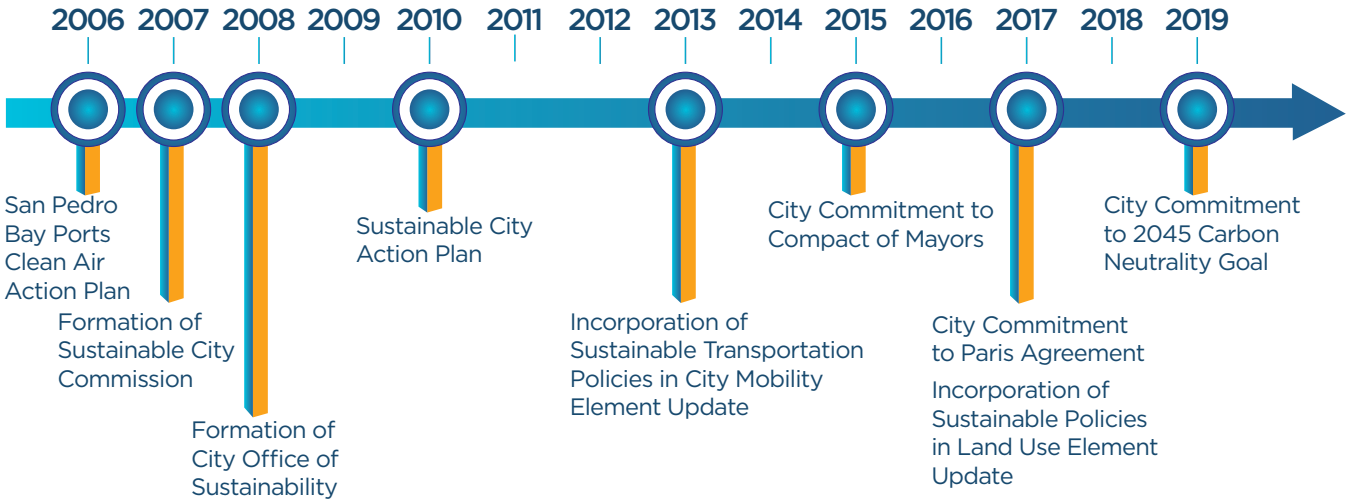
# PLAN GOALS

Based on community input throughout the CAAP development process, the following goals were established:

- Be inclusive and incorporate the views of the entire community while prioritizing populations that are vulnerable to and disproportionately impacted by climate change.
- Create a healthier community by addressing climate change.
- Consider social, environmental, and economic co-benefits holistically.
- Empower young people to be leaders in creating a more sustainable community.
- Invoke a personal sense of responsibility in residents and businesses.
- Create an actionable plan (with the right balance between innovation and practicality).
- Distinguish Long Beach as a leader in climate mitigation and adaptation planning.



**Figure 2 The CAAP builds upon a history of local sustainability accomplishments**




* The San Pedro Bay Ports Clean Air Action Plan was subsequently updated in 2010 and 2017.

# HOW DOES THE CAAP ALIGN WITH STATE POLICIES?

One of the drivers behind the Plan is to align with the various existing State policies guiding cities on how they can contribute to the overall State goals around climate change. The key policies are highlighted below.

## RENEWABLE ENERGY

### Senate Bill 1078 - California Renewables Portfolio Standard Program (2002)

Established the California Renewables Portfolio Stndard Program, which required electric utilities to meet 20 percent of their renewable power by December 31, 2017.

### Senate Bill 350 - Clean Energy and Pollution ReductionAct (2015)

The latest in a series of updates to California's Renewables Portfolio standard Program, which requires retail sellers and publicly owned energy utilities to procure 50 percent of their electricity-from eligible renewable energy resources by 2030

## CLIMATE CHANGE ADAPTATION

### Assembly Bill 691 - State lands: granted trust lands: sea level rise (2013)

Requires local holders of public trust lands, including all coastal areas and tidelands, to assess the impacts of sealevel rise and describe how the local trustee intends to protect those lands in a report to the Califronia State Lands Commission.

### Senate Bill 379 - Land Use: General Plan: Safety Element (2013)

Requires local governments to include climate adaptation and resiliency strategies, including a vulnerability assessment and implementation measures, in the Safety Element of their General Plans.

## CLIMATE ADAPTATION ACTION PLAN

## EMISSIONS REDUCTION TARGETS

### Senate Bill 32 - California Global Warming Solutions Act (2016)

Updates AB 32, requiring California to reduce greenhouse gas emissions to 40 percent below 1990 levels by 2030.

### Executive Order-B-30-15 (2015)

Updated existing statewide green house gas emissions reduction goals to 40 percent below 1990 levels by 2040, and 80 percent below 1990 levels by 2050.

### Assembly Bill 32 - California Global Warming Solutions Act (2006)

California's landmark climate change mitigation legislation set initial statewide greenhouse gas emissions targets and directs the California Air Resources Board to periodically update a Scoping Plan to outline the State's plan for achieving emissions reductions. The 2017 Scoping Plan Update recomments local government goals of 6 metric tons $C0_2e$ per capita by 2030 and 2 metric tons $CO_2e$ per capita by 2050.

## TRANSPORTATION & LAND USE

### Senate Bill 743 - California Environmental Quality Act (CEQA) Transportation Impacts (2013)

This legislation mandated a change (implemented in 2019) in the focus of tranportation impact analysisin CEQA from measuring impacts to drivers to measuringthe impact of driving, in order to promote the reductionof greenhouse gas emissions and the development of multimodal transportation networks.

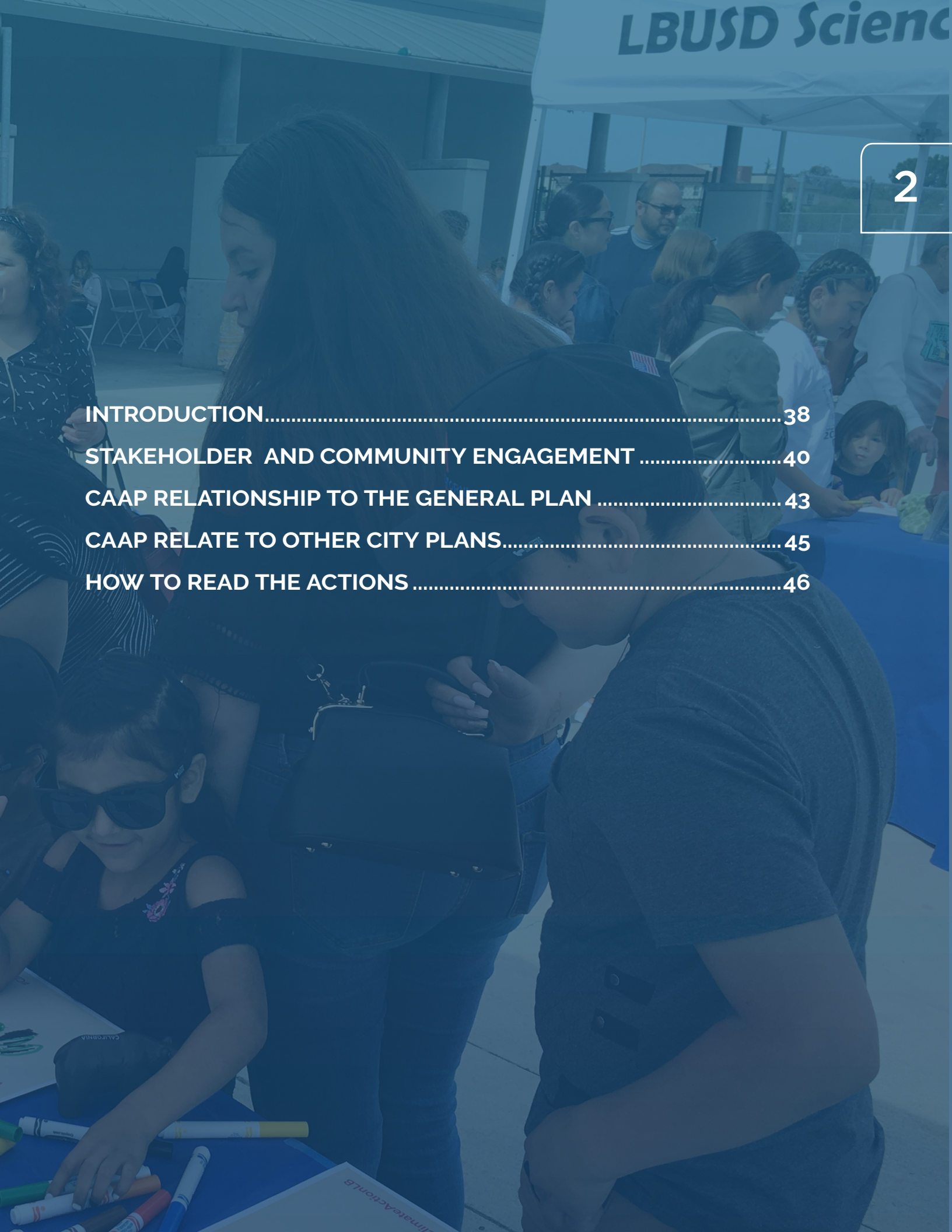
### Senate Bill 375 - Sustainable Communities and Climate Protection Act (2008)

Directs the California Air Resources Board to set regional targets for the reduction of greenhouse gas emissions anddirects each metropolitan planning organization in the state to develop an integrated land use and transportationstrategy with the goal of reducing greenhousegas emissions.

CITY OF LONG BEACH

2

# How was the CAAP Developed?




2

# INTRODUCTION

The CAAP was developed by the City in partnership with the community over more than 3 years, following the steps shown in the illustrations below for the climate adaptation planning and climate mitigation planning processes. Community and stakeholder engagement, which was an integral part of the CAAP development process, is also described in this chapter.

## Climate Adaptation Process

**1+2+3 Review Science, Inventory Assets and Operations, and Assess Vulnerability:** Critical city assets were assessed for vulnerability to sea level rise (SLR), precipitation, wildfire, and extreme heat. See Chapter 3 for further details.

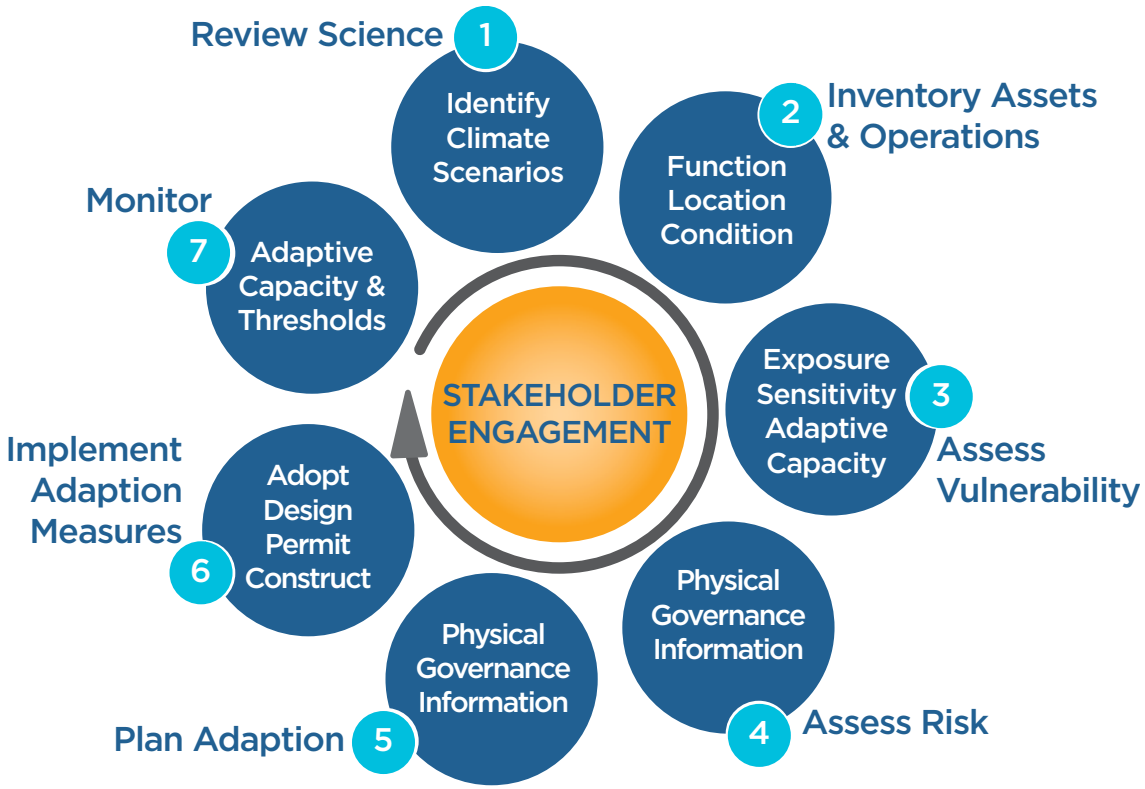
**4. Assess Risk:** Once vulnerabilities had been identified, their health, safety, and economic consequences were assessed in line with State requirements. See Chapter 3 for further details.

**5. Plan Adaptation:** With input from stakeholders, the community, and City departments, a long list of actions was developed to adapt critical assets and neighborhoods to climate impacts. These were then prioritized using community and City input, in line with a set of performance criteria/guiding principles developed for the actions. See Chapter 4 for the full set of adaptation actions selected for the CAAP.

**6. Implementation:** For short-term actions, initial implementation steps have been identified. These actions are part of each action write-up in Chapter 4.

**7. Monitor:** Given the evolving nature of climate science and observed climate changes, the City will monitor updates on a regular basis as well as the performance of early implementation measures. See Chapter 8 for more details.

**Figure 3: The Climate Adaptation Process**



## Climate Mitigation Process

**1+2+3 Greenhouse Gas Inventory, Forecast of Projected Emissions, and Reduction Target:** The City carried out its first GHG inventory for this Plan to understand which sectors will need to be focused on. See Chapter 5 for further details.

**4. Analysis of Existing Actions:** The City reviewed all current existing actions and initiatives that are contributing to mitigation and adaptation to understand the baseline to build from.

**5. Action Development:** With input from stakeholders, the community, and City departments, a long list of actions was developed that could provide GHG reductions. These were then prioritized using community and City input, in line with a set of performance criteria/guiding principles developed for the actions. See Chapter 6 for the full set of mitigation actions selected for the plan, and Chapter 7 for City leadership and financing strategies.

**6. Strategy Implementation:** For short term actions, initial implementation steps have been identified. These can be found as part of each action write up in Chapter 6.

**7. Monitoring and Measuring:** Performance towards the City's GHG reduction target will be monitored in part by regular GHG inventories. See Chapter 8 for further details.

**Figure 4: The Climate Mitigation Process**


GHG = Greenhouse Gas

# STAKEHOLDER AND COMMUNITY ENGAGEMENT

Stakeholder engagement was key to the process and had two main components – first, working with a series of stakeholder working groups, and second, extensive public outreach. The City is grateful to all those who provided input. Input from the scientific community input is reflected in the climate science, vulnerability assessment, and other technical appendices. Community input is reflected in the plan's vision and goals, the policies and strategies that have been included and prioritized, and the way in which various actions are anticipated to be implemented.

## Stakeholder Working Groups – Incorporating Local Expertise

Three stakeholder working groups were convened throughout the process:

- **A Scientific Working Group** was convened three times to validate the project methodology, to provide feedback and input on local data, and to review results and early actions. The Scientific Working Group included 13 independent experts from California State University, Long Beach; Long Beach Community College; the University of California, Los Angeles; the Aquarium of the Pacific, the South Coast Air Quality Management District, and RAND Corporation.
- **A Business Working Group** was convened twice to provide input on their climate-related concerns, existing actions, and future opportunities. The group included approximately 30 attendees from 24 businesses, including architecture, engineering, utilities, sustainability consultants, and various other local businesses. Among the firms represented were firms large and small, global and local. The group also consulted with business association leaders and the Chamber of Commerce.
- **A Community Working Group** was convened twice to provide input on the public engagement approach, climate-related concerns, and actions. The group included about 20 representatives from local community groups.

## Public Outreach – Listening to You

In addition to the stakeholder working groups, the proposed CAAP has also been informed by an extensive public engagement process, which reached out to almost 10,000 residents at more than 60 events, including community meetings, open houses, resource fairs, and expert panel discussions hosted throughout the city.

Early in the engagement process, staff set out to create an inclusive, community-centered planning process to broadly engage the Long Beach community, but with particular attention to those most affected by climate change. The community engagement strategy for the CAAP was based on an equity assessment conducted in partnership with other City departments, including Long Beach Parks, Recreation, and Marine, and the Health and Human Services Department.

Throughout the outreach process, staff has held various CAAP presentations and activities in collaboration with the City Council offices and other community partners. By "meeting people where they are," (e.g., at community events, cultural festivals, neighborhood association meetings, faith-based organizations) the City made a concerted effort to engage Long Beach residents and community members and to solicit their input on the CAAP while sharing data and information about local climate science projections and climate change vulnerabilities in Long Beach. Through partnerships with community-based organizations, environmental groups, and educational institutions, the City has been able to reach out to youth, multilingual communities, and older adults. Here are a few highlights:

## Open House Events

The City hosted three open house events at key points in the engagement process to share information being developed for the CAAP (e.g., the greenhouse gas (GHG) emissions inventory, the vulnerability assessment, and mitigation and adaptation actions) and to engage the public on the topic of climate change in Long Beach. Each open house was held in a different geographical area of the city. Each included a sustainability resource fair, with information and resources from various City departments and public agencies, and distributed free food and environmental giveaways such as tote bags and reusable straws. LB ClimateFest (Open House #3), held at Marine Stadium, included distribution of the draft plan, a showcase of environmental projects from local students and emerging leaders, and chalk art of a sea level rise scenario drawn on the ground to engage attendees on the impacts of SLR in Long Beach.

**Figure 5: Summary of Community and Stakeholder Engagement**

**10,260** TOTAL estimated participants

**1,395** sign-ins

**67** events

**#1 OPEN HOUSE**

**200** ESTIMATED PARTICIPANTS
98 sign-ins

- Validate the project methodology;
- Provide feedback and input on local data;
- Review results and early actions.

**#2 OPEN HOUSE**

**200** ESTIMATED PARTICIPANTS
97 sign-ins

- Provide input on climate-related; their concerns
- Review existing actions;
- Recommend future opportunities.

**#3 OPEN HOUSE**
Long Beach ClimateFest

**500** ESTIMATED PARTICIPANTS
107 sign-ins

- Input on the public engagement approach;
- Provide input on Climate-related concerns;
- Review proposed actions.

## Panel Discussions

In partnership with local organizations, the City hosted panel discussions on extreme heat and SLR. Both events covered an overview of the CAAP, specific climate hazards and their impacts in Long Beach, and strategies for keeping residents safe and healthy during extreme weather events.

## Multilingual Outreach

Through partnerships and early conversations with community-based organizations and local leaders, staff co-created culturally appropriate activities and ideas for collaboration to implement at community resource fairs and other community events. Through the outreach process, staff continued to evaluate engagement approaches to make them more linguistically and culturally appropriate and to further strengthen relationships between the City and local communities. Interpretation services were available at all CAAP public workshops and events.

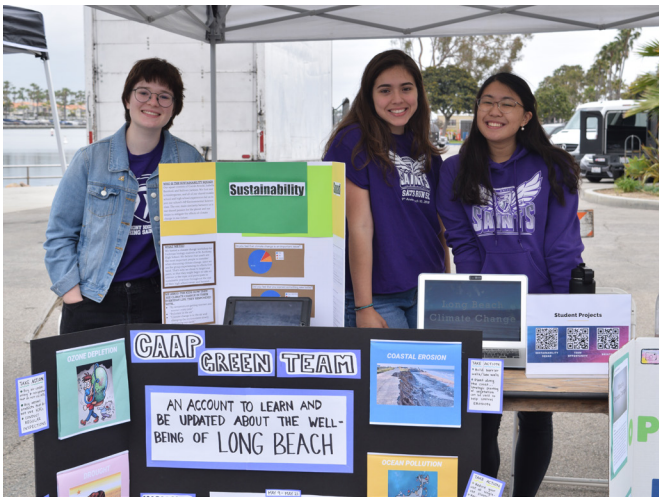
## Engaging Youth Leaders

Recognizing that young people will be those most impacted by climate change in the long term, the City partnered with youth leadership programs and local schools across Long Beach to engage youth and emerging leaders in developing the CAAP. As part of this effort, the City partnered with California State University, Long Beach; Long Beach City College; Long Beach Unified School District; St. Anthony's High School; Youth Leadership Long Beach; and Aquarium of the Pacific youth volunteers.

## Art, Creativity, and Online Engagement

Art and creativity were central to engaging children and their families. For example, at community resource fair events, staff used drawing prompts like "To me sustainability means..." to encourage children and their families to draw ways that climate change is affecting them at home or to share strategies they have implemented at home or at school to reduce their carbon footprint. In addition, to supplement in-person outreach, staff connected with residents and community members digitally through periodic e-newsletters and on social media using hashtags such as #CAAPLB and #ClimateActionLB. Easy to understand, animated videos and infographics were created to further explain what the CAAP is and why the City is developing it.

The Community Engagement Appendix provides more details on the outreach process.




# CAAP RELATIONSHIP TO THE GENERAL PLAN



The CAAP is being incorporated into the Long Beach General Plan as a mitigation measure of the Land Use Element. Recognizing that the State of California obligates the City to create opportunities for increased housing and jobs to meet the needs of a growing population, the CAAP outlines requirements, incentives, and potential policies to ensure more sustainable development.

In order to meet their obligations under state law, local governments may prepare a Plan for Reduction of Greenhouse Gases that is consistent with Assembly Bill 32 and Senate Bill (SB) 32 goals. The development of such a plan can be used to streamline the GHG analysis for future plans and projects undergoing review pursuant to Section 15183.5 of the California Environmental Quality Act (CEQA). CEQA review of subsequent plans and projects that are consistent with the GHG reduction strategies and targets in the CAAP may take advantage of CEQA streamlining. This approach allows jurisdictions to address GHG emissions at a community-wide level to determine the most effective and efficient methods to reduce them, to identify the reduction measures that would promote the goals of the General Plan, and to employ the reduction measures that have the most co-benefits (for improving mobility and access, increasing local economic development, reducing household and business utility and transportation costs, improving public health).

Therefore, the CAAP has been included as a mitigation measure in the General Plan Land Use Element update, and the CAAP will be used as the basis for future assessments of consistency with this plan in lieu of a project-specific GHG CEQA analysis for future projects. A project-specific environmental document that relies on this plan for its cumulative impacts analysis would identify specific reduction measures applicable to the project that are consistent with the CAAP; it would also describe how the project incorporates those measures. If the measures are not otherwise binding and enforceable, they must be incorporated as mitigation measures or project conditions of approval, or as some other mechanism to ensure implementation. Each of the actions described in the CAAP provides details on implementing the GHG reduction strategies, including the party or parties responsible for implementation. The actions in the CAAP include the GHG reduction strategies that apply to the City itself. For each action that is related to development projects, the City will determine whether: (a) the project is consistent; (b) the project with conditions would be consistent; (c) the strategy is relevant for new development, but not the subject project; or (d) the project includes one or more replacement strategies that would be equally or more effective in reducing GHG emissions, and such replacement strategy or strategies are not included in the CAAP or required by any other regulation, standard, design criteria, or other existing requirement.[ii] See Chapter 8 for a more detailed explanation of action implementation and monitoring to ensure the City achieves its adopted GHG target.

To meet the standards of a qualified GHG reduction plan, Long Beach's CAAP must achieve the following criteria (which elaborate upon criteria established in State CEQA Guidelines Section climate mitigation 15183.5[b][1]):

- Complete a baseline emissions inventory and project future emissions.
- Identify a community-wide reduction target.
- Prepare a CAP to identify strategies and measures to meet the reduction target.
- Monitor the effectiveness of reduction measures and adapt the plan to changing conditions.
- Adopt the CAP in a public process following environmental review.

The CAAP addresses each of these recommended plan elements, as summarized below.

Chapter 5 includes the GHG inventory and presents the 2015 base year emissions inventory and forecasts, the City's 2030 emissions target, and the 2045 aspirational goal to achieve net carbon neutrality. Chapter 6 contains three subsections, one for each CAAP emissions sector area, that describe the reduction actions that will be implemented to achieve the GHG targets. Chapter 7 includes City leadership, funding, and financing strategies, and Chapter 8 describes the City's process for monitoring, evaluating, and revising the CAAP to ensure that the estimated strategy reductions do occur so that the targets are achieved. As part of its CAAP, the City has included an adaptation plan that identifies strategies the City will pursue to adapt to and protect against major anticipated climate change impacts — extreme heat, worsening air quality, drought, and SLR and flooding. See Chapter 4 for the mitigation and adaptation strategies.

In addition to CEQA streamlining, the CAAP is included as part of the General Plan in order to meet the requirements of SB 379, which states that cities and counties must include climate adaptation and resiliency strategies in their General Plans to ensure the safety and protection of their communities. In addition, through the CAAP process, information was gathered to develop a report to comply with SB 691, which requires local planning to address SLR in the Tidelands area, and to comply with SB 1000, which requires local governments to identify disadvantaged communities and address environmental justice in their General Plans.

Incorporating the CAAP into the General Plan is important because the City Council and Planning Commission use the goals and policies of the General Plan as the basis for making decisions, determining long-term objectives, generating and evaluating budgets, planning capital improvements, and prioritizing tasks.

# HOW DOES THE CAAP RELATE TO OTHER CITY PLANS?

Many City plans touch on issues that are covered in this CAAP, and all City departments worked closely with the City's Planning Bureau to ensure alignment as part of the CAAP development process. The table below identifies these City relationships and the synergies among the various City plans.

**Table 1: How the CAAP relates to other city plans**

| Organization | Plan | Date | Summary/Connection |
|---|---|---|---|
| **Relevant City of Long Beach Plans** | | | |
| City of Long Beach | General Plan – Land Use Element | 2019 | Addressing and adapting to climate change is one of the stated goals of the Land Use Element, which will directly and indirectly reduce GHG emissions though transit-oriented development and mixed-use development, increased active transportation, promotion of green technology, and establishment of sustainable development goals and policies. |
| City of Long Beach | Hazard Mitigation Plan | 2017 | Details the City's vulnerability to earthquakes, floods, windstorms, tsunamis, public health crises, technological disasters, and drought, along with strategies to mitigate disasters before they strike. |
| City of Long Beach | General Plan – Mobility Element | 2013 | Includes complete streets and multimodal transportation policies that have the potential to reduce GHG emissions from private vehicles. |
| City of Long Beach | Sustainable City Action Plan | 2010 | Targets reductions and implementation steps for municipal and private buildings, municipal vehicles, solid waste, and water use. |
| City of Long Beach | Local Coastal Program* | 1980 | Contains ground rules for development and protection of coastal resources in the Long Beach coastal zone. |
| **Relevant Port of Long Beach Plans** | | | |
| Port of Long Beach | Master Plan Update | In Progress | Outlines strategic goals, operational initiatives and environmental policies, and evaluates the consistency of future developments and land uses with those goals, initiatives, and policies. |
| Port of Long Beach and Port of Los Angeles | San Pedro Bay Ports Clean Air Action Plan** | 2017 Update | Sets port-related GHG reduction targets for 2030 and 2050. Strategies proposed include establishing incentive programs for efficient ships, installing shore power infrastructure, revamping the Clean Trucks Program, and encouraging cleaner and more efficient locomotives and harbor craft. |
| Port of Long Beach | Climate Adaptation and Coastal Resiliency Plan | 2016 | Sets forth vulnerability assessment and adaptation strategies to protect Port assets from future climate stressors, including extreme heat, storm surge, and sea level rise. |

* The Local Coastal Program will be updated to reflect the Land Use Element and the CAAP.

** The initial San Pedro Bay Ports Clean Air Action Plan was adopted in 2006 and updated in 2010; the current iteration followed in 2017.

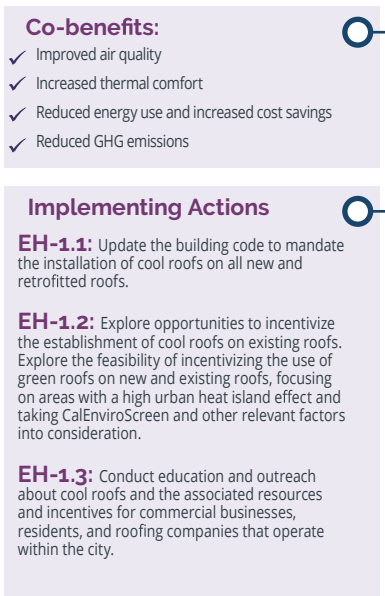
# HOW TO READ THE ACTIONS

The following graphic outlines the content of each action in Chapter 4: Adaptation Actions and Chapter 6: Mitigation Actions. The actions described will be implemented across time frames and with a range of partners. The actions will reduce GHG emissions and climate vulnerability and provide many co-benefits for Long Beach.


## Description

The City will consider instituting a requirement that cool roofs be used on new and replaced commercial and residential roofs. The City will also develop a process for assessing the feasibility of cool and green roofs on future development projects and existing candidate buildings, focusing on neighborhoods that would benefit most from reduced temperatures and additional green space. While this action provides broader public health and quality of life benefits, populations most impacted by climate change, especially the sick, the young, and the elderly and low-income communities stand to benefit the most.

Cool roofs and walls are made of materials that help reflect the sun's energy, such as light-colored paints, roof tiles, coatings and shingles. Such materials effectively reduce the amount of the sun's energy that enters a building. This keeps homes and businesses cooler, and reduces the amount of additional cooling that may be needed to keep internal air temperatures at a healthy level (particularly during heat waves). Reflective surfaces also lower temperatures in the surrounding neighborhood. Green roofs are covered partially or completely with living plants. Their benefits include cooler buildings, reduced GHG emissions, and reduced stormwater runoff.




## PARTNERS
The City departments and other organizations that will support the implementation of the action.

## TIME LINE
Short (0-2 years)
Medium (2-5 years)
Long (5+ years)

## COST
Rough order of magnitude costs;
Low ($0-$150k)
Medium ($150k-$1M)
High ($1M+)

## DESCRIPTION
Brief description of the action. Further details may be found in Appendix B.

## CO-BENEFITS
The additional benefits the action may provide in addition to GHG emission reductions or reduction in climate vulnerability.

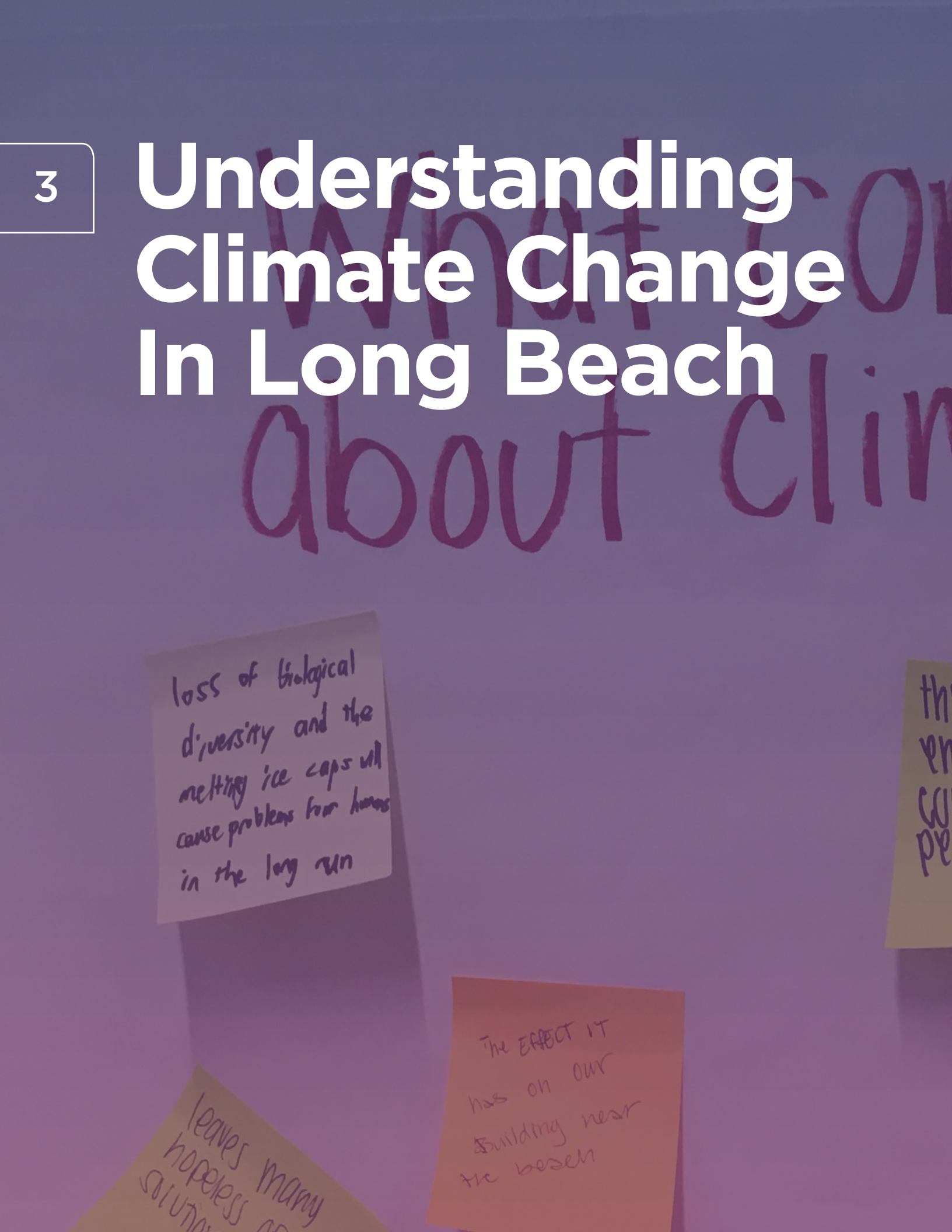
## EQUITY STRATEGY
Summary of how the action will attempt to address inequities in Long Beach.

## ACTIONS
The specific steps needed for the action to be implemented.

CITY OF LONG BEACH

3

# Understanding Climate Change In Long Beach



# INTRODUCTION

Preparing Long Beach for climate change presents both daunting challenges and significant opportunities. It will require changes to many things we take for granted—how we power our homes, how we get around, how businesses and industry are run, how and where buildings get built, what we consume, and what we throw away.

But rather than an inconvenient necessity, reducing our contribution and adapting the city to climate change calls for addressing the structural and systemic inequities in our community in order to realize a vision of Long Beach where everyone has the opportunity to live in thriving communities built on sustainability and resilience. Through implementing a coordinated response to climate change, we can help move Long Beach towards a more equitable, low-carbon, climate-resilient future.

This chapter begins with a brief explanation of the science behind climate change and summarizes the local impacts that are expected in Long Beach. It highlights the City's primary vulnerabilities and the communities that are particularly vulnerable due to socioeconomic, racial, and environmental health disparities. Finally, it concludes with a discussion of the economic, social, and environmental co-benefits associated with climate change adaptation and mitigation.

# THE CAUSES OF CLIMATE CHANGE

The earth's habitable climate is maintained by the Greenhouse Effect – a blanket of gases that trap heat in the atmosphere and keep surface temperatures relatively stable. Greenhouse gases (GHGs) trap warmth generated from solar radiation, much as a car or a greenhouse heats up in the sun.

If it were not for these gases, the earth's surface would be frigid and we would have no air to breathe. However, since the Industrial Revolution in the mid-1800s, human activities, such as the burning of fossil fuels and the conversion of natural lands into agriculture and settlements, have resulted in the release of additional GHGs into the atmosphere at an unprecedented rate.

Major GHGs include:

- **Carbon Dioxide ($CO_2$) –** generated from the burning of fossil fuels or organic matter
- **Nitrous Oxide ($N_2O$) –** a byproduct of the burning of fossil fuels and the fertilization of crops
- **Methane ($CH_4$) –** created from the decomposition of waste and off-gassing from livestock
- **Chlorofluorocarbons (CFCs) –** originally released into the atmosphere as refrigerants, propellants, and cleaning solvents, but now illegal under international law due to their impact on the ozone layer; past emissions remain in the atmosphere for several years to more than a thousand years, depending on the CFC
- **Hydrofluorocarbons (HFCs) –** now used as a substitute for CFCs because they do not contribute to ozone depletion, but do contribute to global warming
- **Perfluorocarbons (PFCs) and Sulfur hexafluoride (SF6) –** byproducts of industrial processes, including aluminum production

# LOCAL CLIMATE CHANGE PROJECTIONS AND VULNERABILITIES

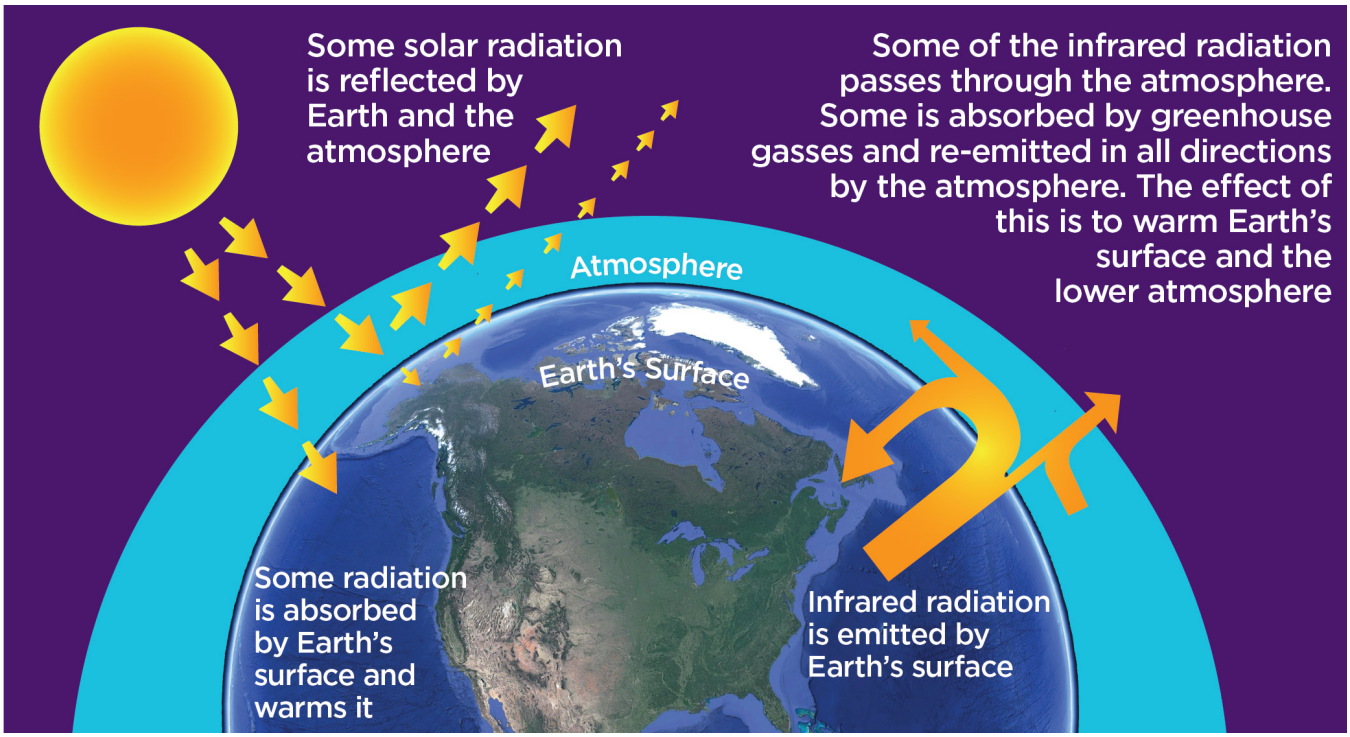
As part of the CAAP process, the most up-to-date science and local climate projections for three primary climate change stressors (extreme heat, sea level rise (SLR), and precipitation) and two secondary stressors (air quality and drought) were reviewed (see the 2018 Long Beach Climate Stressors Review, Appendix D). Primary climate change stressors are first-order local conditions that are directly affected by changes in global atmospheric and oceanic temperatures. Secondary climate stressors are conditions affected by complex interactions between primary variables and other factors.

The City also carried out a Climate Vulnerability Assessment, which explored how the climate stressors predicted for Long Beach will impact different types of city assets. The study assessed vulnerability (see the 2018 Climate Vulnerability Assessment, Appendix C) based on the following categories:

- Public Health
- Housing and Neighborhoods
- Buildings and Facilities
- Parks and Open Space
- Transportation Assets
- Energy Assets
- Stormwater Assets
- Wastewater Assets
- Portable Water Assets

Key information from both the Climate Science Memo and Climate Vulnerability Assessment is summarized below, organized by climate stressor. It is important to note that the science of understanding climate change is being regularly revised, as climate models and projections are improved and updated with new data and observations. The outputs from these climate models will inform future updates of this CAAP. These revisions improve our understanding of the impacts we can expect in the future. However, this does not mean that there is uncertainty around whether there will be impacts or whether human activity is a major contributing factor, but rather uncertainty about the timing and extent of impacts.

**Figure 6: The Greenhouse Effect**



# EXISTING ENVIRONMENTAL HEALTH BURDENS AND CLIMATE CHANGE

Though climate change will impact the entire city environs, some communities within Long Beach already experience disproportionate environmental health burdens today. Long Beach is very diverse, which can be a source of strength, vibrancy, and resilience. However, it also has racial and economic disparities that are manifested spatially across the city. Tools such as CalEnviroScreen help identify the California communities that are most affected by many sources of pollution and the areas where people are often especially vulnerable to pollution's effects. For Long Beach, CalEnviroScreen shows how Central, West and North Long Beach have some of the highest pollution impacts in California, and how many areas are worse off than 95 percent of the state. It is not a coincidence that the communities that live in these areas tend to be low-income communities of color.

Low-income people and communities of color in Long Beach are more likely to live in areas with poor air quality, in regions with little green space, and in areas along the Los Angeles River channel where urban flood risk may increase. The geography of differentiated risk is due to socioeconomic inequality caused by historic racial and economic injustices (discussed in the section on Climate Change, Public Health, and Health Equity). When reviewing the summary of how future climate change is projected to impact Long Beach, existing environmental health burdens and social vulnerabilities to climate change should be considered. In addition to the need to prioritize communities with existing environmental health burdens as well as communities that are most vulnerable to the impacts of climate change, lessons in resiliency need to be shared, including how disproportionately impacted communities have withstood the combined effects of segregation and pollution to adapt and prepare for changing conditions. As Long Beach prepares for an uncertain climate future, the City must lift up and learn from these communities to make sure they can thrive.

## Extreme Heat

### Trends and Projections

Long Beach's pleasant Mediterranean climate is expected to warm considerably in the coming decades, and the region will experience a greater number of extreme heat days (>95 degrees Fahrenheit [°F]). Cal-Adapt predicts that average annual temperatures in the Los Angeles region will increase 3-4°F by midcentury and 3-8°F by the end of the century.[iii] The average number of extreme heat days each year has already increased from the baseline average of 4 extreme heat days per year in the period from 1980 to 2000,[iii] to the average 9.2 extreme heat days per year recorded between 2008 and 2017.[iv] Extreme heat days are projected to increase even more by mid-century, to 11 to 16 days per year by midcentury, and 11 to 37 extreme heat days per year by the end of the century.[iii] Heat waves will occur more frequently and be longer lasting,[v] and more humidity will mean less cooling at night.[vi] These changes will have wide impacts on Long Beach's environment, infrastructure, and residents. Extreme heat will also disproportionately affect already vulnerable populations, including the elderly and infants who are more susceptible to the health impacts of extreme heat. It will also disproportionally affect low-income households or households where English is the second language, which are less likely to have access to resources to cope with extreme heat.

## Key Vulnerabilities

Of all the climate stressors Long Beach will face, extreme heat is expected to be the greatest health threat to the largest number of residents. Analysis of census population data (from 2010) and data from the Climate-Smart Cities Los Angeles heat vulnerability zone indicates that approximately 275,000 residents of Long Beach live in the high-vulnerability areas. Extreme heat events can increase heat-related, cardiovascular-related, and respiratory-related mortality, and they can increase hospital admission and emergency department visits. Particularly vulnerable populations include children, the elderly, people with respiratory diseases, people with physical disabilities, a nd those who work outdoors.[viii] (See the section on Climate Change, Public Health, and Health Equity in this plan for details on geographic vulnerabilities to extreme heat in Long Beach.)

Increased electricity demand for air conditioning during heat waves can cause power outages, which can put vulnerable populations at even higher risk. Traffic disruptions from a loss of power to traffic lights can also result from the increased demand. Heat-related power outages are already common in Southern California. In the summer of 2015, Long Beach residents experienced four separate power outages. In July 2015, high temperatures may have been a factor in equipment failures that caused two powers outages in downtown Long Beach that left thousands of residents and businesses without power for days. The power outage stranded people without medical devices, refrigeration, air conditioning or elevator service during a period of high temperatures. This was particularly challenging for seniors living in high-rise apartments.[viii]

Low-income residents, who already spend a higher proportion of their income on utilities, will be hit hardest by increased power bills. They are also more likely to live in substandard housing with inefficient insulation or without any air conditioning at all. Roads can be damaged by asphalt, softening when temperatures remain above 100°F with no cooling at night, particularly in areas with high truck traffic.[ix]

**Figure 7: Projected Days of Extreme Heat (95 degrees and above)**

# Sea Level Rise

## Trends and Projections

Sea level rise is already occurring off of Long Beach and is projected to accelerate over the coming decades. Analysis of historical sea levels at the nearest National Oceanic and Atmospheric Administration tide gauge in Los Angeles indicates a long-term trend of sea levels rising at approximately 0.96 millimeter per year from 1923 to 2016.

The projections for future SLR considered in this CAAP are from the National Research Council's (NRC's) Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future,[x] which represented a synthesis of the best available SLR science when the CAAP planning process began in 2017.

Note that the Ocean Protection Council's (OPC's) new SLR guidance document was adopted in March 2018. Not only were the OPC[xi] SLR projections not yet available at the time of the vulnerability assessment, but the SLR projections from NRC[x] show higher potential SLR for near-term planning horizons (2030 and 2050). Given the differences in projections, it was determined that a conservative approach would be adopted in developing a plan to preserve life and property and that the more aggressive forecast should be used. To understand the implications of a worst-case scenario and to include a factor of safety, particularly for critical assets, the high end of the NRC[x] SLR range was selected for each planning time frame.

**Examples of King Tides in Long Beach**

Marine Stadium

Naples Island

Alamitos Bay

Peninsula

This rationale aligns with the State Guidance from the OPC (2011) and the California Coastal Commission (2015). Because there is increased uncertainty (wider ranges of SLR) after 2050 both the projection (mid-range) and high-range magnitudes were selected to guide planning for 2100. In addition, including the mid-range magnitudes for 2100 allows for a range of SLR scenarios to better understand thresholds for exposure of city assets or subareas of the city. The City also recognizes the OPC[xi] H++ scenario, which estimates a potential for 10 feet of SLR by 2100. Although the likelihood of this scenario is unknown, it is important to consider, particularly for high-stakes, long-term decisions, given that the probabilistic projections listed above may underestimate the likelihood of extreme SLR resulting from loss of the West Antarctic ice sheet, especially under high emissions scenarios. This potential scenario suggests that the 66-inch SLR projection could happen sooner than 2100.

Best practices in climate change adaptation planning, as recommended by the State of California Sea Level Rise Guidance,[xi] are to use worst-case projections for midcentury and to use both middle-range to worst-case projections for the end of-century analysis, because uncertainty increases into the future.

The National Research Council (2012) indicates that sea levels in Southern California are expected to rise between 5.0 inches and 23.9 inches by midcentury (2050) and between 17.4 inches and 65.6 inches by the end of the century (2100).[x] The CAAP's SLR vulnerability assessment matched these ranges to available SLR inundation model data from the U.S. Geological Survey's Coastal Storm Modeling System to understand what portions of the City are expected to be at risk, and when they will be at risk. The City used inundation scenarios of 11-inch SLR for 2030, 24-inch SLR for midcentury, and both 37- and 66-inch SLR for the end of the century.

The projected increases in mean sea level will also result in secondary impacts – higher storm tides, more extensive inland flooding, increased coastal erosion during storm events, and increased frequency of these events. Evidence of these impacts is already being felt in Long Beach.

## Key Vulnerabilities

For the low-lying coastal communities of Long Beach, permanent inundation from SLR as well as increased frequency and intensity of temporary flooding from king tides and storm surges will become a very real threat in the near future. Approximately 1.3 million square feet of buildings in Long Beach could be exposed to annual king tides by 2030. Approximately half of these buildings are residential (624,100 square feet) and half are commercial (689,600 square feet). These buildings are primarily located in Marina Pacifica and along Shoreline Drive south of Ocean Boulevard. An additional 9.5 million square feet of buildings, primarily residential, are exposed to flooding from a 100-year storm surge by 2030. These buildings are primarily located in Naples Island, Belmont Shore, and the Peninsula. By 2050, up to 8.4 million square feet of buildings could be exposed to annual king tide flooding.

City infrastructure exposed to flooding from king tides by 2030 includes a solid waste facility; 17 city parks; 4 miles of roads that provide access to Port of Long Beach facilities, the NRG power station, and other industrial operations; a natural gas power generation station; and 18 storm drain outfalls, which could cause inland urban flooding if they are inundated during a rainstorm. Sea level rise will also cause increased erosion to, and possibly the loss of, the city's beaches and coastal access points, which are central to the lifestyle, culture, and economy of the Long Beach community. Projections anticipate widespread daily high tide flooding impacts by 2100 under the no action scenario.

# Precipitation

## Trends and Projections

Climate change will also have a substantial impact on local precipitation patterns. Cal-Adapt, the State of California's official synthesis of the latest climate models, predicts a 6 percent to 11 percent increase in average annual precipitation in Long Beach by midcentury and a 1 percent to 25 percent increase by the end of the century.[xii] There is a wide range in the projections because local climate is influenced by a wide variety of factors and because there is uncertainty in the model projections of future precipitation changes.

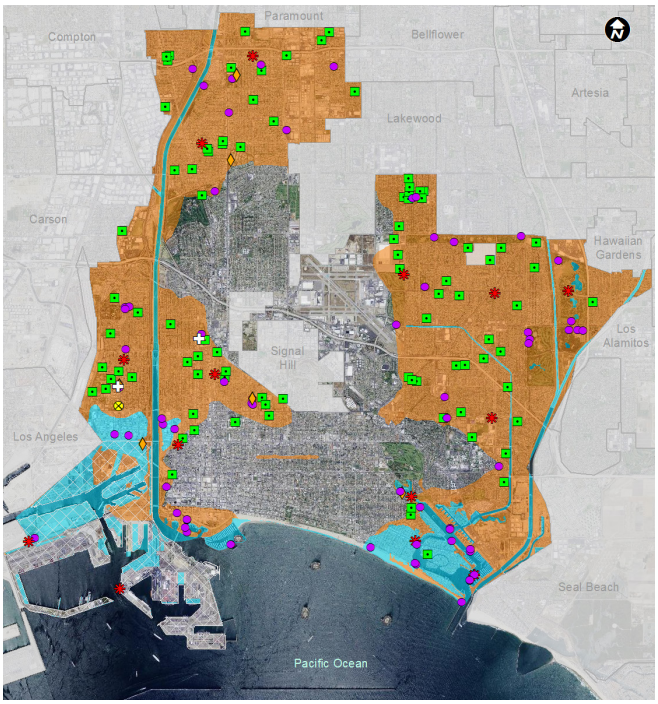
Changes in average annual precipitation are only half the story. The impacts that will have the most consequences for day-to-day life in Long Beach will be increased intensity of rain events leading to greater flood risk,[xiiixiv] and high year-to-year variability, which will affect the availability of fresh water. [xvxvi]

## Key Vulnerabilities

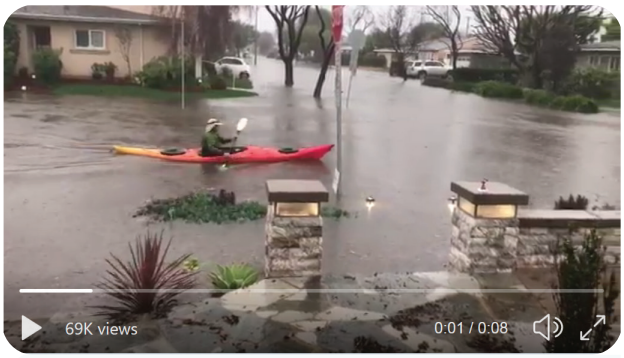
For this CAAP, exposure to riverine flooding was assessed based on the Federal Emergency Management Agency's (FEMA's) 100- and 500-year riverine floodplains. These FEMA floodplains serve as proxies for areas that may be at risk to increased exposure to riverine flooding in the future. In general, 100-year floodwaters flow along the primary riverine waterways and are contained within their channels by existing levees. However, the 500-year floodplain, which represents a scenario that will become more likely in the future due to the increased intensity of precipitation events, covers a much larger area, which includes certain disadvantaged populations along the Los Angeles River. Within the 500-year floodplain are two hospitals, 11 fire stations, one police station, 96 schools, 600 miles of roads, 26 power substations, more than 20 wastewater pump stations, and 20 potable water facilities.

Urban flooding during precipitation events is already a problem in Long Beach, and extreme events today provide an example of what may become more common in the future, when more intense precipitation events are projected. In January 2017, severe rainstorms overwhelmed storm drains and resulted in widespread flooding of streets and homes. More intense precipitation events, coupled with higher tides due to SLR, will worsen urban flooding in developed areas if no action is taken to increase stormwater system capacity so that discharge runoff can be collected during combined flooding events.

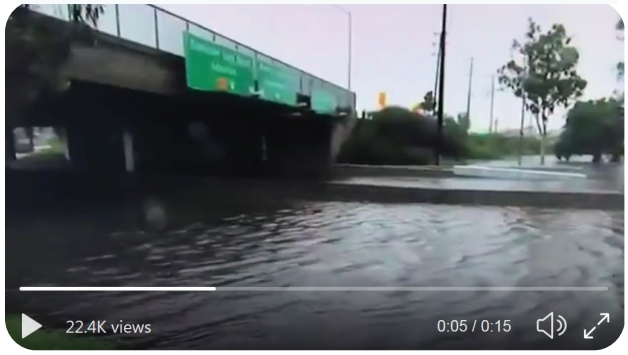
**Figure 8: Map showing 100-year and 500-year flood plain and community assets**



### Images of flooding during January 2017 extreme precipitation events




· Jan 22, 2017
@LongBeachPost **waterfront property in East Long Beach** 😳




· Jan 22, 2017
**The 710 freeway in #longbeach** #storm #losangeles #california **2017**

· Jan 22, 2017
One of many rescues today found by **a** LB Sergeant & rescued by LB Fire @lbfd personnel. **Passenger was in a wheelchair**.

(source: twitter.com)

## Drought

### Trends and Projections

Changes in drought patterns are a secondary climate stressor that will be influenced by changes in temperature and precipitation. Changes in temperature and precipitation are predicted to produce longer and more frequent droughts that will have an impact on Long Beach's water supply. According to Long Beach Water, approximately 25 percent of the City's water supply is from the Colorado River and 15 percent is from the Northern California Bay-Delta. Future drought patterns are expected to result in regional drying, continued reduction of the Sierra Nevada snowpack, and snowmelt runoff earlier in the season that will stress supplies from the Northern California Bay-Delta. The Colorado River will also face similar dynamics. Local water demand is also expected to increase without a shift to drought-tolerant plant species. The Los Angeles region is expected to experience an overall drying trend with longer and more frequent droughts.[xiiixvi] To respond to this challenging dynamic, Long Beach will need to build on its successful efforts to use existing water resources more efficiently and to diversify its water supply.

### Key Vulnerabilities

Higher temperatures will lead to drier soils and drier vegetation in natural areas,[xiv] which will increase local wildfire risk. Additional examples include increased water demand for irrigating planted areas unless there is a major shift towards planting drought-tolerant species. In addition to regional drying, reduced snowpack in the Sierra Nevada and snowmelt runoff earlier in the season will threaten Long Beach's water supply.[xiiixiv]

## Air Quality

### Trends and Projections

Air quality is another secondary climate stressor that will be influenced by changes in weather and other factors. Despite air quality improvements in the past three decades, which resulted from concerted efforts and increased regulation, higher temperatures will increase the formation of air pollution. Absent further air pollution[xvii] reduction efforts, by the end of the century, the number of days when air quality standards in the Los Angeles region are violated could increase by 25 percent to 80 percent due to warming.[xviii] Higher temperatures, precipitation change, and increasing $CO_2$ concentrations are also expected to increase pollen and some airborne allergens. An increase in wildfires, even far from Long Beach, could worsen air quality, as evidenced by the dangerous air quality levels in Long Beach during the wildfires in Southern California during the fall of 2019. Increased energy consumption in the region due to greater demand for air conditioning could also negatively impact air quality.[xviii]

### Key Vulnerabilities

Air quality is especially relevant as a secondary climate stressor in Long Beach, as there are several sources that impact local air quality and thousands of people. These sources include the 710 and 405 freeways, refineries, the Port of Long Beach, and major industrial sites.[xix] People who are especially sensitive to poor air quality include the young, the elderly, those who have existing respiratory conditions, and those who work outside. Air quality in Long Beach is considerably worse near the Port and major freeways, and near concentrations of low-income residents and communities of color due to historic patterns of marginalization and disinvestment. An in-depth discussion of inequities in exposure to the hazards induced by climate change is presented in the following section.

# CLIMATE CHANGE, PUBLIC HEALTH, AND HEALTH EQUITY



Increased extreme heat events, flooding, and worsened air quality may negatively affect human health. While all people are vulnerable to the impacts of climate change, the degree of vulnerability is a function of place-based conditions and demographic and socioeconomic factors that influence an individual or community's sensitivity to environmental change. As described above, communities in Central, West and North Long Beach face a disproportionately high exposure to many sources of pollution and are more vulnerable to pollution's effects.

This geography of differentiated risk is due to the socioeconomic inequality caused by historic racial and economic injustices, such as discrimination in education, housing, employment, education, local political representation, and access to resources. Low-income communities of color were historically excluded from Long Beach neighborhoods with less environmental pollution and greater public investment, and still today are concentrated in the portions of the city with the worst air quality and environmental health metrics. These same communities not only bear the highest environmental health burdens, but they also have the highest social vulnerability to climate change due to factors such as age, race, and income. The existing health conditions in low-income neighborhoods affect the ability of individuals and low-income communities of color to prepare for, respond to, and recover from an extreme weather event or climate stressor.

Low-income individuals and communities of color in Long Beach are not only more likely to live in areas with poor air quality, but are also more likely to live in areas with little green space and along the Los Angeles River channel, where urban flood risk may increase. People experiencing homelessness are also likely to face additional exposure to extreme heat, lack of access to water, and even vector-borne diseases (e.g., mosquito-borne diseases). In addition, by the end of the century, the Long Beach Multi-Service Center, which serves individuals experiencing homelessness, is projected to be exposed to king tides.

These structural inequalities both increase the risk that people will suffer climate-related impacts and reduce their ability to cope with and respond to climate stressors. Low-income residents are also more likely to live in housing with substandard insulation, inefficient air conditioning, or no air conditioning at all, and are more likely to be cost-burdened renters with no other housing options. As temperatures increase, they will need to spend more of their limited income on utility bills. Low-income seniors and children with limited mobility are particularly at risk during heat waves. Flooding is more disruptive for low-income residents, who are less likely to have low-deductible insurance or emergency savings to cover the cost of repairs.

Low-income residents and communities of color are more likely to live in areas of the city with little green space. Data from the Climate Smart Cities Los Angeles tool on modeling of the urban heat island effect indicates that North and West Long Beach are more susceptible to high surface temperatures and air pollution. The amount of green space varies considerably across Long Beach, and Central, West, and North Long Beach have the lowest amount.[xx]

The following are some of the key considerations regarding vulnerable populations in Long Beach.

## Communities of Color

A majority of Long Beach residents are people of color. As of the 2010 census, the population is 41 percent Hispanic/Latino, 13 percent Black or African American, 13 percent Asian, and 1 percent Native Hawaiian or Pacific Islander.[xx] Communities of color in Long Beach already experience health disadvantages. For example, the Black or African American community in Long Beach has the highest rates of hospitalization for heart disease, diabetes, and asthma compared to other races and ethnicities. The asthma hospitalization rate for Black or African American residents, which is directly impacted by poor air quality, is nearly three to four times that of the other races and ethnicities.[xx] In Long Beach, lack of access to health insurance is highest among those identifying themselves as Hispanic or Latino (31.8 percent), followed by those identifying as Black or African American (19.8 percent), Asian (19.2 percent), and White (11.0 percent).[xx]

## Age

Elderly populations can be more vulnerable to extreme weather and climate stressors. They may be less able to evacuate, as a higher proportion do not drive, often live alone, and may rely on public transportation. They may also have pre-existing health conditions that can be exacerbated by climate stressors. In Long Beach, almost 40 percent of people over the age of 65 report a disability, compared to 10 percent of the overall Long Beach population. Children are also disproportionately impacted by certain climate change effects, including extreme heat and air pollution. Central, West and North Long Beach have disproportionately younger populations, as the largest and highest percentages of children live there compared to other parts of the city.

## Language

Non-English speakers may struggle to communicate with service providers and experience difficulties making use of preparedness, response, and recovery resources. In Long Beach, 34 percent of households speak Spanish at home and 10 percent speak Asian or Pacific Islander Languages at home. English proficiency in the city varies by age. People over the age of 65 are most likely to report speaking English "not well" or "not at all" (38 percent).[xx]

## Income

Low-income communities face disproportionately higher rates of poor health outcomes and greater obstacles to achieving good health, and they are more likely to live in neighborhoods with higher environmental health burdens.[xxi] Income varies across race and ethnic groups, and people of color have lower incomes and wealth than White communities. Black or African American and Hispanic or Latino households had the lowest median incomes—about $10,000 less than the overall median income in Long Beach.[xx] Median income also varies by neighborhood, with higher incomes in East and Southeast Long Beach and lower incomes in North, West Central, and Southwest Long Beach. In addition, approximately 15.3 percent of all residents in Long Beach live below the poverty line, which is 2 percent higher than the statewide poverty rate of 12.8 percent.[xxii]

# OPPORTUNITIES

## Geography of Combined Social Vulnerability

The Climate-Smart Cities Los Angeles Project and its Technical Advisory Team, which included public health experts, local academic and research institutions, and community leaders, developed a geographic information system decision support tool that includes a social vulnerability index consisting of 10 indicators. This index is based primarily on the U.S. Environmental Protection Agency's EJSCREEN definition of demographic factors that indicate a community's potential susceptibility to environmental stressors. These factors include people of color, low income, educational attainment less than a high school degree, linguistic isolation, population under the age of 5, and population over the age of 64. The index includes three additional characteristics—unemployment, asthma, and low birth weight—which were added based on recommendations from the Technical Advisory Team.

The neighborhoods of Southeastern Long Beach, which are most susceptible to SLR and flooding, exhibit many demographic factors that make them less at risk to the health impacts of climate change (higher income, lower rates of respiratory disease, higher share of residents that identify as white), but also have a higher share of elderly residents, who can be more vulnerable during flood events due to limited mobility.

North, Central, and West Long Beach neighborhoods have the lowest amounts of green space and experience a high urban heat island effect, which can further stress existing health conditions during extreme heat events. West and North Long Beach have poor air quality and high levels of hospitalizations for asthma.

While responding to climate change presents the City with urgent challenges, addressing the city's vulnerabilities is an opportunity to tackle issues and systemic inequities that residents face today. Climate adaptation and mitigation actions will have a wide range of co-benefits, including improved air quality, improved access to green space, and the potential for sustainable economic growth and job opportunities for all income and education levels. Policies that seek to improve environmental justice outcomes for Long Beach's most vulnerable residents will also lead to better outcomes for all.

## Public Health Co-Benefits

As described in the previous section, differences in health outcomes between residents are often a result of socioeconomic and racial inequities. Addressing these issues now will increase our community's resilience in the future, and vice versa; actions taken to reduce our contribution to climate change will also address public health problems now.

Urban greening, which will reduce the impact of future extreme heat events on residents in areas that are currently threatened by the urban heat island effect, offers a myriad of benefits for current residents. Proximity to green space improves mental health by reducing stress and anxiety, improves physical health by providing recreation space, and increases community cohesion by creating pleasant public spaces for social interaction and gatherings. Increasing the urban tree canopy also helps address local air pollution, as trees absorb particulate matter from the air and, by shading sidewalks, encourage walking and biking.

Policies that seek to reduce carbon emissions in the transportation sector can also positively address health in a variety of ways. Investments in public transit and walkable, bikeable neighborhoods increase mobility and accessibility, lead to more active and healthy communities, reduce vehicle miles traveled, and improve air quality. Similarly, expanding electric vehicle infrastructure also leads to a reduction in transportation emissions and improved air quality as more electric vehicles take to our roads.

Building efficiency, building decarbonization, and increasing electricity generation from renewable sources will also improve local air quality.

In addition to directly addressing public health disparities, climate adaptation and mitigation actions have the potential to spur economic development, create jobs, expand access to economic opportunity, and mitigate income inequality, thereby directly addressing one of the underlying causes of public health disparities. A discussion of the economic benefits of climate change adaptation and mitigation is included in the next section.

## Economic Opportunities

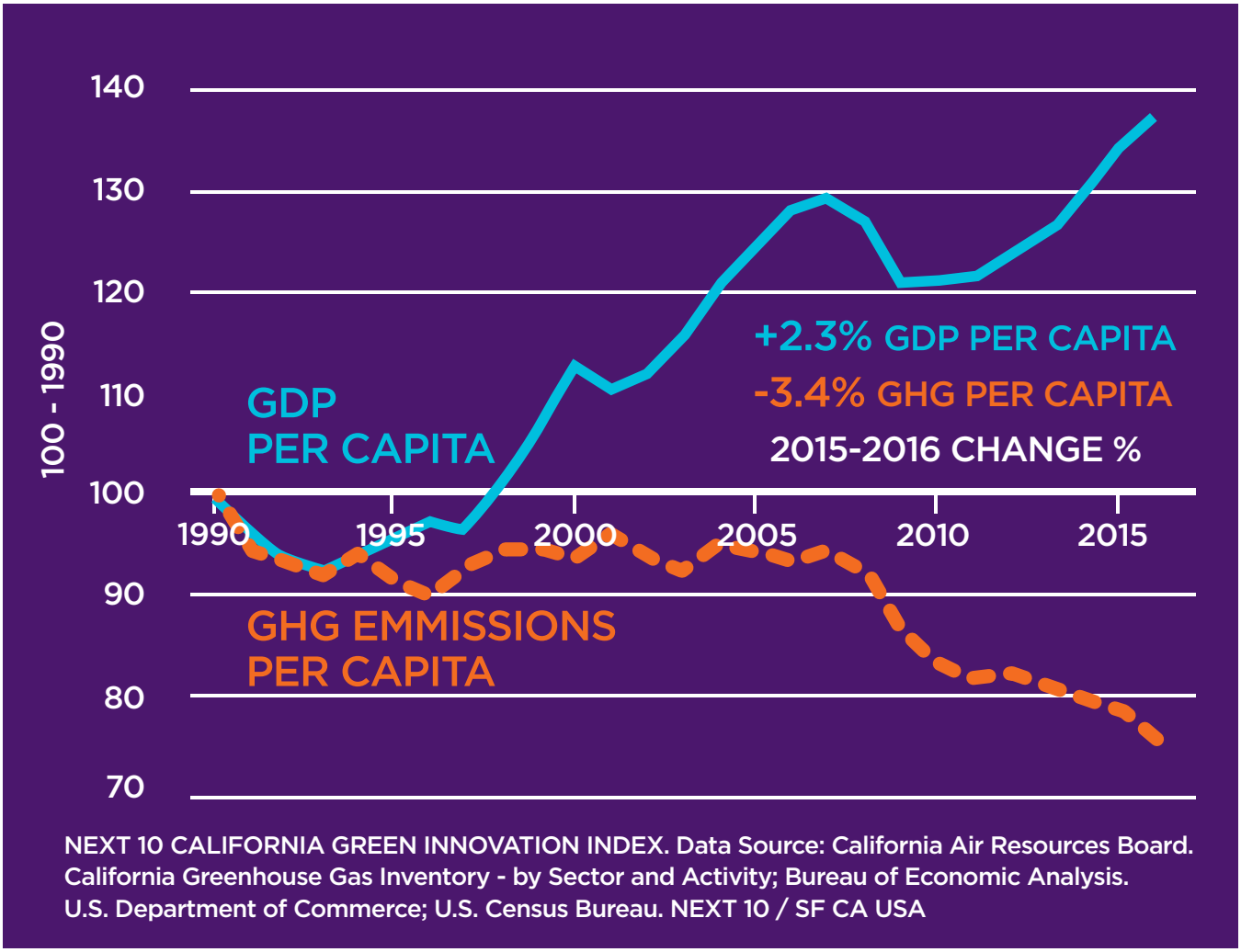
A common misconception is that addressing climate change and reducing GHG emissions will harm economic growth. Evidence in California contradicts this perception. When the State of California passed Assembly Bill 32 in 2006, many were skeptical that the State could reach its ambitious climate goals without sacrificing economic growth. Ten years later, California not only reached its goal of reducing emissions to 1990 levels by 2020, which was four years earlier than planned, but did so while achieving one of the largest economic expansions in state history.[xxiii] Studies conducted by the California Air Resources Board show that economic growth need not be compromised to achieve the State's goal of an 80 percent reduction in GHG emissions below 1990 levels by 2050.[xxiv]

The State of California is making considerable investments to drive technological innovation and the decarbonization of the economy. The State's policies, along with the local actions recommended in subsequent chapters in this plan, present an enormous opportunity for Long Beach to promote sustainable economic development through infrastructure projects, innovation and deployment of new technologies, and the creation of green jobs for various backgrounds and education levels.

Increased economic opportunities are already emerging as investments are directed towards meeting the State's goals. Building efficiency retrofits, decarbonization of energy generation, construction of high-performance buildings, rooftop and community solar deployment, and transit infrastructure are all examples of market responses to climate change that are taking advantage of current technologies to create jobs today.

Addressing climate change not only creates job opportunities, it helps residents and businesses save money on utilities and transportation—savings that can be redirected to other areas of the economy. More fuel-efficient vehicles and public transportation will also help Long Beach residents reduce their transportation costs.

Figure 9: GDP and Emissions. California, in 2016 $




NEXT 10 CALIFORNIA GREEN INNOVATION INDEX. Data Source: California Air Resources Board. California Greenhouse Gas Inventory - by Sector and Activity; Bureau of Economic Analysis. U.S. Department of Commerce; U.S. Census Bureau. NEXT 10 / SF CA USA

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CITY OF LONG BEACH

# 4 Adaptation Actions

Image: Tetra Tech, Inc.

4

# ADAPTATION OBJECTIVES AND ACTIONS AT A GLANCE

## EH Extreme Heat

**Goal: Long Beach buildings, neighborhoods, and infrastructure are climate resilient, reduce the urban heat island effect, and are set up to ensure and improve public health and safety in the face of extreme heat events**

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| New and existing buildings, streets, and public spaces reduce extreme heat through incorporation of cool surfaces and green infrastructure | EH-1 | Increase presence of cool roofs and cool walls |
| | EH-2 | Increase the presence of reflective streets, cool surfaces, and shade canopies |
| | EH-3 | Enhance and expand urban forest cover and vegetation |
| All residents have access to services and programs to withstand extreme heat events | EH-4 | Install additional water fountains and other actions to increase public access to water |
| | EH-5 | Identify future vulnerability potential for power outages related to extreme heat and develop plans to prevent such outages |
| | EH-6 | Enhance and expand the accessibility of cooling centers |
| Public transit is a comfortable and viable mobility option during extreme heat events, especially for transit-dependent populations | EH-7 | Provide bus shelter amenities |
| | EH-8 | Improve beach and coastal transit access during extreme heat events |

## AQ Air Quality

**Goal: All Long Beach communities have clean air and improved public health**

| OBJECTIVES | | ACTIONS |
|---|---|---|
| Buildings and facilities actively reduce air pollution as a component of a broader energy reduction strategy. | AQ-1 | Incentivize installation of photocatalytic tiles |
| | AQ-2 | Encourage urban agriculture practices that reduce air quality pollution |
| Emissions are reduced by shifting to cleaner equipment and vehicles. | AQ-3 | Support the development of the Long Beach Airport Sustainability Plan |
| | AQ-4 | Electrify small local emitters, such as lawn and garden equipment, outdoor power equipment, and others |
| | AQ-5 | Work with Long Beach Unified School District (LBUSD) to support school bus electrification |
| | AQ-6 | Implement the Port of Long Beach Clean Air Action Plan |
| Air quality impacts from local oil and gas operations are minimized. | AQ-7 | Increase monitoring and regulation of oil extraction and refining process |

# DRT Drought

**Goal: Long Beach has a more sustainable and diverse water supply that reduces dependence on imported water and improves long-term water security**

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| Maximize water efficiency and conservation. | **DRT-1** | Continue development and implementation of water use efficiency programs and implement additional water conservation programs |
| | **DRT-2** | Enhance outreach and education related to water conservation |
| Maximize water that is captured and reused locally. | **DRT-3** | Expand usage of green infrastructure and green streets |
| | **DRT-4** | Expand usage of recycled water and greywater for non-potable use |
| | **DRT-5** | Incorporate increased rainfall capture and other actions to maximize local water supplies and offset imported water |

# FLD Sea Level Rise + Flooding

**Goal: Long Beach understands and is prepared for its future flood risk**

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| Short-Term Actions (to 2030)<br>City plans and policies are forward-looking and ensure projects and investments account for projected sea level and flooding impacts | **FLD-1** | Update and augment floodplain regulations as necessary |
| | **FLD-2** | Incorporate sea level rise language into citywide plans, policies, and regulations |
| | **FLD-3** | Establish a flood impacts monitoring program |
| | **FLD-4** | Incorporate adaptation into City lease negotiations |
| | **FLD-5** | Update the City's existing Stormwater Management Plan |
| Clear and sufficient information is on hand to identify and prioritize near-term adaptation needs and best practices | **FLD-6** | Conduct citywide beach stabilization study |
| | **FLD-7** | Review and conduct studies of combined riverine/coastal flooding and increased severity of rainfall events on watershed flooding |
| Adaptation strategies are implemented to protect vulnerable shoreline areas and wastewater infrastructure | **FLD-8** | Enhance dunes |
| | **FLD-9** | Inventory and flood-proof vulnerable sewer pump stations |
| Medium-Term Actions (2030-2050)<br>Vulnerable infrastructure is elevated or relocated | **FLD-10** | Relocate/elevate critical infrastructure |
| | **FLD-11** | Elevate riverine levees |
| Long-Term Actions (2050-2100)<br>Long-term physical adaptation strategies are selected and implemented based on additional research and community adaptation priorities, and prioritize natural solutions whenever possible. | **FLD-12** | Expand beach nourishment |
| | **FLD-13** | Construct living shoreline/berm |
| | **FLD-14** | Elevate street hardscapes |
| | **FLD-15** | Elevate streets/pathways |
| | **FLD-16** | Retrofit/extend sea wall |
| | **FLD-17** | Retreat/realign parking lots |
| | **FLD-18** | Extend/upgrade existing seawalls |
| Additional long-term adaptation options are evaluated using the best available science. | **FLD-19** | Investigate feasibility of managed retreat |
| | **FLD-20** | Evaluate feasibility of storm surge barrier at Alamitos Bay |

# INTRODUCTION



This chapter includes adaptation actions identified to improve the ability of Long Beach and its residents and businesses to adapt to climate change, and related impacts now and in the future. Actions are organized into four climate impacts:

- Extreme Heat
- Air Quality
- Drought
- Sea level rise and flooding

These adaptation actions were developed based on the 2018 Long Beach Climate Stressors Review (Appendix D) and the Long Beach Climate Change Vulnerability Assessment Results (Appendix C).

A range of factors were considered in the design and selection of the various actions, including:

- The projected timeframe and estimated likelihood of the vulnerability
- The importance and effectiveness of each action in increasing resilience
- Technical feasibility and City implementation capacity
- Public and stakeholder feedback throughout the CAAP development process

The City has placed a high priority on public engagement and input to identify and select actions. Major points of public emphasis included selecting actions that have the potential for strong, positive, and inclusive impacts on low-income communities most impacted by climate change. As a result, a majority of the actions include implementation steps that will require the City to prioritize these actions in areas of highest need. Each action consists of an implementation lead and partners, general timeline (short, medium, long) and City costs (low, medium, high), co-benefits, implementing sub-actions, and an equity strategy. The City has included a preliminary set of potential performance metrics associated with each action in Appendix F.

These actions establish an initial roadmap to withstand rising temperatures, flooding associated with sea level rise and intense storm events, and drought among others. Over time as understanding of climate change science evolves and local impacts are observed, the City will evaluate the need for adjustment of existing actions and the need for new ones. This process will take place through regular CAAP monitoring and reporting and future CAAP updates.

While Long Beach is already experiencing the effects of climate change, adaptation to SLR and its related impacts will require the City to incorporate a long-term adaptive management approach to its planning and investment decision making processes. This will be particularly important due to the long lifespan of infrastructure and land uses that will need to be resilient in the face of future SLR and related impacts that are not immediate or near-term.

# EXTREME HEAT ACTIONS



In the coming decades extreme heat is expected to be the greatest climate-related health threat to Long Beach residents, causing an increase in heat-related mortality, cardiovascular, and respiratory related mortality, and an increase in hospital admissions and emergency department visits. Extreme heat events disproportionately impact vulnerable populations such as young children, the elderly, people with respiratory diseases, people with physical disabilities, and those that work outdoors. Low-income households that already spend a higher proportion of their income on utilities and may live in energy inefficient, substandard housing also are more at risk.

According to an analysis of 2010 U.S. Census and Climate Smart Cities Los Angeles data, at least 275,000 Long Beach residents live within areas that are highly vulnerable to extreme heat. As temperatures and the number of extreme heat days (>95°F) increase there is strong potential for this number to increase. The number of extreme heat days has increased from an average of 4 days per year in 1980-2000 to 9 days per year from 2008-2017. Cal-Adapt predicts that average annual temperatures in the Los Angeles region will increase 3-4°F by mid-century and 3-8°F by end-of-century and extreme heat days to 11-16 per year by mid-century, and 11-37 per year by end-of-century.

The adaptation actions in this section establish a roadmap for the City to implement new and improved existing programs to address extreme heat now and in the future. Prioritizing tree planting in communities that are most vulnerable to higher temperatures is an example of an improvement that will be made to an existing program. An example of a new effort includes requirements for cool roofs and reflective surfaces to reduce temperatures and save energy. As it implements each action, the City will prioritize specific populations and communities that are most vulnerable to extreme heat.

# EH Extreme Heat

**Goal: Long Beach buildings, neighborhoods, and infrastructure are climate resilient, reduce the urban heat island effect, and are set up to ensure and improve public health and safety in the face of extreme heat events**

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| New and existing buildings, streets, and public spaces reduce extreme heat through incorporation of cool surfaces and green infrastructure | EH-1 | Increase presence of cool roofs and cool walls |
| | EH-2 | Increase the presence of reflective streets, cool surfaces, and shade canopies |
| | EH-3 | Enhance and expand urban forest cover and vegetation |
| All residents have access to services and programs to withstand extreme heat events | EH-4 | Install additional water fountains and other actions to increase public access to water |
| | EH-5 | Identify future vulnerability potential for power outages related to extreme heat and develop plans to prevent such outages |
| | EH-6 | Enhance and expand the accessibility of cooling centers |
| Public transit is a comfortable and viable mobility option during extreme heat events, especially for transit-dependent populations | EH-7 | Provide bus shelter amenities |
| | EH-8 | Improve beach and coastal transit access during extreme heat events |

# EH-1 Increase Presence of Cool Roofs and Cool Walls

Increase the installation of cool roofs and cool walls to keep buildings and neighborhoods cooler.

**Implementation Lead:** Development Services
**Partners:** Long Beach Department of Health and Human Services; City of Long Beach Office of Sustainability; SCE; Long Beach Parks, Recreation, and Marine
**Timeline:** Short and Medium
**Potential Cost Level:** Low

## Description

The City will consider instituting a requirement that cool roofs be used on new and replaced commercial and residential roofs. The City will also develop a process for assessing the feasibility of cool and green roofs on future development projects and existing candidate buildings, focusing on neighborhoods that would benefit most from reduced temperatures and additional green space. While this action provides broader public health and quality of life benefits, populations most impacted by climate change, especially the sick, the young, and the elderly and low-income communities stand to benefit the most.

Cool roofs and walls are made of materials that help reflect the sun's energy, such as light-colored paints, roof tiles, coatings and shingles. Such materials effectively reduce the amount of the sun's energy that enters a building. This keeps homes and businesses cooler, and reduces the amount of additional cooling that may be needed to keep internal air temperatures at a healthy level (particularly during heat waves). Reflective surfaces also lower temperatures in the surrounding neighborhood. Green roofs are covered partially or completely with living plants. Their benefits include cooler buildings, reduced GHG emissions, and reduced stormwater runoff.

## Co-benefits:

- ✓ Improved air quality
- ✓ Increased thermal comfort
- ✓ Reduced energy use and increased cost savings
- ✓ Reduced GHG emissions

## Implementing Actions

**EH-1.1:** Update the building code to mandate the installation of cool roofs on all new and retrofitted roofs.

**EH-1.2:** Explore opportunities to incentivize the establishment of cool roofs on existing roofs. Explore the feasibility of incentivizing the use of green roofs on new and existing roofs, focusing on areas with a high urban heat island effect and taking CalEnviroScreen and other relevant factors into consideration.

**EH-1.3:** Conduct education and outreach about cool roofs and the associated resources and incentives for commercial businesses, residents, and roofing companies that operate within the city.

## Equity Strategy

Prioritize neighborhoods that are most impacted by extreme heat, focusing on communities burdened with the poorest air quality.

# EH-2 Increase the Presence of Reflective Streets, Cool Surfaces, and Shade Canopies

Treat paved surfaces such as streets, parking lots, and playgrounds with reflective surfaces and install shade canopies to reduce urban heat.

**Implementation Lead:** Public Works Department
**Partners:** Long Beach City College; Cal State Long Beach; parking lot owners; Long Beach Parks, Recreation, and Marine; LBUSD
**Timeline:** Short
**Potential Cost Level:** Low to Medium

## Description

The City will identify priority areas for shade structures, cool pavement, and other reflective surfaces focusing on areas with high exposure to sunlight, heavy foot traffic, and populations vulnerable to heat. These areas may include playgrounds in addition to streets and parking lots. The City will consider disadvantaged communities (using CalEnviroScreen) as candidate sites for shade structures, cool pavement, and other reflective surfaces and include community engagement to inform cool street planning where applicable.

Roads that have been treated with a grey-colored, water-based asphalt emulsion that reflects the sun's rays instead of absorbing them, have shown to be an average of 10 to 15 degrees cooler than roads with traditional, untreated blacktop. Whereas traditional asphalt reflects around 10 percent of solar radiation and absorbs and radiates the remaining 90 percent as heat, cool pavement reflects 35 to 50 percent of the sun's rays. Shade is also a highly effective way of reducing temperatures and improving thermal comfort.

## Co-benefits:

- ✓ Increased life span for asphalt surfaces
- ✓ Improved air quality
- ✓ Reduced energy use and increased cost savings
- ✓ Reduced GHG emissions

## Implementing Actions

**EH-2.1:** Identify and establish priority corridors to focus effective pavement application where heat impacts are most severe.

**EH-2.2:** Conduct community engagement to identify playgrounds and parking lots that would benefit from cool pavement and shade installations.

**EH-2.3:** Identify necessary changes and amend the City's Municipal Code as appropriate to incentivize or require the use of cool pavement on projects.

**EH-2.4:** Identify and secure funds for capital improvements to increase the presence of reflective streets, surfaces, and shade canopies.

## Equity Strategy

Identify corridors in the areas most impacted by extreme heat and/or poor air quality to prioritize them for shade, cool pavement, and other reflective surfaces.

# EH-3 Enhance and Expand Urban Forest Cover and Vegetation

Expand and enhance urban forest cover and vegetation to mitigate urban heat island conditions.

**Implementation Lead:** Neighborhood Services Bureau; Public Works Department; City of Long Beach Office of Sustainability

**Partners:** Long Beach Parks, Recreation, and Marine; Conservation Corps of Long Beach; local community/neighborhood groups and stakeholders

**Timeline:** Short

**Potential Cost Level:** Low to Medium

## Description

The City will increase the urban forest and expand and enhance vegetation citywide to reduce the urban heat island effect. The City will build upon the Urban Forest Management Plan, with attention to reducing urban heat island conditions. The City will prioritize neighborhoods that are most impacted by extreme heat and poor air quality and that have higher vulnerability because they lack a sufficient amount of urban forest and green space or have fewer resources to limit exposure to heat (e.g., shelter, air conditioning). Emphasis is placed on selecting drought-tolerant plants or California natives, which require less water and offer multiple benefits.

Urban forest cover and vegetation can serve an important role in climate change adaptation by lowering temperatures and providing shade and evaporative cooling. This is important because extreme heat is projected to increase in Long Beach, leading to intensification of the urban heat island effect, which could exacerbate heat-related illnesses and infrastructure deterioration.

## Co-benefits:

- ✓ Increased carbon sequestration
- ✓ Improved energy conservation
- ✓ Enhanced wildlife habitat
- ✓ Improved air quality
- ✓ Increased natural stormwater management
- ✓ Increased access to green spaces
- ✓ Enhanced aesthetic and property values
- ✓ Increased creation of green jobs

## Implementing Actions

**EH-3.1:** Update the Urban Forest Management Plan with a focus on prioritizing reduction of urban heat island conditions through both increased urban forest and enhanced vegetation.

**EH-3.2:** Identify tree planting opportunities in subwatershed areas with the lowest urban forest cover to minimize stormwater runoff and help protect the area from flooding during intense storm events.

**EH-3.3:** Identify and prioritize the planting of drought-tolerant or California native trees to enhance and expand urban forest cover and vegetation.

**EH-3.4:** Identify and involve community stakeholders in the planning process to inform urban forest cover needs and priorities.

**EH-3.5:** Evaluate the cost of water and other infrastructure to provide ongoing maintenance for trees, and seek ways to meet those costs through the City's budget process, Capital Improvement Program, grants and other funding or financing opportunities.

**EH-3.6:** Incorporate tree planting into partnerships with different groups, such as students involved in group courses to design neighborhood adaptation approaches to extreme heat.

## Equity Strategy

Prioritize the enhancement and expansion of urban forest cover in neighborhoods that are the most impacted by extreme heat and poor air quality and that lack urban forest coverage and green space.

## Existing Program: Tree Planting to Enhance the Urban Forest Cover

The "I Dig Long Beach - 10,000 trees by 2022 Initiative," which hosts neighborhood tree planting events and engages residents in planting, watering, and caring for new trees, has planted 5,000 trees in the city to date. This program is part of the City's efforts to expand the urban forest and increase the canopy cover.

## Existing Program: Equity Toolkit

The Long Beach Equity Toolkit is a framework for equity offering specific strategies that can be applied to make positive changes through the City's policies, programs, and services. Acknowledging that a history of unfair laws and practices in Long Beach and the United States created many of the racial and social inequities that persist today, the toolkit supports the City in evaluating burdens, benefits, and outcomes for historically underserved or underrepresented communities while improving conditions for all citywide.

# EH-4 Install Additional Water Fountains and Take Other Actions to Increase Public Access to Water

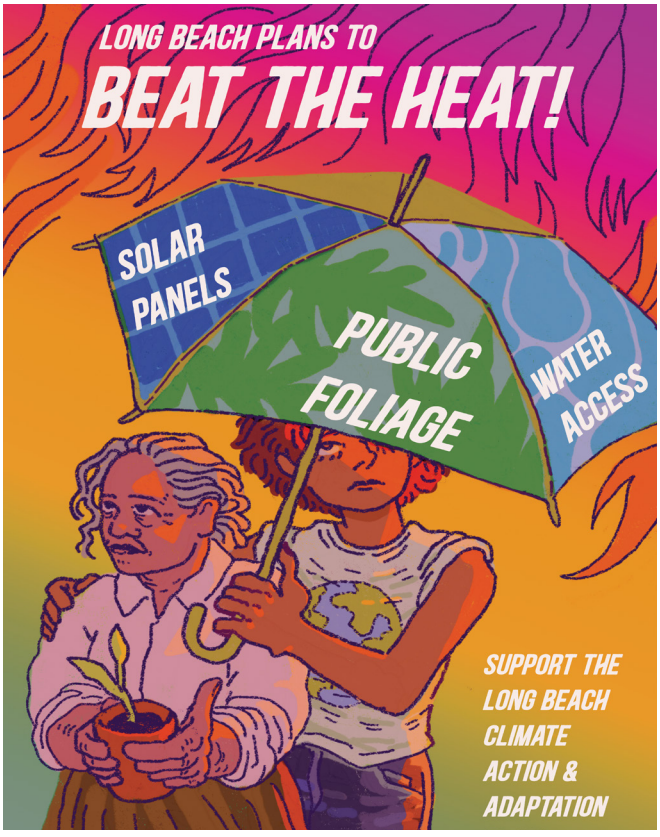
Ensure that water fountains are available in all public facilities, parks, and beaches, and where feasible at other public amenities.

**Implementation Lead:** Public Works Department
**Partners:** Long Beach Water Department; Long Beach Parks, Recreation, and Marine; LBUSD
**Timeline:** Medium
**Potential Cost Level:** Low

## Description

The City will identify locations and complete installations of water fountains at City facilities, partnering with other agencies such as LBUSD as appropriate. The City will also conduct outreach and promote awareness on the benefits of reusable water bottles in reducing plastic pollution, especially as it relates to the ocean and wetlands.

Climate change will bring more days of extreme heat, which can lead to dehydration, heat-related illness, injury, or death. Drinking fluids is crucial to staying healthy. Public water fountains offer access to free water and reduce waste. Outdoor workers, the homeless, and older adults often do not get enough fluids and risk becoming dehydrated and sick, especially during the summer.




## Co-benefits:

- ✓ Reduced dependence on single-use plastic water bottles
- ✓ Reduced plastic trash
- ✓ Reduced GHG emissions from single-use plastic production

## Implementing Actions

**EH-4.1:** Survey the location of public drinking fountains in the city to determine where water drinking fountains and water stations are needed or in need of repair or replacement.

**EH-4.2:** Work with LBUSD to ensure that school fountains are in a state of good repair.

**EH-4.3:** Work with WeTap to ensure that the smart phone app provides the coordinates of public water fountains.

**EH-4.4:** Support the Long Beach Water Department's efforts to spread awareness of its various services and outreach and engagement programs.

**EH-4.5:** Develop an education and awareness campaign at beaches and through schools to encourage people to carry refillable bottles. Explore additional opportunities with other organizations, such as the Long Beach Aquarium, to demonstrate plastic pollution impacts.

## Equity Strategy

Prioritize public water access in areas most impacted by extreme heat, with a focus on opportunities to serve children, seniors, core transit riders, and low-income communities.

Image: ArtCenter College of Design, Designmatters. Image + Idea Course, spring 2020

# EH-5 Identify Future Vulnerability Potential for Power Outages Related to Extreme Heat and Develop Plans to Prevent Such Outages

Continue to partner with Southern California Edison to assess current grid vulnerabilities related to extreme heat to prevent future potential power outages due to worsening heat waves because of climate change.

**Implementation Lead:** Disaster Preparedness and Emergency Communications; Public Works
**Partners:** City of Long Beach Office of Sustainability; SCE
**Timeline:** Short
**Potential Cost Level:** Medium

## Description

The City will continue to work with SCE to assess potential grid vulnerabilities due to worsening extreme heat and to develop and refine strategies and actions to prevent future power outages related to extreme heat. Depending on the results of the assessment, actions will be identified and prioritized to reduce pressure on the grid as well as to build Long Beach's resilience to these power outages, such as by establishing microgrids. This will also include using the recently developed guidelines produced by SCE for conducting maintenance outages in relation to extreme heat events.

Extreme heat events result in increased use of air conditioning, which causes strain on the transmission lines and the electrical grid. Sagging of power lines in high heat events can cause safety and/or outage issues. This means heat waves can cause power outages that could be inconvenient and even life threatening for vulnerable residents of Long Beach.


## Co-benefits:

- ✓ Expansion of renewable energy capacity
- ✓ Enhanced grid stability

## Implementing Actions

**EH-5.1:** Collaborate with SCE to determine how Long Beach can contribute to their existing efforts to prevent and prepare for power outages related to extreme heat.

**EH-5.2:** Develop a mitigation plan to prevent and be prepared for future power outages related to extreme heat.

**EH-5.3:** Identify and prioritize actions to build resiliency into the local electrical infrastructure through new actions or by partnering and expanding upon existing SCE actions.

## Equity Strategy

Develop a power outage plan that prioritizes emergency response and resiliency of the elderly, young, and low-income communities.

# EH-6 Enhance and Expand Accessibility of Cooling Centers

Evaluate the existing cooling center network, facilitate the usage of cooling centers citywide and identify areas of expansion, prioritizing the communities most vulnerable to extreme heat.

**Implementation Lead:** Disaster Preparedness and Emergency Communications; Long Beach Department of Health and Human Services; Long Beach Parks, Recreation, and Marine; Library Services Department

**Partners:** LBUSD; faith- and community-based organizations

**Timeline:** Short

**Potential Cost Level:** Low to Medium

## Description

The City will evaluate the existing cooling center network to better understand the utilization characteristics of community centers and libraries. Factors to be evaluated include the hours of operation, capacity, characteristics such as presence of functioning HVAC systems, access in neighborhoods most vulnerable to extreme heat, community awareness of the centers, staff preparedness, transit accessibility, digital inclusion, and other variables. The City will develop a set of strategies to increase the usage and effectiveness of the network and individual centers. Improvements will be prioritized in low-income communities most vulnerable to extreme heat. The City will also work with faith- and community-based organizations to strengthen the public use of churches, temples, mosques, and other buildings as cooling centers.

As climate change increases the likelihood of frequent and extreme heat events, indoor facilities (e.g., cooling centers) can provide relief for those who are impacted by heat illnesses, such as heat cramps, heat exhaustion, and heat strokes.

## Co-benefits:

- ✓ Enhanced use of public buildings

## Equity Strategy

Prioritize increasing access to cooling centers for those most at-risk of heat-related injury, illness and death, such as people experiencing homelessness, seniors, young children and infants, pregnant women, people with chronic illnesses, transit riders, and outdoor workers.

## Implementing Actions

**EH-6.1:** Evaluate the existing cooling center network and identify various means to expand access, prioritizing neighborhoods and households most vulnerable to extreme heat.

**EH-6.2:** Partner with the school district and faith- and community-based organizations to identify and provide resources to existing and new cooling centers.


Image: ArtCenter College of Design, Designmatters. Image + Idea Course, spring 2020

# EH-7 Provide Bus Shelter Amenities

Provide more bus shelter amenities to help prevent health effects from long sun exposure and to incentivize usage of public transportation.

**Implementation Lead:** Public Works Department; Long Beach Transit
**Partners:** Outdoor advertising companies
**Timeline:** Short
**Potential Cost Level:** Low to Medium

## Description

The City will work with Long Beach Transit to complete a full assessment of bus stops to identify potential improvements. This will include focusing on such right-of-way improvements as sidewalk width, bulb-outs, and Americans with Disabilities Act accessibility, which are often prerequisites for bus stop improvements. In addition, the City will ensure that the permitting and installation process is carried out through completion.

High-quality bus stops that include a combination of amenities, such as shade, seating, and hydration stations, can provide transit riders a refuge from high temperatures. This is especially critical for transit-dependent residents who rely on transit as their primary or only means of accessing key destinations and services. Transit-dependent youth and the elderly, sick, and disabled are particularly vulnerable to extreme heat. Shaded, high-quality bus stops also play an important role in attracting new transit riders and retaining existing ones, and increased transit ridership has strong air

## Co-benefits:

- ✓ Increased transit ridership
- ✓ Reduced GHG emissions

## Implementing Actions

**EH-7.1:** Work with Long Beach Transit to identify and prioritize bus stops without shade structures on highly utilized routes that are in areas with high heat vulnerability.

**EH-7.2:** Partner with Long Beach Transit to engage with transit riders and other stakeholders in identifying priority locations and desired bus stop features.

**EH-7.3:** Pursue public and private funding opportunities for bus shelter amenities, such as the Low Carbon Transit Operations Program, and through advertising companies.

**EH-7.4:** Facilitate the permitting and installation of new bus stop amenities.

## Equity Strategy

Prioritize bus stop amenities and improvements in neighborhoods with the largest populations of core transit riders and those that are most affected by extreme heat and many sources of pollution, as identified by CalEnviroScreen.

# EH-8 Improve Beach and Coastal Transit Access During Extreme Heat Events

Identify options to improve beach and coastal transit access during extreme heat events, with priority given to communities and populations that are most affected by extreme heat.

**Implementation Lead:** Long Beach Transit
**Partners:** California Coastal Commission; community organizations
**Timeline:** Short
**Potential Cost Level:** Low

## Description

The City will support Long Beach Transit in evaluating a range of options to improve beach access during extreme heat events, with priority given to highly vulnerable populations such as children, the elderly, people with disabilities, and communities and neighborhoods that are most susceptible to extreme heat. These options could include improvements to existing fixed transit routes, new fixed transit routes, shuttles or flexible transit service, and reduced or free transit rides.

During extreme heat events, coastal temperatures are often significantly lower than those farther inland. For those residents who do not have access to a car or are unable to drive, public transit that accesses the coast and beach offers a reprieve from high temperatures and provides additional recreational opportunities.

## Co-benefits:

- ✓ Increased transit ridership
- ✓ Reduced GHG emissions

## Implementing Actions

**EH-8.1:** Evaluate the beach and coastal transit access of communities and neighborhoods that are most vulnerable to extreme heat events.

**EH-8.2:** Identify options to improve the beach and coastal transit access of communities and neighborhoods that are vulnerable to extreme heat events.

**EH-8.3:** Partner with Long Beach Transit to identify strategies and funding mechanisms to expand or increase the frequency of transit services in order to improve beach access for communities that are the most vulnerable to extreme heat.

## Equity Strategy

Improve beach and coastal transit access for the populations most vulnerable to extreme heat, such as youth, the elderly, and people with disabilities, and for the geographic areas of the city most impacted by extreme heat conditions.

# AIR QUALITY ACTIONS

Air pollution is a major threat to public health and carries increased risk for vulnerable populations. In a 2006 assessment, the Long Beach Health Department found that 14 percent of residents suffer from asthma which is 2.5 percent higher than Los Angeles and 6 percent higher than the entire U.S. The report found that people of color and low-income communities were disproportionately impacted. All air quality actions taken by the City will prioritize vulnerable communities.[i]

Regional air quality has improved substantially over the past three decades, but it is still a major health issue in Long Beach, in particular for communities near freeways, industry, and the Port of Long Beach. Climate change has the potential to make air quality worse, negating some improvements in air quality that have been achieved and reducing the effectiveness of future efforts. Warming could increase the number of days violating air quality standards in the region by as much as 25-80 percent by end-of-century. Additionally, an increase in wildfires in the broader region could also lead to dangerous air quality levels. The combination of higher temperatures, precipitation change, and increasing CO2 concentrations is expected to increase pollen and some airborne allergens.

The City of Long Beach has made improved air quality a core priority through existing efforts such as the San Pedro Bay Ports Clean Air Action Plan, efforts to improve transit service, and efforts to spur the development of walkable, transit-oriented communities. The CAAP both continues and builds upon these and other efforts. The air quality adaptation actions target air pollution reductions from a variety of sources such as buses, landscaping equipment, the Long Beach Airport, and food transportation. Combined with the air pollution reduction co-benefits that are expected to result from the mitigation actions, the CAAP has the potential to lead to substantial improvements in air quality and public health.

[i] http://www.calhealthreport.org/2016/03/07/breathing-air-into-asthma-prevention-in-long-beach/

## AQ Air Quality

**Goal: All Long Beach communities have clean air and improved public health**

| OBJECTIVES | | ACTIONS |
|---|---|---|
| **Buildings and facilities actively reduce air pollution as a component of a broader energy reduction strategy.** | **AQ-1** | Incentivize installation of photocatalytic tiles |
| | **AQ-2** | Encourage urban agriculture practices that reduce air quality pollution |
| **Emissions are reduced by shifting to cleaner equipment and vehicles.** | **AQ-3** | Support the development of the Long Beach Airport Sustainability Plan |
| | **AQ-4** | Electrify small local emitters, such as lawn and garden equipment, outdoor power equipment, and others |
| | **AQ-5** | Work with Long Beach Unified School District (LBUSD) to support school bus electrification |
| | **AQ-6** | Implement the Port of Long Beach Clean Air Action Plan |
| **Air quality impacts from local oil and gas operations are minimized.** | **AQ-7** | Increase monitoring and regulation of oil extraction and refining process |

# AQ-1 Incentivize Installation of Photocatalytic Tiles

Support the installation of photocatalytic tiles to improve air quality.

**Implementation Lead:** Development Services
**Partners:** Long Beach Department of Health and Human Services; Harbor Department; South Coast Air Quality Management District (SCAQMD)
**Timeline:** Medium
**Potential Cost Level:** Low

## Description

To improve air quality, the City will support the installation of photocatalytic tiles by actively pursuing grant funding options to incentivize the installation of photocatalytic tile products. Typically embedded into cool roofing products, these tiles are covered with titanium-dioxide-coated granules that act as a catalyst for sunlight-activated chemical reactions that convert smog (nitrogen oxide [NOx]) into other substances, such as calcium nitrate and water. This action will include collaborating with SCAQMD, community partners, developers, and other stakeholders to identify projects that could incorporate photocatalytic tiles as part of a more holistic emissions reduction strategy that prioritizes the neighborhoods and communities near the Port and the Interstate 710 (I-710) corridor, which are heavily impacted by air pollution.


## Co-benefits:

- ✓ Reduced air pollution through use of smog-reducing granules, when combined with reflective material, as well as lower both indoor and outdoor temperature
- ✓ Reduced greenhouse gas (GHG) emissions

## Implementing Actions

**AQ-1.1:** Work with SCAQMD, community groups, and stakeholders to identify projects that could incorporate photocatalytic tiles as part of a more holistic emissions reduction strategy.

**AQ-1.2:** Pursue funding to retrofit existing buildings, new developments, and/or redevelopments that could incorporate photocatalytic tiles as part of a more holistic emissions reduction strategy.

**AQ-1.3:** Partner with SCAQMD to monitor air pollutant reductions resulting from the installation of photocatalytic tiles.

**AQ-1.4:** Contingent on initial success, explore code changes to require or incentivize photocatalytic tiles in communities with poor air quality.

## Equity Strategy

Evaluate the air quality benefits of installing photocatalytic tiles in neighborhoods with high pollution levels and prioritize projects that will provide the greatest benefits in Long Beach communities with the poorest air quality.

# AQ-2 Encourage Urban Agriculture Practices that Reduce Air Quality Pollution

Continue to incentivize urban agriculture practices and projects in community and home gardens that increase local food production and reduce air quality impacts from food transportation.

**Implementation Lead:** City of Long Beach Office of Sustainability; Long Beach Water Department
**Partners:** Library Services Department
**Timeline:** Short
**Potential Cost Level:** Low

## Description

The City will provide new incentives that encourage the overall expansion of urban agriculture in home and community gardens. Local urban agriculture has the potential to improve air quality and access to healthy food for Long Beach residents. Food imported from outside the region is generally transported long distances by trucks and ships that produce substantial quantities of air pollution. In addition, urban agriculture can incorporate drought-tolerant practices that further increase the water and emissions efficiency of local food production.

The Long Beach Water Department has a robust Lawn-to-Garden (L2G) program that provides rebates for replacing grass with drought-tolerant gardens. Expanding the L2G program to include urban agricultural components may include identifying incentives for drought-tolerant seeds and plants, rain capture and drip irrigation systems, and other water conservation equipment.


## Co-benefits:

- ✓ Increased local food security and strengthened local food system
- ✓ Increased public health benefits resulting from healthy food access
- ✓ Decreased urban heat island effect

## Implementing Actions

**AQ-2.1:** Develop new incentives that encourage the expansion of urban agriculture in home and community gardens.

**AQ-2.2:** Explore ways to incorporate urban agriculture components in the L2G program, including incentives.

**AQ-2.3:** Evaluate ways to reduce barriers to urban agriculture in home and community gardens, including amending the zoning code, waiving and reducing fees, and providing guidance on City processes.

**AQ-2.4:** Develop educational and training opportunities for drought-tolerant urban agriculture.

## Equity Strategy

Support urban agriculture as a means of enhancing local food access and decreasing neighborhood food insecurity, and prioritize options for renters.

# AQ-3 Support the Development of the Long Beach Airport Sustainability Plan

Work with Long Beach Airport to support the development of the Long Beach Airport Sustainability Plan, with a focus on reducing emissions from vehicles and equipment at the airport.

**Implementation Lead:** Long Beach Airport
**Partners:** City of Long Beach Office of Sustainability; airlines; aviation industry companies
**Timeline:** Long
**Potential Cost Level:** Low to Medium

## Description

The City will support the development and implementation of the Long Beach Airport Sustainability Plan to ensure the success of the airport's efforts to reduce emissions from ground vehicles and equipment, including expanding zero emission vehicle fleets, increasing electric-charging infrastructure, and pursuing Airport Carbon Accreditation. Over the long term, the City will also support efforts to explore the feasibility of longer-term technologies for the integration of electric airplanes into the airport's fleet.

Overall, the aviation industry accounts for 11 percent of all transportation-related GHG emissions in the United States, which are a result of burning jet fuel and releasing NOx and carbon dioxide ($CO_2$). By transforming Long Beach Airport into a center of GHG reduction innovation, the City will both improve local air quality and become a national leader in climate mitigation.

## Equity Strategy

Implement actions that improve air quality for impacted communities around Long Beach Airport.

## Co-benefits:

- ✓ Reduced GHG emissions
- ✓ Increased potential for energy savings
- ✓ Increased energy efficiency
- ✓ Reduced waste

## Implementing Actions

**AQ-3.1:** Work with Long Beach Airport to support the development and implementation of the Long Beach Airport Sustainability Plan, which includes reducing fuel use, reducing facility waste output, and replacing on- and off-road vehicles and equipment with zero- or low-carbon alternatives at the Long Beach Airport.

**AQ-3.2:** Encourage airlines to help customers in buying carbon offsets through their ticket purchase process.

**AQ-3.3:** Support the long-term integration of sustainable fuels and electric-powered airplanes operating out of Long Beach Airport.

## Existing Program: Sustainability at Long Beach Airport

In August 2018, the Long Beach City Council directed Long Beach Airport to work with its airlines and other partners to become an incubator of clean technology in aviation, with the goal of becoming a carbon-neutral facility. The City, which is the airport's owner and operator, has begun to develop a Long Beach Airport Sustainability Plan to reduce the airport's carbon footprint through actions that address air emissions, energy, water conservation, water quality, and solid waste and recycling. The Airport Modernization Program includes sustainability improvements ranging from facility upgrades to energy efficiency enhancements.

# AQ-4 Electrify Small Local Emitters, Such as Lawn and Garden Equipment, Outdoor Power Equipment, and Others

Support the replacement of small, fossil-fuel-powered engine equipment with electric-powered equipment.

**Implementation Lead:** Public Works Department; Long Beach Parks, Recreation, and Marine
**Partners:** SCAQMD; California Air Resources Board (CARB)
**Timeline:** Short and Medium
**Potential Cost Level:** Low to Medium

## Description

City staff will support the replacement of small fossil-fuel-powered engine equipment with electric-powered equipment. These small off-road engines, which are primarily used for lawn, garden, commercial utility, and other outdoor power equipment (e.g., generators, utility carts), contribute greatly to local air pollution. At least 50 cities across the state already have some sort of regulation on lawn and garden equipment.

As of 2017, the population of small engines in California (16.7 million) is estimated to be greater than that of light-duty passenger cars (13.7 million). This engine population consists of 77 percent residential lawn and garden equipment, 9 percent commercial lawn and garden equipment, 11 percent federally regulated construction/farming equipment, and 3 percent other equipment types (e.g., generators, utility carts). In Long Beach, the amount of fossil-fuel-powered small engines operated by the City, by commercial landscapers, and by residential owners is unknown. As an initial step, the City will immediately implement the recommendation of the Board of Health and Human Services that City-owned fossil-fuel-powered leaf blowers be model years 2007 or newer and be 65 decibels (sound level) or less. This will be followed by a process to identify options to require all-electric equipment to be used in the future in City operations and City-owned equipment as well as privately owned equipment.

## Co-benefits:

- ✓ Reduced noise from leaf blowers, lawn mowers, and other landscaping equipment
- ✓ Reduced GHG emissions

## Implementing Actions

**AQ-4.1:** Conduct outreach and education efforts to inform the general public of the emissions impacts of this equipment and work with SCAQMD to publicize its Electric Lawn and Garden Equipment Incentive and Exchange Program and Residential Lawn Mower Rebate Program.

**AQ-4.2:** . Collaborate with SCAQMD and CARB to advance regulations restricting the use of small fossil-fuel-powered emitters.

**AQ-4.3:** Phase out City-owned fossil-fuel-powered lawn and garden equipment, and establish requirements for vendors contracted by the City to do the same.

## Equity Strategy

Work with the regulatory agencies to provide assistance and incentives for private phase out to reduce financial barriers for commercial landscapers and residents as needed.

# AQ-5 Work With LBUSD to Support School Bus Electrification

Explore opportunities to support the LBUSD in transitioning the district's school bus fleet from diesel-powered to electric vehicles.

**Implementation Lead:** LBUSD
**Partners:** CARB; California Energy Commission; SCAQMD; Southern California Edison (SCE); Long Beach Transit
**Timeline:** Short
**Potential Cost Level:** Low to Medium

## Description

LBUSD discontinued daily school bus transportation in 2013. However, school buses are still used for transporting students to field trips and athletic events. School buses are also regularly used by students enrolled in the district's Special Education Program. LBUSD is working on programs to transition to electric buses, including working with vendors that already have renewable natural gas electric buses. In partnership with LBUSD and others, the City will explore opportunities to support the transition of the school bus fleet from diesel-powered to electric vehicles. Moving forward, the City will identify ways to support LBUSD in exploring opportunities to transition its current diesel-powered fleet, , including applying for incentives for buses and supportive infrastructure such as charging stations.

The negative impacts of using diesel-powered school buses are well documented and are known to affect lung development and have respiratory health effects over time. Transitioning diesel-powered buses to electric power will have positive, long-term public health impacts on children and neighborhoods along bus routes.

## Co-benefits:

✓ Reduced GHG emissions

## Implementing Actions

**AQ-5.1:** Identify ways to support LBUSD and other partners in applying for funding from state and local sources to transition from diesel-powered to electric buses.

**AQ-5.2:** Evaluate air quality impacts on specific school and bus route service areas to prioritize planning efforts.


## Equity Strategy

Target efforts to phase out diesel-powered buses for electric buses in school and bus route service areas with the poorest air quality.

# AQ-6 Implement the San Pedro Bay Ports Clean Air Action Plan

Continue to implement the San Pedro Bay Ports Clean Air Action Plan and align with the City's overall GHG emissions reduction targets.

**Implementation Lead:** Harbor Department
**Partners:** Drayage truck owners; terminal operator; intermodal rail yards
**Timeline:** Ongoing
**Potential Cost Level:** Low to High

## Description

The Port will continue to implement the San Pedro Bay Ports Clean Air Action Plan, which contains a comprehensive set of strategies focused on improving air quality. This includes achieving up to 100 percent compliance with state requirements for ships to use shore power or alternative capture technologies while docked. It also includes continuing implementation of the Clean Trucks Program and adoption of a suite of additional actions. The Port will continue to work in partnership with its tenants; regional, state, and federal agencies; and other stakeholders to implement the plan, invest in developing and deploying clean technologies, and advocate for needed policies and funding. The Port has engaged with environmental groups and local communities to encourage input and provides regular public updates on plan implementation.

The San Pedro Bay Ports Clean Air Action Plan provides a suite of strategies organized into the categories of clean vehicles and equipment technology and fuels, freight infrastructure planning and investments, freight efficiency, and energy resource planning. Actions include plugging ships into shore power while docked; reducing ship speeds; increasing the percentage of clean and alternative-fuel trucks accessing the Port; increasing the use of more efficient locomotives, hybrid and electric cargo equipment, and harbor craft; increasing energy efficiency and renewable power generation; investing in infrastructure to increase the efficient movement of cargo; and continuing the implementation of a Clean Trucks Program.

## Co-benefits:

- ✓ Reduced GHG emissions
- ✓ Improved public health

## Implementing Actions

**AQ-6.1:** Collaborate with the Port to implement Clean Air Action Plan strategies, maximizing air quality improvements and GHG emissions reductions.

**AQ-6.2:** Support the Port in implementing and expanding the Green Ports Collaborative.

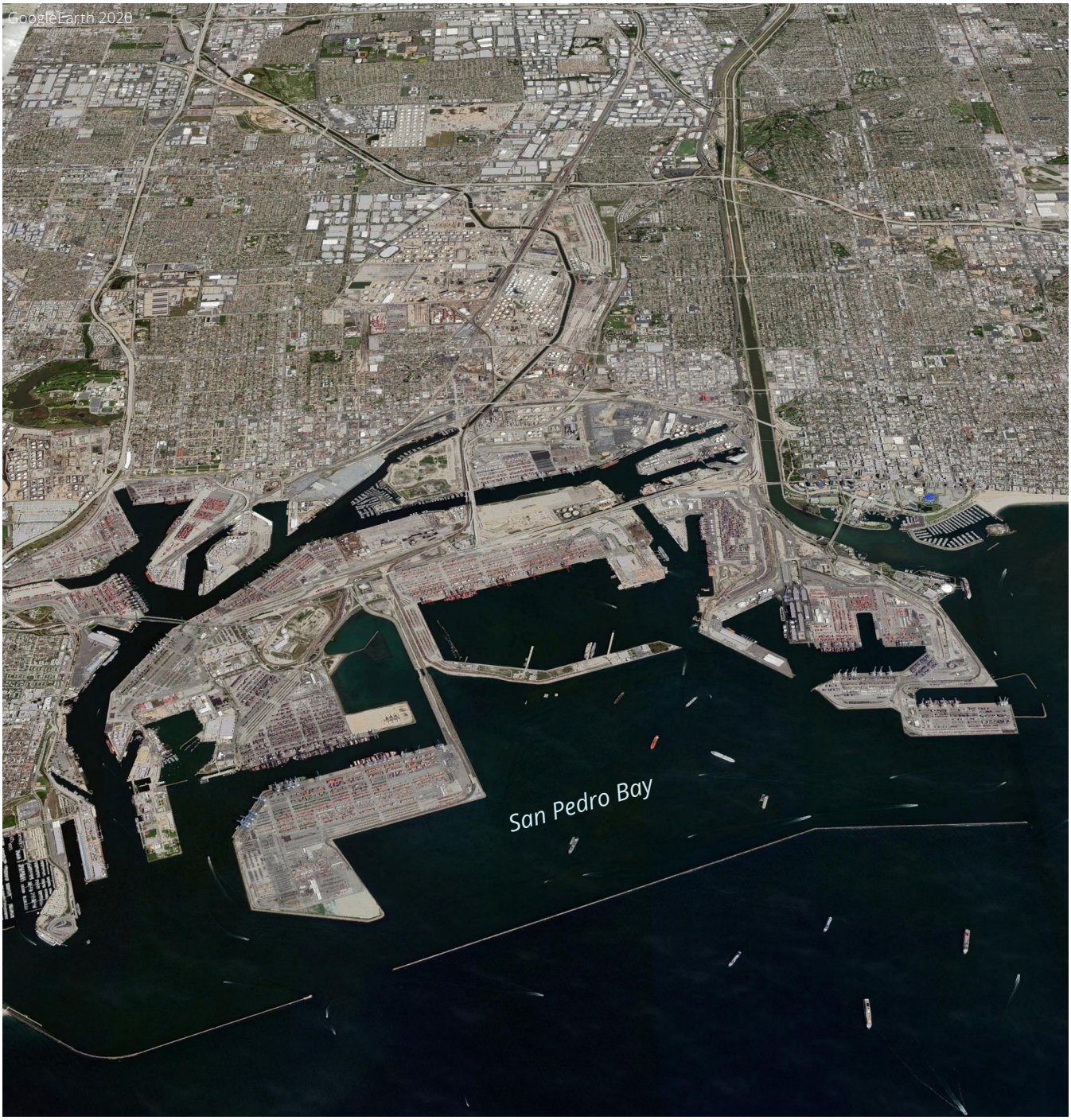
**AQ-6.3:** Support the Port's investments in the Technology Advancement Program to encourage green technology development and piloting.

**AQ-6.4:** Continue to provide quarterly and annual progress reports that are available to the public.

**AQ-6.5:** Collaborate with the Port to further reduce shipping-related emissions through use of 100% emissions-free cargo handling equipment by 2030 and implementation of state's shore power regulation for at-berth vessels.

## Equity Strategy

Prioritize actions that improve air quality for impacted communities surrounding the Port and along industrial corridors, and meaningfully include those communities in decisions about how actions should be implemented.




## Existing Program: San Pedro Bay Ports Clean Air Action Plan

The San Pedro Bay Ports Clean Air Action Plan accelerates the Port's progress toward a zero-emissions future. Since 2005, port-related air pollution emissions in San Pedro Bay have dropped 87 percent for diesel particulate matter, 56 percent for nitrogen oxides, and 97 percent for sulfur oxides. In 2017, the Mayors of the City of Los Angeles and City of Long Beach announced a joint declaration for creating a zero-emissions goods movement future, with goals of zero emissions for cargo-handling equipment by 2030 and zero emissions for on-road drayage trucks serving the ports by 2035.

# AQ-7 Increase Monitoring and Regulation of Oil Extraction and Refining Process

Establish air monitors outside of active wells that are within the Long Beach city limits. Conduct an audit survey of all methane emissions to check possible emissions coming from either active or abandoned oil wells.

**Implementation Lead:** Energy Resources Department; Long Beach Department of Health and Human Services

**Partners:** City of Long Beach Office of Sustainability; CARB; California Air Pollution Control Officers Association (CAPCOA)

**Timeline:** Medium

**Potential Cost Level:** Low

## Description

The State of California has some of the strictest air emission policies in the United States. In 2013, the Interagency Refinery Task Force was formed, and CARB and the California Air Pollution Control Officers Association (CAPCOA) were tasked with monitoring refineries across the entire state. Their March 2019 Report stated the need to increase air monitoring systems to gather relevant, reliable air quality data in real time to help make informed safety decisions. This is a priority for the State and impacts Long Beach and its residents. The City will increase its participation in this process and help grow this air monitoring network. The City will also audit all methane emissions from active or abandoned oil wells to check for possible noncompliance and make this data available to the public.

## Co-benefits:

- ✓ Availability of data to inform both state and regional regulators and others looking to protect their health
- ✓ If leaks identified through the monitoring, could lead to a reduction in fugitive methane emissions, a gas with a potent global warming potential

## Implementing Actions

**AQ-7.1:** Work with CARB and CAPCOA while developing the air monitoring program for oil wells.

**AQ-7.2:** Establish air monitors outside of active wells and create a schedule to regularly check their methane emissions. Conduct audits at wells to monitor compliance.

**AQ-7.3:** Regularly send air monitoring reports to regulators and CARB for review.

**AQ-7.4:** Make air monitoring data available to the public.

## Existing Program: West Long Beach Air Quality Monitoring

The Wilmington/Carson/West Long Beach community was designated by the California Air Resources Board for year one Assembly Bill (AB) 617 implementation. AB 617 is a law that focuses on reducing air pollution in California's environmental justice communities. As part of this effort, stakeholders in West Long Beach contributed to the development of a Community Air Monitoring Plan that will inform actions to reduce local exposure to harmful air pollutants.

## Equity Strategy

Using CalEnviroScreen and other appropriate data tools, identify locations for air monitors in neighborhoods that are the most impacted by poor air quality.

# DROUGHT ACTIONS

Changes in temperature and precipitation are predicted to produce longer and more frequent droughts that will have an impact on Long Beach's water supply. According to Long Beach Water, approximately 60 percent of the City's water supply is from local ground water, 25 percent is from the Colorado River, and 15 percent is from the Northern California Bay-Delta. Future drought patterns are expected to result in regional drying. This is expected to include continued reduction of the Sierra Nevada snowpack and snowmelt runoff earlier in the season that will stress supplies in the Northern California Bay-Delta. The Colorado River will also face similar dynamics. Local water demand is also expected to increase absent a shift to drought tolerant plant species. To respond to this challenging dynamic Long Beach will need to build on its successful efforts to use existing water resources more efficiently and diversify its water supply. The City has made significant strides through the initiation of a number of programs to respond to drought and meet and exceed state water use efficiency targets. This includes successful public outreach, education, and incentives to residents and businesses to conserve water. The City's Water Reclamation Plant recycles up to 25 million gallons of wastewater per day for reuse. The water is used at over 60 sites and for uses such as irrigation, both replenishment of groundwater supply and protection from saltwater intrusion, and re-pressurization of oil-bearing strata off the coast. What is not used is discharged to Coyote Creek.

To establish a more diverse and sustainable water supply the City will identify ways to increase the supply and use of recycled water, expand green infrastructure and streets, and increase the capture and storage of rainfall. These actions have numerous potential co-benefits such as water and energy savings, expansion of green space, and reduced urban heat island effects. The City will prioritize programs and infrastructure that benefit communities most impacted by climate change.

## DRT Drought

**Goal: Long Beach has a more sustainable and diverse water supply that reduces dependence on imported water and improves long-term water security**

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| Maximize water efficiency and conservation. | DRT-1 | Continue development and implementation of water use efficiency programs and implement additional water conservation programs |
| | DRT-2 | Enhance outreach and education related to water conservation |
| Maximize water that is captured and reused locally. | DRT-3 | Expand usage of green infrastructure and green streets |
| | DRT-4 | Expand usage of recycled water and greywater for non-potable use |
| | DRT-5 | Incorporate increased rainfall capture and other actions to maximize local water supplies and offset imported water |

# DRT-1 Continue Development And Implementation Of Water Use Efficiency Programs And Implement Additional Water Conservation Programs

Continue development and implementation of additional water use efficiency and conservation programs to help reduce water use.

**Implementation Lead:** Long Beach Water Department
**Partners:** City of Long Beach Office of Sustainability; Metropolitan Water District of Southern California (MWD)
**Timeline:** Short
**Potential Cost Level:** Low to Medium

## Description

Building upon Long Beach's Water Resources Plan and Urban Water Management Plan, the City will identify and move forward with further water conservation programming and efficiency measures to help reduce overall usage. Water use efficiency programs provide cost savings to customers through water utilities and through electricity and gas utilities, due to the reduced need for these resources to transport and heat water. Mitigating utility cost burdens will play a role in controlling costs for residents and businesses.

Long Beach's Water Resources Plan and Urban Water Management Plan are intended to ensure that Long Beach will achieve the water use reduction and efficiency targets set by the State of California. Identifying additional strategies will help reduce reliance on imported water and reduce GHG emissions, since importing water to Southern California accounts for 20 percent of the state's electricity.1

## Equity Strategy

Conduct targeted water efficiency program outreach to ensure that low-income communities benefit from cost savings.

## Existing Program: Certified Blue Restaurant Program

The Certified Blue Restaurant program supports and recognizes Long Beach restaurants for achieved water efficiency. Restaurants can receive a no-cost, on-site efficiency survey, free water-efficient devices, and an assessment for other possible rebates.

## Co-benefits:

- ✓ Reduced GHG emissions through conservation of gas and electricity needed to distribute and heat water
- ✓ Increased protection of upstream rivers and wildlife habitat
- ✓ Reduced urban runoff and thus reduced pollution of coastal waters (based on reduced landscape irrigation)

## Implementing Actions

**DRT-1.1:** Monitor Assembly Bill 1668 and Senate Bill 606 on water restriction and conservation.

**DRT-1.2:** Identify partners and participants for water use efficiency outreach and education. Conduct outreach to residents to ensure they understand the programs that are available and the eligibility requirements.

**DRT-1.3:** Establish water use efficiency programs tailored to commercial, industrial, and institutional water users.

**DRT-1.4:** Identify potential incentives and requirements that can be included in City contracts to reduce the use of potable water and spur access to and use of recycled/reclaimed water for uses such as sidewalk pressure washing and landscape irrigation.

**DRT-1.5:** Establish programs to invest in City infrastructure that can create water efficiency, such as irrigation systems and water-reuse systems in parks.

**DRT-1.6:** Conduct an analysis of program and rebate participation by census tracts to spur greater participation in new and existing programs within the low-income communities most impacted by climate change.

[1] http://www.lbwater.org/Residential%20

# DRT-2 Enhance Outreach and Education Related to Water Conservation

Enhance public outreach campaigns to promote water conservation and efficient water use.

**Implementation Lead:** Long Beach Water Department
**Partners:** City of Long Beach Office of Sustainability; Library Services Department
**Timeline:** Short
**Potential Cost Level:** Low

## Description

The City will build upon its existing water conservation educational programs and consider launching an ad campaign focusing on water conservation at home, the importance of water to the region, and how water conservation translates to cost savings for Long Beach residents. The City will seek opportunities to enhance its water conservation trainings and workshops. Outreach and education will consider targeting high water usage behaviors to reduce consumption and low-income communities to share the resources and cost savings associated with water conservation. Water conservation should complement efforts to maximize local water supplies and improve water efficiency. Water conservation efforts can aim to share various water conservation practices and resources with residents and businesses.


## Co-benefits:

- ✓ Increased conservation of gas and electricity needed to distribute and heat water, resulting in reduced GHG emissions
- ✓ Reduced water, electricity, and gas utility costs to residents
- ✓ Increased opportunities to coordinate community engagement with other Climate Action and Adaptation Plan (CAAP) initiatives

## Implementing Actions

**DRT-2.1:** Identify partners and participants for water conservation outreach and education.

**DRT-2.2:** Continue to develop outreach and educational programming.

**DRT-2.3:** Continue the existing educational campaign to achieve citywide goals for residential water use reductions.

## Equity Strategy

Ensure that low-income and drought-vulnerable communities receive information about the cost savings and other benefits from water conservation. Identify and implement ways to maximize costs savings and other benefits for those communities.

# DRT-3 Expand Usage Of Green Infrastructure And Green Streets

Incorporate green infrastructure and green streets to diversify water supply, increase natural and stormwater capture, prevent urban runoff, reduce the demand on existing infrastructure, reduce the heat island effect, and increase sustainability and resiliency.

**Implementation Lead:** Public Works Department; Long Beach Parks, Recreation, and Marine
**Partners:** City of Long Beach Office of Sustainability; Harbor Department
**Timeline:** Medium
**Potential Cost Level:** Medium to High

## Description

Green infrastructure – such as permeable pavement, bioretention areas, bioswales, or vegetated strips – can often be easily retrofitted into existing infrastructure, as evidenced by the Long Beach Water Department's Lawn-to-Garden program. The City will identify and implement strategies to diversify the water supply, reduce demand on existing infrastructure, and increase resiliency during droughts as well as heavy rainstorms. Examples of green infrastructure and green streets include approaches such as permeable pavement, bioretention areas, bioswales, and vegetated strips.

To start, the City will study and identify locations that are best suited for green infrastructure (i.e., areas that are prone to frequent flooding during rainfall events) and alleys or streets that are best suited for grey to green conversion. In addition, the City will start to identify potential incentives and requirements that can be included in City contracts and on new developments.

## Co-benefits:

- ✓ Increased green space
- ✓ Reduced urban heat island effect
- ✓ Improved water quality
- ✓ Improved walkability

## Implementing Actions

**DRT-3.1:** Study and identify locations that are best suited for green infrastructure, such as areas that are prone to frequent flooding during heavy rainfall events.

**DRT-3.2:** Study and identify alleys or streets that are best suited for grey to green conversion for inclusion in the City's Capital Improvement Program and other investment prioritization. Conduct outreach to residents to discover any existing concerns with the alley or street, such as frequent flooding, low lighting, or pedestrian and bicycle safety, and to understand how the space could best be used by the community.

**DRT-3.3:** Identify potential incentives and requirements that can be included in City contracts and in new developments to increase the amount of stormwater capture and reduce the amount of impervious areas in projects.

**DRT-3.4:** Develop a green infrastructure design or technologies guide to facilitate and encourage the use of green infrastructure in new developments.

## Equity Strategy

Prioritize investments in communities with the least green space and the greatest climate risks, and that are located in the most vulnerable subwatershed areas.

# DRT-4 Expand Usage of Recycled Water and Greywater for Non-Potable Use

Increase and incentivize recycled water and greywater use to establish a more diverse water supply portfolio.

**Implementation Lead:** Public Works Department; Long Beach Parks, Recreation, and Marine
**Partners:** City of Long Beach Office of Sustainability; MWD; Water Replenishment District of Southern California; Long Beach Water Department
**Timeline:** Medium
**Potential Cost Level:** Medium to High

## Description

Currently 6 million of the 25 million gallons of water treated per day at the Long Beach Water Reclamation Plant is reused at more than 60 reuse sites, which include schools and parks, and there is public support for continuing and expanding this use. The City will identify and implement strategies to expand the usage of recycled water and greywater for non-potable use, such as landscape irrigation. This would establish a more diverse water supply portfolio, which would increase resiliency to drought and reduce reliance on imported water. Initial strategies will include identifying partners and participants for recycled water and greywater outreach and education to ensure residents understand the available programs and eligibility. In addition, the City will also explore potential incentives and requirements that can be included in City contracts to reduce the use of potable water.


## Co-benefits:

- ✓ Reduced GHG emissions from importing water
- ✓ Increased water and energy savings
- ✓ Expanded green space
- ✓ Reduced urban heat island effects

## Implementing Actions

**DRT-4.1:** Identify partners and participants for recycled water and greywater outreach and education. Conduct outreach to residents to ensure they understand the programs and the eligibility requirements.

**DRT-4.2:** Identify potential incentives and requirements that can be included in City contracts to reduce the use of potable water and spur access to and use of recycled or greywater for uses such as irrigation.

**DRT-4.3:** Conduct analysis of program and rebate participation to spur greater participation in new and existing programs and expand the greywater infrastructure system.

**DRT-4.4:** Identify options to incentivize or require greywater use for irrigation and incorporate greywater into new building standards.

## Equity Strategy

Prioritize investments in low-income communities and the most vulnerable subwatershed areas.

## Existing Program: LB-MUST

In April 2016, the City Council approved a $28 million Cooperative Implementation Agreement with the California Department of Transportation (Caltrans) for the design and construction of an innovative stormwater treatment plant. The Long Beach Municipal Urban Stormwater Treatment Recycle Facility, or LB-MUST, will be built along the east bank of the Los Angeles River in the area between 4th and 7th Streets and will capture polluted urban runoff before it enters the river. This will stop pollution from entering the river and beaches, provide a source of water for use in  create recreational space along the river.

## Existing Program: Long Beach Water Department

The Long Beach Water Department installs, operates, and maintains the city's water distribution and sanitary sewer systems. Groundwater is pumped using groundwater wells located throughout the city and is enough to fulfill around 60 percent of Long Beach's water needs. The rest of the water supply in Long Beach, about 40 percent, comes from imported sources. The two main imported water sources are the Colorado River watershed and the Sacramento-San Joaquin Bay Delta. That water is imported into the region by the MWD. In addition, the Long Beach Water Department operates and maintains more than 700 miles of sanitary sewer lines that collect and deliver over 40 million gallons of wastewater per day for treatment.

# DRT-5 Incorporate Increased Rainfall Capture and Other Actions to Maximize Local Water Supplies and Offset Imported Water

Increase and incentivize rainfall capture and other actions to establish a more diverse water supply portfolio and maximize local water supplies from stormwater capture, recycled water, and groundwater.

**Implementation Lead:** Public Works Department; Long Beach Parks, Recreation, and Marine
**Partners:** City of Long Beach Office of Sustainability; MWD; Water Replenishment District of Southern California; Long Beach Water Department
**Timeline:** Medium
**Potential Cost Level:** Low to Medium

## Description

Long Beach receives its potable water supply from two main sources – groundwater and imported water. Roughly 60 percent of the Long Beach water supply is local groundwater. The rest of the City's drinking water comes from two imported water sources: the Colorado River and Northern California's Sacramento-San Joaquin Bay Delta region.

The City will pursue strategies that include identifying incentives and exploring regulatory options to encourage rainfall capture, and other actions that maximize local water supplies that can be incorporated in new developments when possible. The City will capture rainwater for use on-site when possible. The City will consider expanding community outreach and participation in rainwater collection and reuse, and will prioritize rainfall capture programs that benefit disadvantaged communities (as identified by CalEnviroScreen).

## Equity Strategy

Ensure that low-income and drought-vulnerable communities can benefit from cost savings and augmenting household water supply through rainfall capture.

## Co-benefits:

- ✓ Reduced GHG emissions from importing water
- ✓ Increased conservation of gas and electricity needed to distribute and heat water
- ✓ Reduced stormwater runoff and demand on existing infrastructure
- ✓ Increased benefits to parks and recreational opportunities through irrigation with harvested rainwater

## Implementing Actions

**DRT-5.1:** Identify potential incentives and requirements for water reuse strategies, such as rainfall capture and harvesting in private developments.

**DRT-5.2:** Explore opportunities to integrate rainfall capture and harvesting in City facilities or by entities with whom the City has contracts.

**DRT-5.3:** Identify partners and participants for rainfall capture outreach and education. Conduct outreach to residents about available programs and eligibility, and target qualifying low-income renters and homeowners.

**DRT-5.4:** Apply for funding to supplement the existing MWD rebate for rain barrels and cisterns.

**DRT-5.5:** Conduct an analysis of existing program and rebate participation to inform efforts toward greater participation in new and existing programs to increase rainfall capture and harvesting.

# SEA LEVEL RISE AND FLOODING ACTIONS

Mean sea levels off the coast of Long Beach rose by approximately one millimeter per year from 1923 to 2016 according to tide gauge data, for a total of around 3.7 inches. This is expected to accelerate in the coming decades. Relative to the year 2000, Long Beach could experience approximately 11-inch of sea level rise (SLR) by 2030, 24-inch by 2050, and 66-inch by 2100. Low-lying areas, such as Belmont Shore, Naples, and the Peninsula are already experiencing coastal flooding, particularly during combined high tide and rain events. As sea levels continue to rise, these areas of the City are expected to be more frequently impacted by higher storm tides, more extensive inland flooding and increased coastal erosion during storm events.

Homes, businesses, and City infrastructure, including roads, parks, buildings, the stormwater system, and utilities will increasingly be vulnerable to flood exposure. By 11-inch of SLR, critical assets at risk include, three fire stations in the Harbor District and along the Alamitos Bay Marina, marine safety facilities in the Harbor District, and a solid waste facility. Four miles of roads within the Harbor District would also be exposed under 11-inch of SLR from king tide flooding alone and an additional 45 miles from storm surge resulting from a 100-year storm. Although all beaches will likely experience erosion effects due to rising seas, by 11-inch of SLR, Alamitos Bay Beach, Mother's Beach, Belmont Shore Beach, and Peninsula Beach are largely exposed during king tide events. Without adaptation, exposure is expected to increase. By 2100 (66-inch of SLR), the number of critical facilities at risk increases to seven fire stations, three police facilities, and eight marine safety facilities. During king tide events, 89 miles of roadway would be exposed to king tide flooding with an additional 27 miles exposed due to storm surge flooding. Beaches likely to experience major erosion expand to include Alamitos Beach, Junipero Beach, Rosie's Dog Beach, and Long Beach City Beach. The City will employ an adaptive management approach to address existing and future impacts from sea level rise.

The foundation of this approach includes monitoring, keeping track of the latest projections, and updating plans for the near, medium, and long-term on a regular basis. The suite of adaptation actions includes establishing the monitoring program, integrating consideration of SLR and related impacts into City policies, plans, and programs, investing in resilient infrastructure and buildings, and striving to preserve coastal access and recreation among others. It will also require increased collaboration with regional, state, and federal partners to identify and fund adaptation strategies.

# FLD Sea Level Rise + Flooding

**Goal: Long Beach understands and is prepared for its future flood risk**

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| Short-Term Actions (to 2030)<br>City plans and policies are forward-looking and ensure projects and investments account for projected sea level and flooding impacts | **FLD-1** | Update and augment floodplain regulations as necessary |
| | **FLD-2** | Incorporate sea level rise language into citywide plans, policies, and regulations |
| | **FLD-3** | Establish a flood impacts monitoring program |
| | **FLD-4** | Incorporate adaptation into City lease negotiations |
| | **FLD-5** | Update the City's existing Stormwater Management Plan |
| Clear and sufficient information is on hand to identify and prioritize near-term adaptation needs and best practices | **FLD-6** | Conduct citywide beach stabilization study |
| | **FLD-7** | Review and conduct studies of combined riverine/coastal flooding and increased severity of rainfall events on watershed flooding |
| Adaptation strategies are implemented to protect vulnerable shoreline areas and wastewater infrastructure | **FLD-8** | Enhance dunes |
| | **FLD-9** | Inventory and flood-proof vulnerable sewer pump stations |
| Medium-Term Actions (2030-2050)<br>Vulnerable infrastructure is elevated or relocated | **FLD-10** | Relocate/elevate critical infrastructure |
| | **FLD-11** | Elevate riverine levees |
| Long-Term Actions (2050-2100)<br>Long-term physical adaptation strategies are selected and implemented based on additional research and community adaptation priorities, and prioritize natural solutions whenever possible. | **FLD-12** | Expand beach nourishment |
| | **FLD-13** | Construct living shoreline/berm |
| | **FLD-14** | Elevate street hardscapes |
| | **FLD-15** | Elevate streets/pathways |
| | **FLD-16** | Retrofit/extend sea wall |
| | **FLD-17** | Retreat/realign parking lots |
| | **FLD-18** | Extend/upgrade existing seawalls |
| Additional long-term adaptation options are evaluated using the best available science. | **FLD-19** | Investigate feasibility of managed retreat |
| | **FLD-20** | Evaluate feasibility of storm surge barrier at Alamitos Bay |

# FLD-1 Update and Augment Floodplain Regulations as Necessary

Update and augment floodplain regulations as necessary to limit, elevate, or provide floodproofing standards for development in areas designated as vulnerable to flooding in order to minimize physical damage to development.

**Implementation Lead:** Planning and Building
**Partners:** Federal Emergency Management Agency (FEMA); California Coastal Commission
**Timeline:** Short
**Potential Cost Level:** Low

## Description

The City will update and augment, as necessary, floodplain regulations that address the fact that sea level rise will increase the height of floodwaters and the inland extent of floodplains in Long Beach. Regulations will include new base flood elevation requirements informed by current science. Future updates to the ordinance will be informed by the latest projections and local impact monitoring. Longer-term updates may consider managed retreat if projections and observed local impacts warrant it. Regulations will include incentives for building owners to invest in resiliency improvements by either meeting or exceeding flood-resistant construction standards, even when they are not required by FEMA or a City building code.

Floodplain regulations will encourage building owners living and/or working in the floodplain to design or retrofit buildings to reduce damage from existing and future floods and potentially reduce long-term flood insurance costs. Overall, implementation of the action would improve the ability of the city's flood-prone neighborhoods to withstand and recover quickly from coastal flooding.

The Local Coastal Program will also be amended as needed.

## Equity Strategy

Evaluate risk and design assistance programs for building or retrofitting to a higher flood protection standard, with an emphasis on areas with social vulnerability to climate change, as defined by the Long Beach Vulnerability Assessment and other relevant information.

## Co-benefits:

- ✓ Coordinated regulations with energy building retrofit improvements
- ✓ Reduced flood insurance rates, potentially, of 5 to 45 percent

## Implementing Actions

**FLD-1.1:** Update Chapter 18.40 (Building Code) of the Long Beach Municipal Code and/or create new regulations, if necessary, to respond to future sea level rise conditions, referencing (FEMA) standards and other relevant guidelines as appropriate.

**FLD-1.2:** Develop minimum design standards to be considered for long-term flood protection, based on CAAP flooding maps and the most up-to-date projections as they become available.

**FLD-1.3:** Ensure other building code regulations (e.g., setbacks, building heights) are consistent with the updated standards developed for the Floodplain Ordinance.

**FLD-1.4:** Pursue FEMA grant program opportunities for adapting public facilities to flood impacts and other resilience investments.

**FLD-1.5:** Educate the public about resources available to individual property owners seeking to elevate and flood-proof their properties, including FEMA grant programs and potential insurance premium benefits.

**FLD-1.6:** Design flood protection assistance programs for low-income communities affected by flooding impacts, as feasible.

# FLD-2 Incorporate Sea Level Rise Language into Citywide Plans, Policies, and Regulations

Incorporate sea level rise adaptation into relevant plans, policies, and regulations (e.g., the General Plan, neighborhood plans, Local Coastal Program, design standards for capital projects).

**Implementation Lead:** Planning and Building; Public Works Department
**Partners:** Varies based on planning document
**Timeline:** Short
**Potential Cost Level:** Low

## Description

The City will incorporate consideration of sea level rise impacts and adaptation strategies into relevant plans, policies, and regulations in order to integrate sea level rise into a citywide planning framework. Consideration of sea level rise in various contexts by all city departments for various types of planning purposes (e.g., infrastructure planning, transportation planning, land use planning) is important. This effort will require coordination with and possible training for staff from the various departments responsible for relevant plans, policies, and regulations. Incorporating language related to sea level rise in City policies, plans, and guidelines can ensure that future investments by the City consider potential flood impacts and incorporate adaptation strategies, as appropriate.

SB 379 requires cities and counties to include climate adaptation and resiliency strategies in the Safety Elements of the General Plan. The Local Coastal Program will also be amended as needed.


## Co-benefits:

- ✓ Increased longevity of the project from consideration of sea level rise
- ✓ Increased assistance with future applications to FEMA
- ✓ Compliance with SB 379

## Implementing Actions

**FLD-2.1:** Identify and update as appropriate relevant city plans, policies, and regulations that should be prioritized due to sea level rise conditions, such as the Local Coastal Plan. Otherwise, incorporate sea level rise language in plans as they are updated.

**FLD-2.2:** Coordinate with and train staff from the various departments responsible for relevant plans, policies, and regulations.

**FLD-2.3:** Use CAAP sea level rise inundation maps and the most up-to-date projections, as they become available, to inform plan updates currently being prepared by the City.

## Equity Strategy

Plan for flooding impacts, with an emphasis on areas with social vulnerability to climate change as defined by the Long Beach Vulnerability Assessment and other relevant information.

Image: ArtCenter College of Design, Designmatters. Image + Idea Course, spring 2020

# FLD-3 Establish a Flood Impacts Monitoring Program

Establish a flood impacts monitoring program to monitor flood damage and inform the selection and deployment of adaptation and resilience strategies.

**Implementation Lead:** Disaster Preparedness and Emergency Communications; Public Works Department; Technology and Innovation Department; City of Long Beach Office of Sustainability; Tidelands Capital Improvement Division; Long Beach Parks, Recreation & Marine

**Partners:** Local schools; neighborhood associations; community organizations; local businesses; residents

**Timeline:** Short

**Potential Cost Level:** Low to Medium

## Description

The City will establish a program in which it will monitor flood impacts with support from the public. City efforts will include identifying existing and potential data sources to track sea level rise trends and flooding impacts in different areas of Long Beach. The program will monitor changes in sea level, storm event data, and the impacts of specific flooding events. In addition to direct impacts on property and infrastructure, the City will establish a framework to track City resources used in responding to flooding events, such as resources for repair, maintenance, and cleanup, and to track the effectiveness of existing adaptation strategies. The program will also include a complementary measure — a citizen monitoring component designed to harness the potential of citizen reporting through crowdsourcing platforms such as smartphone photos, webcams, and social media posts. The City will perform annual data reporting that includes data from both the City and the citizen monitoring, and will use the data to inform the selection of adaptation trigger points and appropriate adaptation strategies.

## Equity Strategy

Ensure low-income communities are well represented in the data collected through the flood impacts monitoring program in order to inform and prioritize improvements that enhance their resiliency.

## Co-benefits:

- ✓ Increased engagement of the public in flood response from including them in efforts to ground truth the accuracy of flood projections
- ✓ Improved City flood response based on site- or neighborhood-specific data

## Implementing Actions

**FLD-3.1:** Identify and use data sources such as tide gauges to track sea level rise and flooding impacts and trends.

**FLD-3.2:** Evaluate opportunities to install flood-monitoring technology to increase understanding of local impacts.

**FLD-3.3:** Develop and implement a public crowdsource flood impact monitoring platform and develop a process for evaluating submissions for incorporation in infrastructure improvements. Target outreach to low-income communities impacted by flooding to ensure an equitable geographic distribution of collected data.

**FLD-3.4:** Continue conversations with the Technology and Innovation Department about creating a public crowdsource flood impact monitoring program for the Go Long Beach app.

**FLD-3.5:** Complete annual or biannual evaluation and data reporting.

# FLD-4 Incorporate Adaptation into City Lease Negotiations

Include requirements and incentives for implementing adaptation strategies into new and renewed leases on City-owned land.

**Implementation Lead:** Economic Development Department; Harbor Department; Long Beach Airport

**Partners:** Public Works Department; Tidelands; Long Beach Parks, Recreation, and Marine; Coastal Commission; City lease holders

**Timeline:** Short

**Potential Cost Level:** Low

## Description

The City will develop and include an adaptation section in City lease applications and lease renewal negotiations. The new section will include a simplified map of flood vulnerability, extreme heat, and air quality zones or proximity to major emissions sources. For flood vulnerability, questions regarding the proposed location, cost, maximum life span of the infrastructure, and potential consequences of climate impacts, will guide tenants to the appropriate adaptation measures. The City will establish incentives and/or requirements to address extreme heat, air quality, drought, and reduce GHG emissions, which will be based on the exposure to climate change impacts and the potential benefits of adaptation strategies.


Dr. Jerry Schubel, President & CEO of the Aquarium of the Pacific discusses sea level rise.

## Co-benefits:

- ✓ Reduced service interruptions for tenants located in flood zones
- ✓ Increased awareness of flood risks for potential tenants
- ✓ Reduced GHG emissions from opportunity to incorporate other GHG mitigation and adaptation strategies

## Implementing Actions

**FLD-4.1:** Identify and develop mapping and GIS resources to best communicate the anticipated impacts of sea level rise, flooding, extreme heat, and air quality on City-owned property.

**FLD-4.2:** Establish leasing guidelines that include incentives, requirements, or a combination thereof, to incorporate adaptation components (and mitigation co-benefits) into new and renewed leases.

**FLD-4.3:** Develop sea level rise and flood provisions for tenant lease agreements.

**FLD-4.4:** Develop internal guidance and train City staff on how to perform evaluations effectively and provide information to applicants.

## Equity Strategy

Assess City-owned property based on social vulnerability to climate change, as defined by the Long Beach Vulnerability Assessment and other relevant information, to inform adaptation measures and priorities.

# FLD-5 Update the City's Existing Stormwater Management Plan

Update the City's existing Stormwater Management Plan to account for flood risks associated with climate change and develop a funding/implementation plan for fully fund storm drain and pump station improvements.

**Implementation Lead:** Public Works Department
**Partners:** Los Angeles County; Long Beach Parks, Recreation, and Marine
**Timeline:** Short
**Potential Cost Level:** Low to Medium

## Description

The City will update its Stormwater Management Plan to account for and adapt to additional flood risks associated with climate change, including sea level rise and more frequent and intense rain events. In addition to protecting water quality, the City will work with Los Angeles County to update the Stormwater Master Plan to prioritize efficient conveyance of excess stormwater to prevent inland flooding. Based on the findings of the evaluation, capital improvement projects to increase drainage efficiency and protect new and existing electrical and mechanical equipment (e.g., pump stations) from potential flood damage will be identified.

## Co-benefits:

- ✓ Increased longevity of projects from consideration of sea level rise and riverine flooding
- ✓ Increased assistance with future FEMA applications
- ✓ Compliance with SB 379

## Implementing Actions

**FLD-5.1:** Review and identify sections of the Stormwater Management Plan that could be updated with sea level rise language.

**FLD-5.2:** Review and incorporate data collected from the flood impacts monitoring program.

**FLD-5.3:** Assess, prioritize, and seek funding for stormwater management projects in low-income communities impacted by flooding. Identify co-benefit strategies for such projects, including urban greening.

**FLD-5.4:** Explore opportunities for tree planting in sub-watershed areas with the lowest urban forest cover to minimize stormwater runoff and help protect the area from flooding during intense storm events.

## Equity Strategy

Assess the Stormwater Management Plan from perspective of social vulnerability to climate change, as defined by the Long Beach Vulnerability Assessment and other relevant information to prioritize projects and solutions in areas of greatest need.

# FLD-6 Conduct Citywide Beach Stabilization Study

Conduct a citywide study to assess the feasibility of a combined nourishment and sand retention program. The study will estimate the sand volumes required to keep pace with sea level rise, costs, and potential sources of sand.

**Implementation Lead:** Long Beach Parks, Recreation, and Marine; Public Works Department
**Partners:** U.S. Army Corps of Engineers (USACE); California Coastal Commission, U.S. Geological Service; local universities
**Timeline:** Short
**Potential Cost Level:** Low

## Description

The City will perform a citywide beach stabilization study of how beaches may respond to sea level changes. The study will inform sound engineering and a cost-effective approach to planning for a future nourishment schedule. Beach nourishment refers to the introduction of sediment onto a beach and is primarily used to offset eroding conditions. Several scenarios will be considered in the modeling, including volumes of sand, material placement, sand composition, and the addition of hard engineering structures (e.g., groins and breakwaters) to promote the accumulation and longevity of placed sand.

Beach nourishment has been an ongoing component of the City's efforts to manage beaches. To maintain property protection and the recreational benefits of the City's beaches in the face of rising sea levels, engineering intervention will be necessary.

## Co-benefits:

- ✓ Increased recreational opportunities for residents and tourists

## Implementing Actions

**FLD-6.1:** Establish partnerships to cooperatively complete a stabilization study for regional beaches.

**FLD-6.2:** Conduct a citywide beach stabilization study and identify priority areas and strategies for beach nourishment and/or sand retention to inform future projects.

## Equity Strategy

Seek to increase beach stability with attention to public access to facilitate recreational opportunities and relief for all people during extreme heat days.

# FLD-7 Review and Conduct Studies of Combined Riverine/Coastal Flooding and Increased Severity of Rainfall Events on Watershed Flooding

Review and conduct studies to understand the potential influence of sea level rise and increased precipitation on flood risk at the riverine/coastal interface and along river channels.

**Implementation Lead:** Public Works Department; USACE; Los Angeles County
**Partners:** Other municipalities within the Los Angeles River Watershed and San Gabriel River Watershed
**Timeline:** Short
**Potential Cost Level:** Low to Medium

## Description

The City will carry out or partner on new studies and/or review existing studies of combined riverine/coastal flooding. The studies should provide both hydrologic and hydraulic analyses of watersheds and drainages that flow through Long Beach, and account for future projected changes in precipitation and sea level rise. The analyses will provide a more detailed understanding of future riverine flooding vulnerabilities. Urban flooding variables, such as the condition of stormwater infrastructure and the extent to which its characteristics exacerbate or mitigate flooding, will be factored in as well.

These analyses will help the City assess the potential impacts that flooding at the riverine/coastal interface will have on the surrounding neighborhoods and infrastructure. Similarly, a study of the impacts of changes in precipitation on watershed flooding will be used to understand how future flood conditions could increase flooding along river channels and in urban neighborhoods and to develop prioritized locations and timelines for elevating levees.

## Equity Strategy

Evaluate flooding in the neighborhoods along the three major river channels; these neighborhoods have high social vulnerability to climate change, based on the Long Beach Vulnerability Assessment.

## Co-benefits:

- ✓ Redeveloped channels that could provide recreation, open space, and/or habitat, and benefit disadvantaged communities in West and North Long Beach

## Implementing Actions

**FLD-7.1:** Identify and review existing studies of combined riverine/coastal flooding.

**FLD-7.2:** Conduct a study of combined riverine/coastal flooding to understand how flooding at the riverine and coastal interface will impact surrounding neighborhoods and infrastructure. Integrate consideration of urban flooding variables into the study to understand combined impacts.

**FLD-7.3:** Conduct a study of the impacts of increased precipitation on watershed flooding to understand how future flood conditions could increase flooding along river channels.

**FLD-7.4:** Based on studies of combined riverine/coastal flooding and increased precipitation impacts on watershed flooding, work with partners such as Los Angeles County to prioritize the locations and timelines for elevating levees and to prioritize other adaptive strategies, such as watershed restoration or green infrastructure, to reduce flood impacts.

# FLD-8 Enhance Dunes

Convert seasonal storm berms to year-round dunes through active dune restoration as part of an adaptive management strategy. Discontinue beach grooming and plant native dune species to allow natural vegetation to stabilize dunes and hold sand.

**Implementation Lead:** Long Beach Parks, Recreation, and Marine
**Partners:** Public Works Department; California Coastal Commission
**Timeline:** Short
**Potential Cost Level:** Medium to High

## Description

The City will convert seasonal storm berms to year-round dunes through active dune restoration as part of an adaptive management strategy. Dune restoration activities will include planting native beach vegetation, installing sand fencing to capture additional sand, and discontinuing beach grooming along the landside portion of each beach. Because residents of Long Beach have come to expect the beaches to be devoid of vegetation, educational signage will be necessary to communicate the purposes and advantages of dune restoration.

The communities of Belmont Shore and Alamitos Peninsula are vulnerable to flooding from a 100-year storm surge after 11 inches of sea level rise, and to flooding from a king tide after 24 inches of sea level rise. Both areas are fronted by coastal beaches, which could provide improved protection from storm surges if strategies are implemented to support the growth of sand dunes as a buffer.

## Co-benefits:

- ✓ Enhanced dunes may provide habitat benefits
- ✓ Decreased disruption to beach habitat and species, as beach grooming will be discontinued
- ✓ Reduced City expenditure over time on annual sand berm engineering

## Implementing Actions

**FLD-8.1:** Implement active dune enhancement strategies, including the planting of native beach vegetation and building of wooden fences to help retain sand.

**FLD-8.2:** Discontinue beach grooming to allow dunes and dune vegetation to form.

**FLD-8.3:** Protect dune restoration areas by using fences and build dune crossovers for beach access.

**FLD-8.4:** Develop multilingual public messaging materials and signage to communicate the purpose of dune enhancement.

**FLD-8.5:** Consider combinations of options to provide flood/erosion protection in Belmont Shore and the southeast tip of Alamitos Peninsula.

## Equity Strategy

Increase beach stability with attention to public access to facilitate recreational opportunities and relief during extreme heat days for all people.

# FLD-9 Inventory and Flood-Proof Vulnerable Sewer Pump Stations

Assess potential for flood damage at all sewer pump stations, and for pump stations identified as vulnerable to flooding, apply floodproofing techniques and add emergency generators.

**Implementation Lead:** Public Works Department
**Partners:** Long Beach Water Department; Long Beach Parks, Recreation, and Marine; Department of Disaster Preparedness and Emergency Communications
**Timeline:** Short
**Potential Cost Level:** Low to High

## Description

Given the increased likelihood of future flooding due to sea level rise, the City will perform a detailed inventory of all sewer pump stations to assess the potential for flood damage at these stations. Pump stations rely on an uninterrupted power supply to maintain operations. A power failure due to flooding may cause sewage overflows, and backups may result. Many of the City's pump stations are located in or near areas at risk of flooding and power outages, such as Belmont Shore, Naples, and the area in downtown around the Shoreline Marina. For pump stations identified as vulnerable to flooding, the City will implement protective measures through capital projects to reduce flood damage to pump stations identified as vulnerable to future flood conditions. Such measures include incorporating floodproofing techniques (such as elevating pump housing entryways, sealing buildings and entryways to projected flood depth, elevating electrical equipment) and adding emergency generators to ensure an uninterrupted supply of power. If floodproofing techniques are not possible due to the configuration or location of components, the entire pump station may need to be relocated.

## Co-benefits:

- ✓ Protection of water quality by preventing the failure of sewer pump stations, which could have serious environmental and public health consequences

## Implementing Actions

**FLD-9.1:** Assess potential for flood damage and timing of vulnerability for each sewer pump station.

**FLD-9.2:** For pump stations identified as vulnerable, apply floodproofing techniques, elevate, or relocate as necessary.

**FLD-9.3:** Equip all vulnerable pump stations with a flood-proof backup generator to ensure continued operation during power outages.

## Equity Strategy

Prioritize floodproofing of pumps in the low-income communities most vulnerable to flooding.

# FLD-10 Relocate/Elevate Critical Infrastructure

Carry out more detailed studies to assess the need to raise or relocate critical infrastructure outside of the sea level rise vulnerability zone.

**Implementation Lead:** Public Works Department; Financial Management; Tidelands; Long Beach Parks, Recreation, and Marine

**Partners:** Long Beach Fire Department; Long Beach Police Department; LBUSD; Long Beach Department of Health and Human Services; local hospitals

**Timeline:** Medium

**Potential Cost Level:** High

## Description

To maintain essential assets and services for the economy, society, and health of the public, the City will identify critical assets that are vulnerable to sea level rise and either relocate them or incorporate protective adaptation measures to ensure the assets continue to maintain their functionality. Critical assets include buildings, such as fire stations, hospitals, schools, police stations, and key government facilities, as well as critical components of transportation, wastewater, potable water, and energy distribution systems.

Many of these critical facilities have limited adaptive capacity and long-life spans that require an adaptive management approach that is informed by the potential impacts of extreme sea level rise scenarios. For assets identified as vulnerable to potential flood exposure, the City will perform a more in-depth study of the critical infrastructure to evaluate the elevations of components sensitive to flood exposure, potential flood entry points (e.g., doors, vents), and the cost of asset replacement. The study will help inform decisions regarding applicable approaches to adaptation.

Whenever possible, the City will prioritize relocation of critical infrastructure and services to a less vulnerable area. As an alternative, the City may retrofit existing infrastructure facilities to reduce the risk of flood impacts. Examples of retrofitting include: elevation and protection of electrical control systems, elevation of access routes, installation of a flood-proofed power generator, interventions to protect underground utilities and telecommunications from water damage, backflow prevention for buildings, and floodproofing of building entries that could become a flood pathway.

## Co-benefits:

✓ Uninterrupted critical services during storm events

## Implementing Actions

**FLD-10.1:** For critical facilities identified as vulnerable to inundation from sea level rise and/or coastal storm flooding, evaluate whether implementation of a shoreline protection strategy (e.g., raising shoreline elevations, restoring dunes, etc.) would provide long-term protection for the site.

**FLD-10.2:** If shoreline protection strategies were not identified for the asset, perform an asset-level study for each critical facility identified as vulnerable to sea level rise flooding to evaluate potential site-specific strategies to increase flood resilience.

**FLD-10.3:** For facilities identified as vulnerable, recommend floodproofing techniques or the raising or relocating of the facility as necessary.

**FLD-10.4:** Prioritize implementation of upgrades based on expected timing of the inundation.

## Equity Strategy

Protect access to public services and facilities, focusing on neighborhoods with high social vulnerability based on the Long Beach Vulnerability Assessment.

# FLD-11 Elevate Riverine Levees

Based on results of a riverine flood study (FLD-7), work with partner agencies to elevate channel banks and levees to provide enhanced flood protection.

**Implementation Lead:** Public Works Department; USACE

**Partners:** Los Angeles County Harbor Department; Port of Los Angeles; Los Angeles County Flood Control District; Long Beach County Flood Control District; California Coastal Commission; California State Lands Commission; U.S. Fish and Wildlife Service

**Timeline:** Medium

**Potential Cost Level:** Medium to High

## Description

Based on the results of FLD-7 (study increased watershed flooding due to climate change), portions of existing levees adjacent to the City's channels and rivers (Los Angeles River, Los Cerritos Channel, and San Gabriel River) may need to be elevated or modified to provide enhanced flood protection. As flood protection structures along the major river channels are owned and managed by an array of public entities, including USACE, Los Angeles County, and others, modification projects will require a high degree of interagency and regulatory coordination. Therefore, design and permitting should begin well before overtopping is expected to occur. The City will work with these agencies and other relevant partners to prioritize channel modification projects based on an assessment of the consequences and likely timing of flooding at each portion that is at risk.

As part of this process there may be design opportunities for multipurpose uses such as open space integrated with commercial and residential development.

## Co-benefits:

- ✓ Protection of water quality by preventing the failure of sewer pump stations, which could have serious environmental and public health consequences

## Implementing Actions

**FLD-11.1:** Work with partner agencies to identify portions of major river channels at risk of overtopping based on riverine flooding studies performed in action FLD-7.

**FLD-11.2:** Work with partners to prioritize at-risk portions of channel levees based on timing of potential flooding.

**FLD-11.3:** Work with partners to ensure the design process is informed by input from stakeholders on design alternatives.

**FLD-11.4:** Work with partners to implement channel modification projects with owners of flood control structures and project leads.

**FLD-11.5:** Seek creative funding options to prioritize investments that bring co-benefits, such as green space, and opportunities for active and passive recreation to communities with limited access.

## Equity Strategy

Evaluate flooding in neighborhoods along the three major river channels that have high social vulnerability to climate change, based on the Long Beach Vulnerability Assessment. Prioritize projects in socially vulnerable communities and maximize the inclusion of co-benefits such as urban greening.

# SEA LEVEL RISE AND FLOODING LONG TERM ACTIONS

Long-term adaptation actions for sea level rise and riverine flooding are anticipated to occur from 2050 to 2100. The table below briefly summarizes information about the actions, which will be selected and implemented based on

| Action No. | Action Title | Action Description | Specific Location (where applicable) | Potential Co-Benefits | Equity Impacts and Other Considerations |
|---|---|---|---|---|---|
| **Structural/Physical (See Maps Overleaf)** | | | | | |
| FLD-12 | Expand beach nourishment | Based on findings from the beach stabilization study, beaches identified as suitable could be elevated and preserved through beach nourishment actions designed to meet regulatory and permitting requirements of relevant state and federal agencies. | Bay View Beach and Peninsula Beach | Increased tourism | Beaches offer recreational opportunities for inland residents and low-income communities impacted by extreme heat, particularly on hot days. If climate change exacerbates heat in Long Beach, beaches will become an even more valuable resource for inland residents. |
| FLD-13 | Construct a living shore-line/berm | The shoreline could be elevated to tie in with the landscape and park facilities to prevent flooding of inland areas while continuing to provide beach access. | Mothers Beach | Mothers Beach is used heavily on the weekdays and weekends by city residents and visitors for swimming, dragon boat racing, picnicking, and other forms of recreation. Protecting this park and beach would protect other areas in Naples from flooding and also preserve the park. | Mothers Beach provides residents with park and beach access, particu-larly on hot days, and could become an even more important resource as climate change exacerbates heat in Long Beach. |
| FLD-14 | Elevate street hardscapes | Street hardscapes such as curbs could be elevated and extended to eliminate gaps that could become flood pathways. | Bay Shore Drive in Alamitos Bay | Long-term preservation of access to restaurants, shops, and the library on 2nd Street. Elevating the curb may also provide flood protection for additional inland assets. | The businesses along 2nd Street serve many residents and visitors. |

additional research and community adaptation priorities that are yet to be determined. Each of the actions will be evaluated from an equity lens to ensure that climate change impacts and adaptation benefits to low-income communities are considered.

| Action No. | Action Title | Action Description | Specific Location (where applicable) | Potential Co-Benefits | Equity Impacts and Other Considerations |
|---|---|---|---|---|---|
| FLD-15 | Elevate streets/path-ways | Waterfront streets and paths may need to be elevated to protect transportation routes and provide flood protection for infrastructure behind the road/path. | 2 Areas:<br>- Communi-ties adjacent to Alamitos Bay, including Belmont Shore, Naples, and Marina Pacifica<br>- Long Beach Shoreline Marina | This action could also be combined with drainage improvements to reduce flooding associated with heavy rainfall. This action would provide enhanced shel-tering from wave overtopping that could occur during coastal storm events. | This action would protect schools and the fire department, which provide critical services for community members in need throughout the region. |
| FLD-16 | Retrofit/ extend walls | The existing wall may currently provide some flood protection, but it is segmented and was not designed for flood protection. It could be retrofitted or rebuilt to provide adequate protection against sea level rise (SLR). | E. Paoli Way near the Marine Stadium | The Marine Stadium and E. Paoli Way are a pathway for flooding and inundation under future SLR. Upgrading the wall here would protect Appian Way (a major connecting road) and several inland neighborhoods. | Residents, visitors, and the general public use Appian Way to access beach areas and visit the Belmont Shore neighbor-hood. Protecting these areas will preserve access. |
| FLD-17 | Retreat/ realign parking lots | Relocate, reduce size of, or realign parking lots as beach narrows. | Beachfront parking lots | Action would protect parking lots from erosion and reduce the habitat impacts of beach narrowing. | Preservation of parking lots retains access for those who do not live within walking distance of the beach. |
| FLD-18 | Extend/ upgrade existing seawalls | Sheet pile seawalls could be expanded to other areas of the Naples shoreline that are not being addressed by the current upgrade. | Treasure Island, areas to the east near the Yacht Club, and areas to the north (which could also be protected by a berm if space allows) | Would result in long-term preservation of access to local public beaches and businesses. | Consider options that balance infrastructure improvements with natural adaptation solutions, as appropriate. |

| Action No. | Action Title | Action Description | Specific Location (where applicable) | Potential Co-Benefits | Equity Impacts and Other Considerations |
|---|---|---|---|---|---|
| **Informational** | | | | | |
| FLD-19 | Investigate the feasibility of managed retreat | Explore managed retreat options for vulnerable shoreline infrastructure through land acquisition and relocation programs. | Communities adjacent to Alamitos Bay, including Belmont Shore, Naples, and Marina Pacifica | Managed retreat may create more space for flood events and alleviate flood conditions on adjacent properties. | |
| FLD-20 | Evaluate the feasibility of a storm surge barrier at Alamitos Bay | Conduct a feasibility study to evaluate construction of a storm surge / tide gate barrier at the entrance to Alamitos Bay. | Alamitos Bay | | Action would protect all inland areas along the Alamitos Bay shoreline from storm surge flooding. |

**Figure 10: Locations of potential long-term flood protection actions**

Figure 11: Locations of potential long-term flood protection actions in Alamitos Bay area

5

# GHG Inventory, Forecasts and Targets


5

# INTRODUCTION

The reduction of greenhouse gas (GHG) emissions is one of the primary objectives of the Long Beach CAAP. Developing meaningful reduction strategies and evaluating their ability to meet a GHG target first requires an understanding of the community's baseline year and projected future emissions levels. This chapter describes the sources and scale of emissions generated by activities in Long Beach, using a baseline year of 2015 to reflect current conditions, and how emissions are estimated to grow through 2050. It also describes the City's emissions reduction target for 2030 and its aspirational GHG goal for 2045 to demonstrate the reductions needed in each target year from implementation of local actions. This is the first time that the City has calculated a community-wide inventory or set a GHG reduction target.

To provide a robust understanding of its GHG profile, the City analyzed emissions through three different lenses. The primary emissions analysis was through development of a production-based inventory that represents emissions occurring from local activities, such as vehicle travel, home energy use, and waste disposal. The production-based inventory is the foundation for the City's emissions forecasts and target setting, and it is the inventory against which CAAP implementation will be measured, as is typical for a CAAP. The City also developed a high-level, consumption-based inventory to better understand the upstream emissions that occur as a result of residents' travel and consumption of energy, water, goods, and services. This analysis primarily focuses on households and takes into account the emissions embedded in the food residents eat, the products they purchase, and the fuels they use. It also accounts for some City operations. Finally, the City analyzed the life cycle emissions associated with oil and gas extraction activities in Long Beach. This analysis estimates the total emissions that occur as a result of local fossil fuel production. Each inventory analyzes the community's emissions in a different way, and so the results of the three inventories cannot be summed into one comprehensive emissions total. Although the production-based inventory is used for the CAAP, as it is the Global Covenant of Mayors' protocol as well as standard practice, the results of each inventory informed the CAAP and were used to define the CAAP's specific actions.

The emissions results presented in this chapter are expressed as metric tons of carbon dioxide equivalent per year (MT $CO_2e$/yr) to provide a standard measurement that incorporates the varying global warming potential (GWP) values of different GHGs. The GWP describes how much heat a GHG can trap in the atmosphere relative to carbon dioxide, which has a GWP of 1. For example, methane has a GWP of 28, which means that 1 metric ton of methane will trap 28 times more heat than 1 metric ton of carbon dioxide, which makes it a more potent GHG.

## EMISSIONS INVENTORY DIFFERENCES

Several City departments have prepared their own department or facility-specific GHG emissions inventories that follow methodological guidance designed for those specific facilities. This CAAP, however, represents a community-wide GHG inventory that follows the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) to support consistency in community-wide inventory preparation and comparison. The result of this use of differing methodologies is that the City's various GHG inventories are not directly comparable to each other. For example, the port waterborne activity emissions reported in the total production inventory differ from the total emissions reported in the Port of Long Beach GHG inventories because each inventory differs as to the scope of emissions to be analyzed and, in some cases, uses different quantification methods. Readers should note that each of the City's inventories has been prepared to serve a specific purpose, and while the CAAP overlaps topically with some of these other sources, the community-wide GHG inventory does not replace those other facility-specific analyses or plans.

# 2015 PRODUCTION INVENTORY



Long Beach's community emissions inventory follows the guidance provided in the GPC, which is the globally accepted framework for calculating and reporting community GHG emissions. It is also the standard used by the Global Covenant of Mayors, the world's largest cooperative effort among mayors and city officials to reduce global GHG emissions, track progress, and prepare for the impacts of climate change. The City of Long Beach joined the Global Covenant of Mayors in 2015. Therefore, this inventory is used as the basis for the Long Beach CAAP.

The GPC requires cities to report their emissions by GHG, sector and subsector, and scope. The scopes framework helps to differentiate emissions occurring physically within the city (Scope 1) from those occurring outside the city (Scope 3), and from the use of energy supplied by grids (e.g., electricity) that may cross city boundaries (Scope 2).

The GPC also provides two levels of reporting, referred to as BASIC and BASIC+, for the sources of the emissions analyzed. Table 2 presents the three emissions scopes analyzed in the GPC framework, along with the BASIC inventory reporting requirements. Long Beach developed a total production inventory that achieves the BASIC reporting requirements and allows a comparison of the city's emissions with those of other cities that follow the GPC methodology.

BASIC+ reporting requires more comprehensive coverage of emissions sources, including some sources over which a city has limited control to reduce emissions. During preparation of the Long Beach BASIC inventory, data were collected for several of these additional BASIC+ emissions sources and analyzed separately from the City's BASIC level inventory to provide an additional emissions perspective. One example would be emissions from airplanes landing at Long Beach Airport, which are federally regulated and over which the City has limited control. In the BASIC inventory, those airplane emissions are not included, but emissions associated with airport operations that are in the City's control, such as ground transport, are included.

**Table 2: GPC Protocol Scope Definitions for City Inventories**

| Scope | Definition | BASIC Requirement |
|---|---|---|
| Scope 1 | GHG emissions from sources located within the city boundary | Fuel use in buildings, transport, and industry Waste generated within the city's boundary |
| Scope 2 | GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat,steam, and/or cooling within the city boundary | Use of grid-supplied energy |
| Scope 3 | All other GHG emissions that occur outside the city boundary as a result of activities taking place within the city boundary | Waste (including wastewater) generated within the city's boundary |

Source:Global Protocol for Community-Scale Greenhouse Gas Emission Inventories

## Emission Sectors

The community production inventories are organized into three emissions categories, or sectors, based on their sources:

- **Stationary Energy:** Emissions from building electricity and natural gas use in residential, commercial, institutional, and industrial buildings, as well as emissions from energy industries operating within the city limits
- **Transportation:** Emissions associated with passenger vehicles, buses, trucks, rail transit, freight rail, off-road vehicles, port waterborne activity (omitted from the jurisdictional inventory), and aviation operations within the city limits
- **Waste:** Emissions from waste disposed in landfills or incinerated, and emissions from wastewater treatment

## Jurisdictional Emissions Sources

One of the primary purposes of a community emissions inventory is to inform city climate policy development, and the CAAP was designed to focus on opportunities for local action that are within the City's and the community's control. Therefore, for target setting and monitoring purposes this CAAP focuses on "jurisdictional emissions" – those emissions sources over which the City and community have some amount of influence. These jurisdictional emissions sources are primarily aligned with the BASIC inventory described above, except for the removal of port-based waterborne activities like cargo shipping. Emissions occurring from vessel operations at the Port of Long Beach are, in part, regulated at the state level by the California Air Resources Board (CARB), and the City of Long Beach does not have the direct authority to dictate emissions reduction policies for private shipping companies that operate from the port. For this reason, the City has removed port waterborne activity from the emissions inventory analyzed in this CAAP.

Emissions associated with energy use in port facilities and with on-road trucking activities associated with the port are still included in the CAAP inventory and analyzed for GHG target-setting purposes. The Port of Long Beach not only develops its own annual emissions inventories, but also developed a Clean Air Action Plan that is designed to improve air quality and reduce GHG emissions associated with port activities.

## Production Inventory Results

To provide a complete emissions analysis, the City evaluated its total production inventory (including the port waterborne activity) according to the BASIC and BASIC+ reporting frameworks. As shown in Table 3, the city's BASIC emissions totaled 3,100,468 MT $CO_2e$/yr in 2015, which equates to 6.6 MT $CO_2e$ per Long Beach resident in 2015 (MT $CO_2e$/capita) and 5.0 MT $CO_2e$ per service population (SP) (i.e., residents plus employees). The BASIC+ emissions sources analyzed for 2015 totaled 3,366,173 MT $CO_2e$/yr (or 7.2 MT $CO_2e$/capita and 5.4 MT $CO_2e$/SP), and reflect the BASIC inventory emissions with the addition of transboundary aviation and transboundary port waterborne activity emissions.

**Table 3: Total Production Emissions Inventory by Subsector**

| Sector/Subsector | 2015 Emissions – BASIC | | 2015 Emissions – BASIC+[1] | |
|---|---|---|---|---|
| | MT $CO_2e$ | % of BASIC Total | MT $CO_2e$ | % of BASIC+ Total |
| **Stationary Energy** | **1,377,291** | **44.4%** | **1,377,291** | **40.9%** |
| Residential Energy | 428,245 | 13.8% | 428,245 | 12.8% |
| Natural Gas | 241,176 | 7.8% | 241,176 | 7.2% |
| Electricity | 187,070 | 6.0% | 187,070 | 5.6% |
| Commercial and Institutional Buildings Energy | 300,818 | 9.7% | 300,818 | 9.0% |
| Natural Gas | 109,593 | 3.5% | 109,593 | 3.3% |
| Electricity | 191,225 | 6.2% | 191,225 | 5.7% |
| Manufacturing Industries and Construction Energy | 399,089 | 12.9% | 399,089 | 11.8% |
| Natural Gas | 74,853 | 2.4% | 74,853 | 2.2% |
| Electricity | 324,235 | 10.5% | 324,235 | 9.6% |
| Energy Industries | 219,899 | 7.1% | 219,899 | 6.5% |
| Fugitive Emissions from Natural Gas | 29,240 | 0.9% | 29,240 | 0.9% |
| **Transportation** | **1,546,326** | **49.9%** | **1,812,031** | **53.8%** |
| On-Road Transportation | 1,213,601 | 39.1% | 1,213,601 | 36.1% |
| Gasoline Vehicles | 960,661 | 31.0% | 960,661 | 28.5% |
| Diesel Vehicles | 252,940 | 8.2% | 252,940 | 7.5% |
| Railways | 11,883 | 0.4% | 11,883 | 0.4% |
| Aviation | 4,550 | 0.1% | 186,738 | 5.5% |
| Port Waterborne Activity | 301,345 | 9.7% | 384,862 | 11.4% |
| Off-Road Equipment | 14,947 | 0.5% | 14,947 | 0.4% |
| **Waste** | **176,850** | **5.7%** | **176,850** | **5.3%** |
| Solid Waste Methane Commitment | 173,164 | 5.6% | 173,164 | 5.1% |
| Solid Waste Incineration | 95 | 0.0% | 95 | 0.0% |
| Wastewater Treatment and Discharge | 3,592 | 0.1% | 3,592 | 0.1% |
| **TOTAL** | **3,100,468** | **100%** | **3,366,173** | **100%** |
| Per Capita | 6.6 | - | 7.2 | - |
| Per Service Population (residents + employees) | 5.0 | - | 5.4 | - |

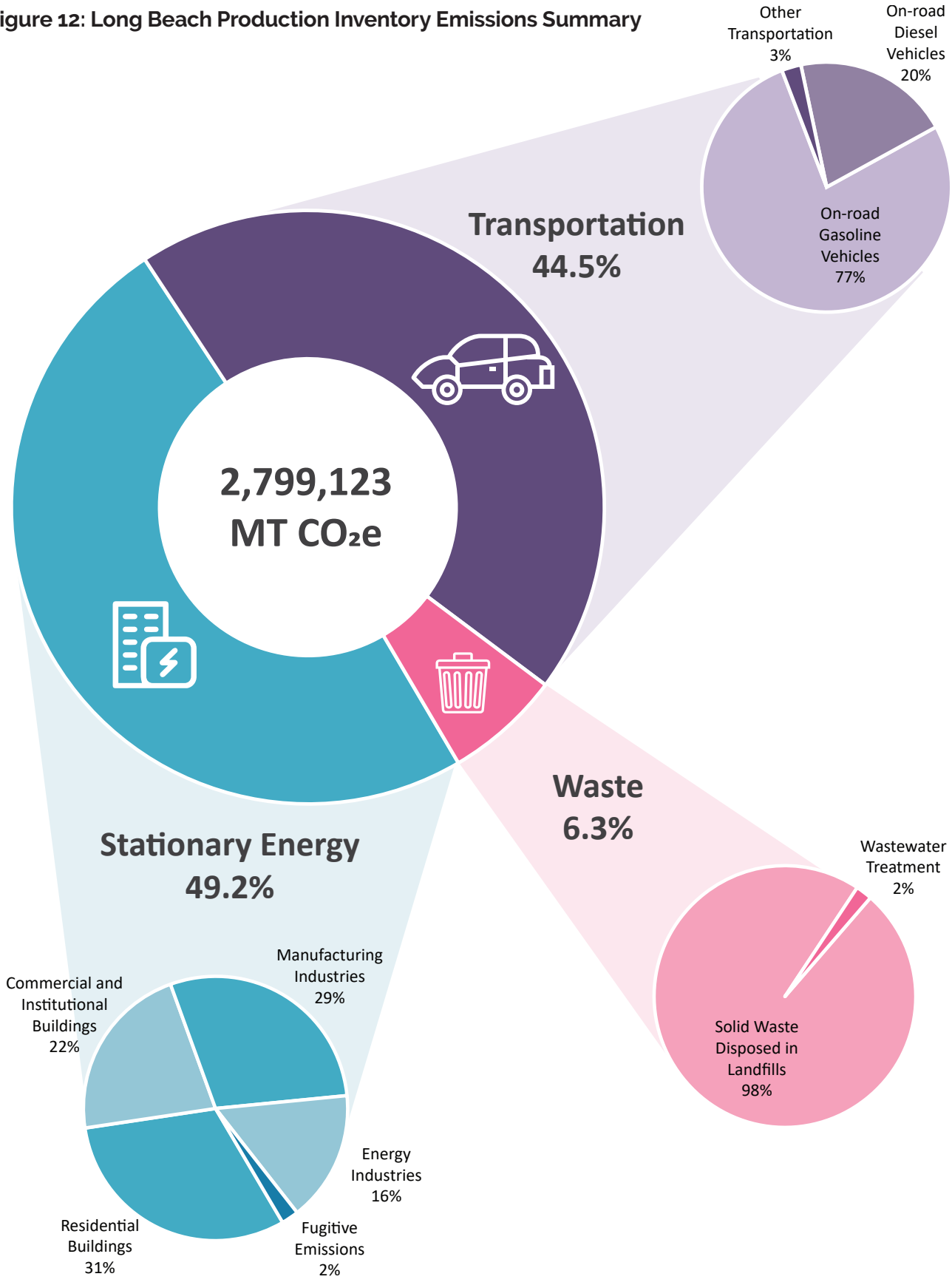
[1] Per the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories, a complete BASIC+ inventory includes calculation of several additional emissions sources beyond those in the BASIC inventory. Long Beach has also calculated the BASIC+ emissions from transboundary journeys in the aviation and waterborne navigation subsectors because the supporting data were collected with data for the BASIC calculations. This column does not reflect a complete BASIC+ inventory, but does provide emissions information beyond the scope of the BASIC inventory.

Table 4 presents the jurisdictional inventory on which the CAAP target setting and analysis are based, and which excludes the port waterborne activity. The jurisdictional inventory totals 2,799,123 MT $CO_2e$ in 2015. This equates to 6.0 MT $CO_2e$/capita and 4.5 MT $CO_2e$/SP in 2015. Stationary energy was the largest emissions source in the inventory (49 percent), with transportation contributing most of the remainder (44 percent). Energy and transportation emissions account for nearly 95 percent of the inventory, which indicates that local reduction efforts should

**Table 4: Jurisdictional Production Emissions Inventory by Subsector**

| Sector/Subsector | 2015 Jurisdictional Production Emissions *(inventory used in CAAP analysis)* | |
|---|---|---|
| | MT $CO_2e$ | % of Total |
| **Stationary Energy** | **1,377,291** | **49.20%** |
| Residential Energy | 428,245 | 15.30% |
| Natural Gas | 241,176 | 8.62% |
| Electricity | 187,070 | 6.68% |
| Commercial and Institutional Buildings Energy | 300,818 | 10.75% |
| Natural Gas | 109,593 | 3.92% |
| Electricity | 191,225 | 6.83% |
| Manufacturing Industries and Construction Energy | 399,089 | 14.26% |
| Natural Gas | 74,853 | 2.67% |
| Electricity | 324,235 | 11.58% |
| Energy Industries | 219,899 | 7.86% |
| Fugitive Emissions from Natural Gas | 29,240 | 1.04% |
| **Transportation** | **1,244,981** | **44.48%** |
| On-Road Transportation | 1,213,601 | 43.36% |
| Gasoline Vehicles | 960,661 | 34.32% |
| Diesel Vehicles | 252,940 | 9.04% |
| Railways | 11,883 | 0.42% |
| Aviation | 4,550 | 0.16% |
| Off-Road Equipment | 14,947 | 0.53% |
| **Waste** | **176,850** | **6.32%** |
| Solid Waste Methane Commitment | 173,164 | 6.19% |
| Solid Waste Incineration | 95 | 0.00% |
| Wastewater Treatment and Discharge | 3,592 | 0.13% |
| **TOTAL** | **2,799,123** | **100.00%** |
| Per Capita | 6.0 | - |
| Per Service Population (residents + employees) | 4.5 | - |

**Figure 12: Long Beach Production Inventory Emissions Summary**



focus on these areas to maximize progress toward the City's GHG reduction targets. Waste sector emissions make up the remainder and are important to consider in the context of the City's long-term carbon neutrality goal. In the rest of this chapter, all references to production inventory refer to the jurisdictional production inventory shown in Table 4. Figure 12 illustrates the City's 2015 production inventory results by sector and subsector.

## 2015 CONSUMPTION INVENTORY

A consumption-based inventory attempts to account for emissions inside and outside a community that occur from consumptive activities in the community. The City's consumption inventory was prepared based on guidance in the ICLEI U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (Community Protocol) and input from City staff. The Community Protocol describes a consumption inventory methodology that is applied at the household level to estimate a household carbon footprint. In other words, how much carbon is generated in the production and use of goods and services by households in Long Beach? The inventory analysis represents a high-level estimate based on the average household emissions factors for the City of Long Beach provided in CARB's Cool California household carbon calculator. Based on this methodology, the inventory primarily represents emissions from the sum of all household consumption in the city, with local government emissions also included where data were available from the City's 2015 Local Government Operations inventory.

Local businesses and industries are not directly included in the consumption inventory because emissions from the goods and services they produce are represented as household emissions from the consumption of goods and services.

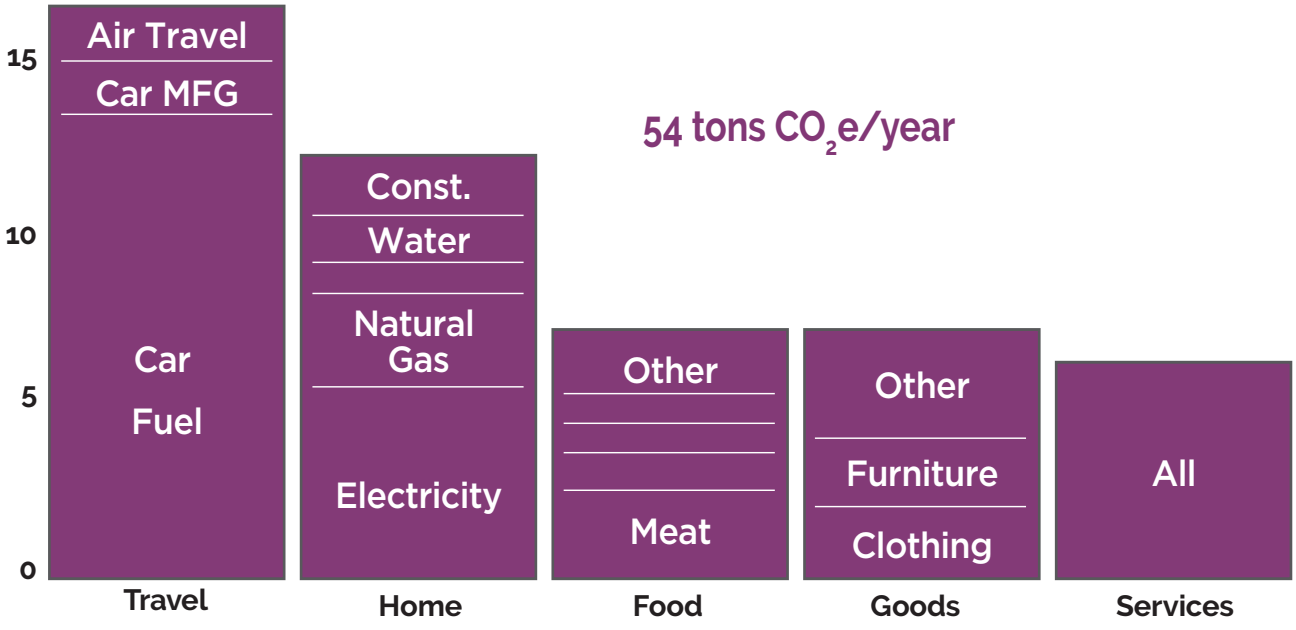
As with the production inventory, the consumption inventory is organized into categories of emissions sources. Cool California organizes emissions into travel, home, food, goods, and services. For purposes of comparison against the City's production inventory, the consumption inventory results are reported here as:

- **Energy:** Emissions associated with household and government operations energy use, including the production and distribution of energy sources to buildings and as energy used to provide water and to construct buildings
- **Transportation:** Emissions associated with fuel use in household vehicles and the City's vehicle fleet, public transit, and air travel; the production and distribution of vehicle fuels; and the manufacture of cars
- **Goods and Services:** Emissions associated with all household goods and services consumption, including emissions from the production and distribution of food and the extraction of raw materials for the production of goods (e.g., clothing, furniture) and emissions associated with businesses providing services to residents of Long Beach

Figure 13 is an example of the average household emissions outputs provided by Cool California. In addition to the subsector labels shown, the travel sector includes emissions from public transit; the home sector includes an "other" emissions category; and the food sector includes emissions from dairy, fruits and vegetables, and cereals.

In developing the consumption inventory, city-specific data were used where possible to further contextualize the analysis to Long Beach. For example, community vehicle travel data collected for the production inventory were used instead of the default car fuel assumptions that are built into Cool California calculations. Similar changes were made for the electricity, natural gas, and waste subsectors.

**Figure 13: Long Beach Average Household Carbon Footprint**




Source: CoolCalifornia.org, 2019

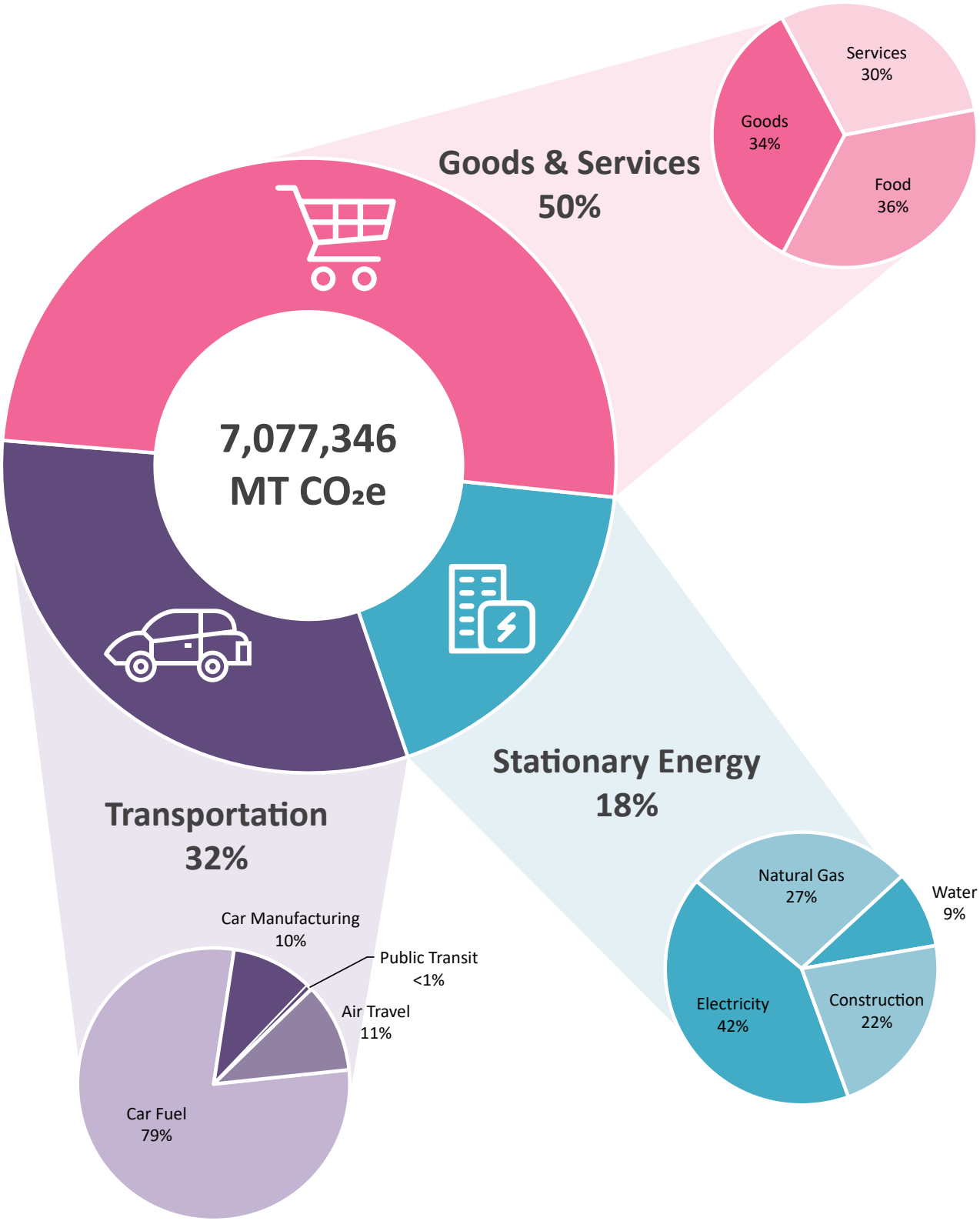
## Consumption Inventory Results

The city's consumption emissions inventory totaled 7,077,346 MT $CO_2e$/yr in 2015, which is more than double the production inventory. As shown in Table 5, goods and services are the largest contributor of emissions in the community, followed by transportation and then energy. Note that emissions associated with the transportation of goods are included in the goods and services category rather than in the transportation category. Consumption emissions total 15.1 MT $CO_2e$/capita. Figure 14 illustrates the emissions by sector and subsector.

**Table 5: Consumption Emissions Inventory by Subsector**

| Sector | 2015 Emissions | |
|---|---|---|
| | MT $CO_2e$ | % of Total |
| **Energy** | **1,284,173** | **18%** |
| Electricity | 534,063 | 8% |
| Natural Gas | 348,138 | 5% |
| Water | 117,371 | 2% |
| Construction | 284,600 | 4% |
| **Transportation** | **2,230,704** | **32%** |
| Vehicle Fuel | 1,764,092 | 25% |
| Car Manufacturing | 216,760 | 3% |
| Public Transit | 13,237 | <1% |
| Air Travel | 236,615 | 3% |
| **Goods and Services** | **3,562,469** | **50%** |
| Food | 1,272,429 | 18% |
| Goods | 1,229,408 | 17% |
| Services | 1,060,633 | 15% |
| **TOTAL** | **7,077,346** | **100%** |
| Per Capita | 15.1 | - |

Figure 14: Long Beach Consumption Inventory Emissions Summary



# COMPARISON OF PRODUCTION AND CONSUMPTION INVENTORIES

The community to which emissions from the consumption of goods is attributed highlights the primary difference between a production and consumption inventory. In a production-based inventory, a city with a large manufacturing industry producing goods would account for the energy used during production, even if the goods are exported for use elsewhere. In a consumption-based inventory, the city in which the consumers of goods live would account for those emissions, even if the goods consumed in the community were imported from elsewhere. The current industry standard in climate action planning is to evaluate a community's production-based inventory because they reflect emissions over which local governments have more direct control and because the supporting quantification methodologies and reporting frameworks are more fully developed at this time. However, there is a growing consensus about the importance of consumption inventory analysis to complement production inventories in helping communities more fully understand their contributions to global emissions.

Table 6 shows the results of the City's 2015 production and consumption inventories. The inventories are organized into three sectors for comparative purposes, although these sectors do not support a direct apples-to-apples comparison. As shown, the consumption inventory is more than 2.5 times larger than the production inventory. The primary difference in the two is in the waste/goods and services sector. Waste emissions in the production inventory represent end-of-use emissions when goods are disposed in a landfill or incinerator. Goods and services emissions in the consumption inventory reflect the complete life cycle of goods, including emissions from upstream production (e.g., raw material extraction, manufacturing, shipping) as well as downstream disposal.

Based on the results of this emissions comparison, the greatest opportunities to reduce consumption emissions are to pursue low-emissions diets (e.g., reduced meat and dairy consumption, which contribute 39 percent and 15 percent of food emissions, respectively), minimize purchases of goods and services, and increase the use of pre-owned goods or the purchase of products that minimize packaging and are produced locally. Figures 15 and 16 on the following page illustrate the production and consumption inventory results.

**Table 6: Production versus Consumption Inventory Emissions by Sector**

| Sector | 2015 Emissions | | | |
|---|---|---|---|---|
| | Production MT $CO_2e$ | Production (%) | Consumption MT $CO_2e$ | Consumption (%) |
| Stationary Energy [1] | 1, 377,291 | 49 % | 1,284,173 | 18% |
| Transportation | 1,244,981 | 44% | 2,230,704 | 32% |
| Waste / Goods and Services [2] | 176,850 | 6% | 3,562,469 | 50% |
| TOTAL | **2,799,123** | **100%** | **7,077,346** | **100%** |
| Per Capita | 6.0 | - | 15.1 | - |

[1] Energy emissions in the production inventory include energy use from residential, commercial & local government, and industrial subsectors. The consumption inventory only includes household and local government energy use, which results in lower total energy emissions.

[2] These sectors from the production and consumption inventories are not directly compatible but are closely related as they represent emissions associated with the consumption and disposal of goods.
Values may not sum to 100 percent due to rounding.

**Figure 15: Production versus Consumption Inventory – Total Emissions**

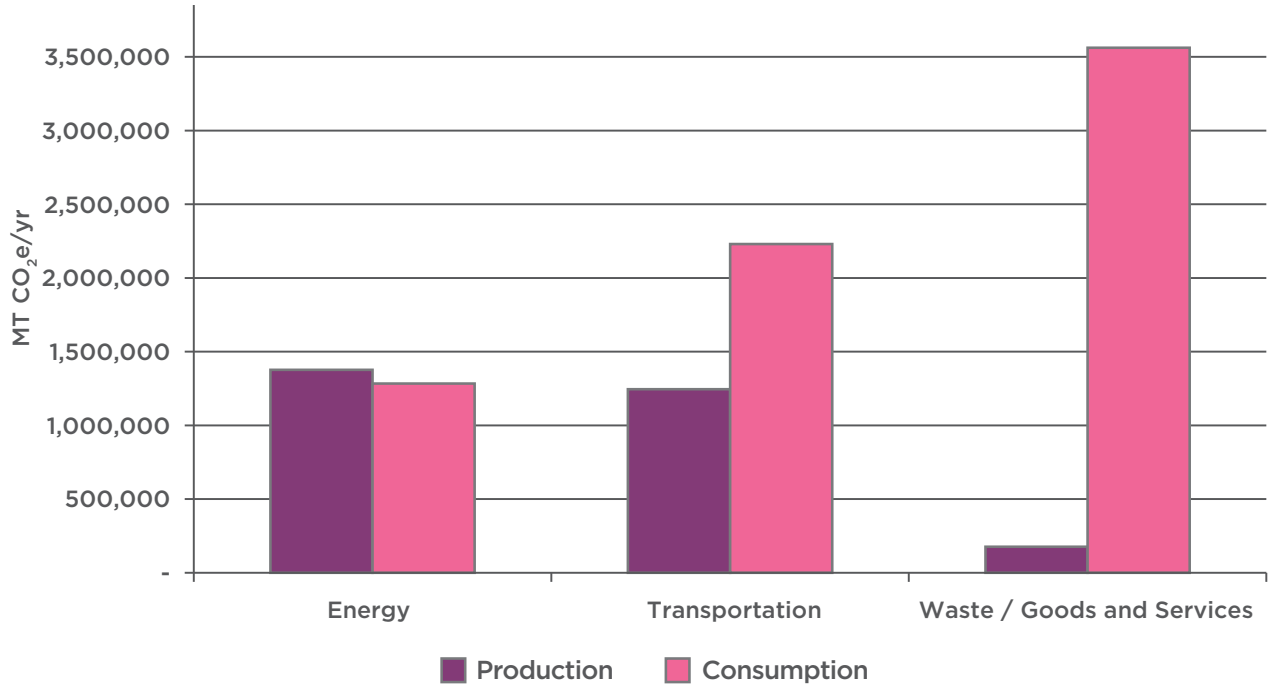
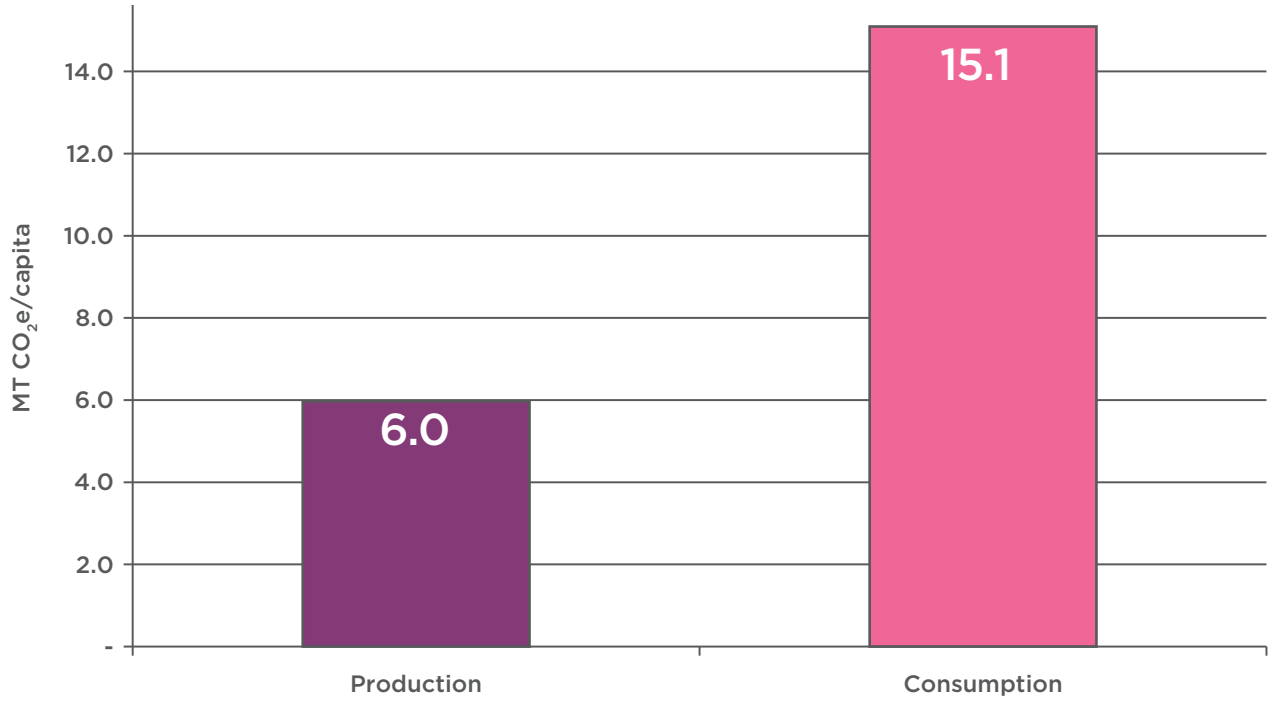



**Figure 16: Production versus Consumption Inventory – Per Capita Emissions**



# OIL AND GAS LIFE CYCLE EMISSIONS ANALYSIS RESULT

As its third type of emissions analysis, the City analyzed the life cycle emissions associated with oil and gas extraction operations occurring within the city boundary. This analysis supports a more holistic view of the City's total contribution to global emissions and complements the production and consumption inventories. The analysis is summarized below. The City of Long Beach Oil and Gas Memo provides additional information, including data sources, methods, and detailed analysis.

In 2015, oil fields in the city produced more than 13 million barrels of crude oil and 5 billion cubic feet of natural gas. The resulting life cycle emissions total 8.3 million MT $CO_2e$, which is almost 3 times greater than the city's production inventory emissions. The life cycle emissions represent different phases of the oil supply chain, including upstream extraction activities at the city's oil fields, midstream refining activity occurring outside of the city, and downstream end use of the fuels produced, such as vehicle gasoline and diesel, which can be consumed inside and outside of the city. The life cycle emissions were estimated using a CARB-developed upstream emissions factor specific to the Long Beach oil fields and midstream and downstream emissions factors for the nearby Wilmington oil field, which were collected from the Oil-Climate Index.

Approximately 96 percent of the city's oil and gas life cycle emissions are attributed to crude oil, and the remaining 4 percent result from natural gas. The analysis estimated that all the natural gas extracted in Long Beach is consumed in the community and that all of the oil extracted in Long Beach is consumed within California. Of the total life cycle emissions, 76 percent occur downstream (i.e., transport to consumers and the end use of the fuel), 14 percent occur midstream (i.e., oil refining), and 5 percent occur upstream (i.e., extraction); the remaining 4 percent are life cycle natural gas emissions.

Understanding the life cycle emissions sources helps to identify the City's opportunities for intervention. Upstream emissions occur at the oil fields within the city boundary, where the City has issued well permits for petroleum operations. The City has made a number of investments to reduce GHG and air pollutant emissions and mitigate the environmental impacts of extraction activities. Further opportunities to reduce these emissions could include energy efficiency improvements in the extraction process or increased leak monitoring and detection. Oil extracted in Long Beach is refined into various end products, which are consumed inside and outside the city. Through this CAAP, the City is pursuing actions that would reduce local consumption of fossil fuels from building energy efficiency improvements, reduced vehicular travel, and expansion of electric vehicle technology. However, the City's ability to influence the use of Long Beach oil products outside of the city is limited. Similarly, the oil-refining process occurs outside the City's jurisdiction, and thus the City's ability to influence these midstream emissions is also limited.

The City's long-term strategy to address oil and gas life cycle emissions will need to be multi-pronged and collaborative. The strategy will need to include local action to replace fossil fuel consumption in Long Beach with clean electricity and other renewable energy sources; supporting efforts that minimize global demand for the types of oil and gas resources extracted in the city, which would lead to a reduction in local oil and gas extraction; and investments in future carbon capture technology. In the long term, to maximize carbon emission reductions, the City must explore ways to decrease and eventually phase out local oil and gas extraction.

# PRODUCTION EMISSION FORECASTS

The production inventory was used to develop community-wide emissions forecasts for the 2030, 2040, and 2050 planning time frames. These "business-as-usual" forecasts estimate how emissions could change in the future if no local action is taken, such as through CAAP implementation. Emissions forecasts can provide useful insights about the scale of reductions necessary to achieve the City's emissions targets and represent a best estimate of the future for the purposes of CAAP development.

Emissions were forecast using a variety of factors that represent the drivers of emissions growth in the community, such as local population growth, employment, and travel demand modeling. The forecasts also take into account the implementation of several important components of the State's GHG reduction strategy, including the Renewables Portfolio Standard Program, a state law that requires increasing amounts of renewable electricity in California and various vehicle efficiency standards that will reduce emissions from on-road transportation to help achieve California's 2030 GHG targets.

For forecasting in the electricity sector, the City assumed a 60 percent Renewable Portfolio Standard (RPS) by 2030 as mandated statewide by Senate Bill (SB) 100. Since the City prepared the GHG inventory and forecasts, Southern California Edison (SCE) set a goal of an 80 percent carbon free energy supply by 2030. SCE's emissions factors, which are consistent with a greater carbon-free component of the energy supply and other measures to meet and exceed state GHG goals, were included in evaluating the GHG reduction potential of action BE-1 and will be monitored as the City conducts future inventories and forecasts. Other available local data on energy, transportation, and waste will also be considered, as appropriate, in inventory and plan updates and in the evaluation of GHG reductions and other benefits of CAAP actions.

Figure 17 illustrates the City's emissions forecasts by sector through 2050 and shows that emissions are estimated to decrease through 2050. The forecasted decline is largely a result of statewide actions influencing the City's electricity emissions and an estimated decrease in natural gas use in the energy sector. A higher local carbon-free component than the State RPS of 60 percent by 2030 would result in some additional GHG reductions within the energy sector in the 2030 and 2040 business-as-usual scenarios beyond what is shown in Figure 17. By 2045, the business-as-usual emissions forecast accounts for SB 100's requirement that California's electricity be derived from carbon-free sources. Vehicle efficiency improvements that reduce on-road transportation emissions serve to partially offset emissions growth in other transportation subsectors. All other emissions sources are forecast to experience growth from 2015 to 2050.

Table 7 on the following page shows the emissions forecasts by sector and subsector in 2015, 2030, 2040, and 2050. Per capita emissions are estimated to decrease through 2050 from 6.0 MT $CO_2e$/capita in 2015 to 3.1 MT $CO_2e$/capita in 2050, while per SP emissions are estimated to decrease from 4.5 MT $CO_2e$/service population to 2.2 MT $CO_2e$/SP in the same period.

**Figure 17: Business-as-Usual Emissions Forecasts 2015 – 2050**

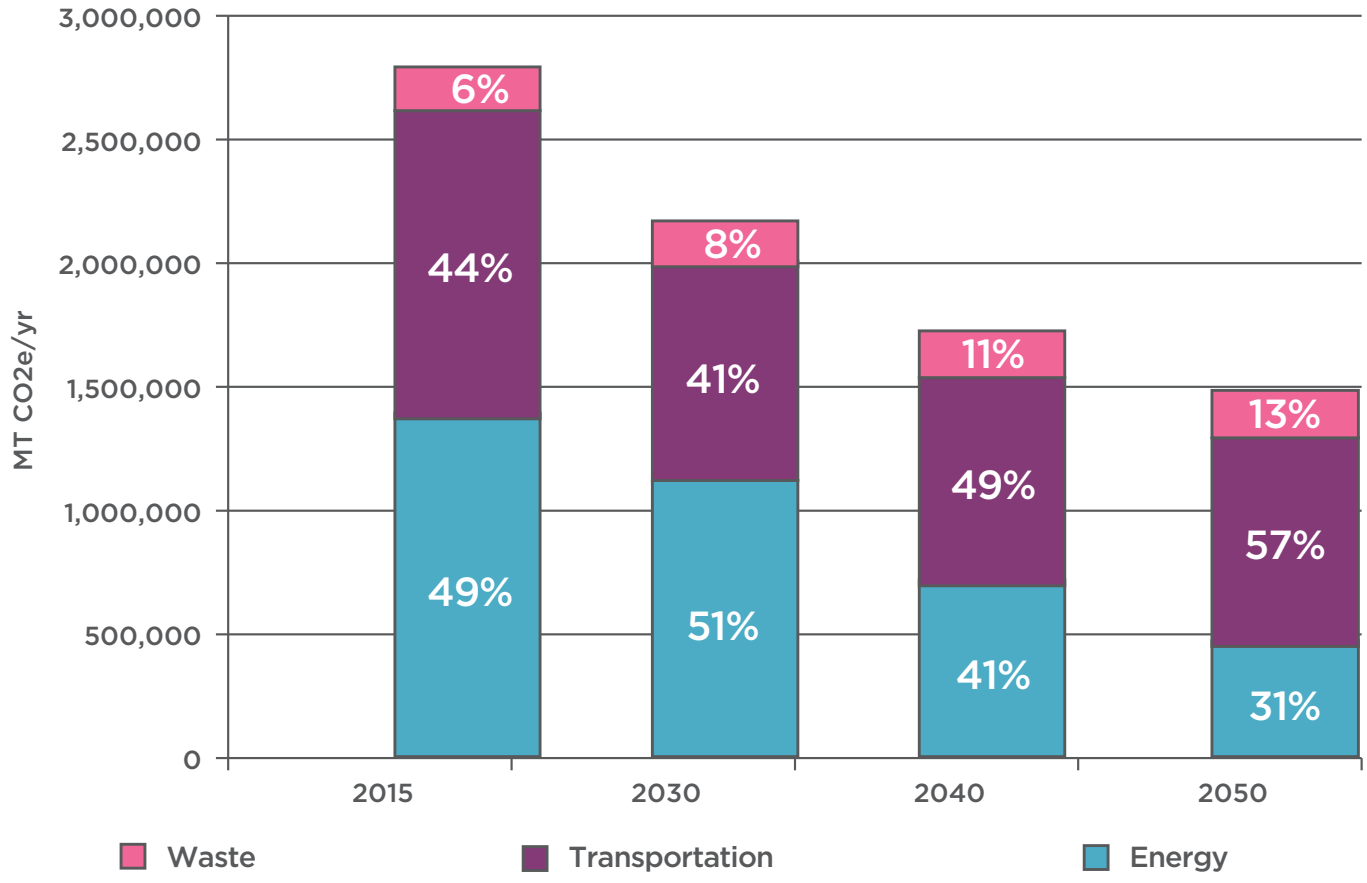


**Table 7: Business as Usual Community Greenhouse Gas Emissions Forecasts 2015 - 2050**

| Sector | Emissions MT $CO_2e$ | | | |
|---|---|---|---|---|
| | 2015 | 2030 | 2040 | 2050 |
| Stationary Energy | **1,377,291** | **1,104,313** | **702,391** | **456,608** |
| Stationary Energy % of Total | **49%** | **51%** | **41%** | **31%** |
| Residential Building Energy | 428,245 | 327,162 | 213,538 | 136,957 |
| Natural Gas | 241,176 | 184,498 | 165,594 | 136,957 |
| Electricity | 187,070 | 142,664 | 47,945 | - |
| Commercial and Institutional Building Energy | 300,818 | 238,760 | 129,472 | 61,312 |
| Natural Gas | 109,593 | 81,780 | 74,452 | 61,312 |
| Electricity | 191,225 | 156,981 | 55,019 | - |
| Manufacturing Industries and Construction Energy | 399,089 | 329,692 | 150,682 | 49,640 |
| Natural Gas | 74,853 | 62,109 | 56,662 | 49,640 |
| Electricity | 324,235 | 267,583 | 94,020 | - |
| Energy Industries | 219,899 | 184,205 | 184,205 | 184,205 |
| Fugitive Emissions from Natural Gas | 29,240 | 24,494 | 24,494 | 24,494 |
| Transportation | **1,244,981** | **887,732** | **840,924** | **843,529** |
| Transportation % of Total | **44%** | **41%** | **49%** | **57%** |
| On-Road Transportation | 1,213,601 | 851,784 | 803,878 | 804,735 |
| Railways | 11,883 | 13,211 | 13,988 | 15,472 |
| Aviation | 4,550 | 7,110 | 7,110 | 7,110 |
| Off-Road Equipment | 14,947 | 15,627 | 15,948 | 16,212 |
| Waste | **176,850** | **184,887** | **188,715** | **191,768** |
| Waste % of Total | **6%** | **8%** | **11%** | **13%** |
| Solid Waste Methane Commitment | 173,164 | 181,043 | 184,768 | 187,820 |
| Solid Waste Incineration | 95 | 99 | 101 | 103 |
| Wastewater Treatment and Discharge | 3,592 | 3,744 | 3,845 | 3,845 |
| TOTAL | **2,799,123** | **2,176,931** | **1,732,030** | **1,491,905** |
| Per Capita | 6.0 | 4.5 | 3.6 | 3.1 |
| Per Service Population (residents + employees) | 4.5 | 3.3 | 2.6 | 2.2 |

# GREENHOUSE GAS REDUCTION TARGET SETTING

Greenhouse gas reduction targets help focus local actions and serve as aspirational metrics for this CAAP. Establishing clear and attainable targets can also motivate community members and City staff, help guide long-term strategies, and increase transparency and accountability regarding the CAAP's goals. Establishing local GHG targets in Long Beach can also help to achieve the following objectives:

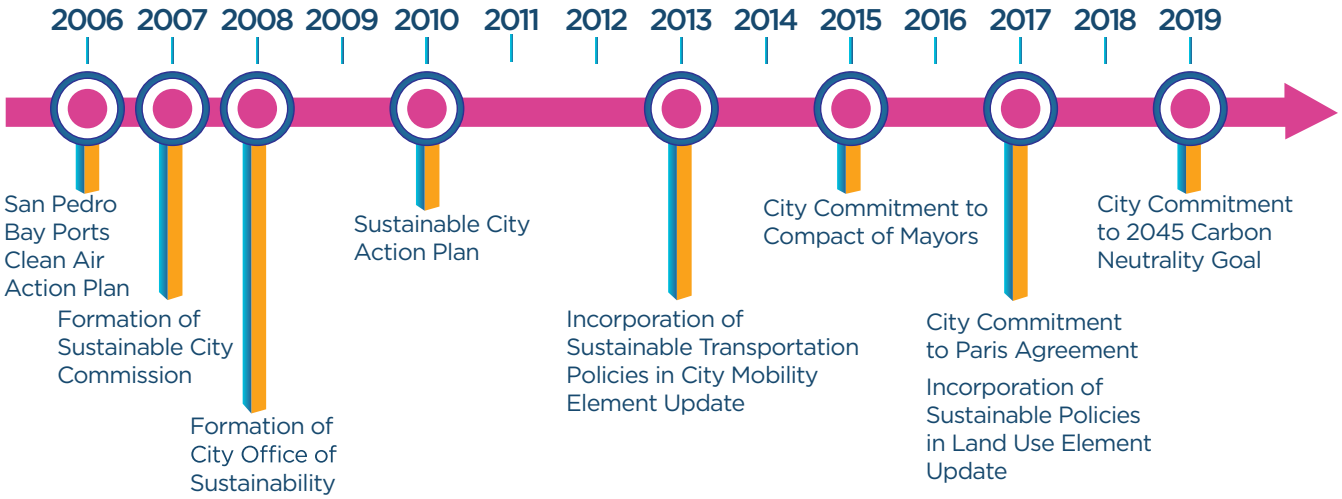
- Provide a goal post against which the cumulative progress of the City's GHG reduction actions over time can be evaluated.
- Comply with requirements of the Global Covenant of Mayors, to which the City of Long of Beach has been a signatory since 2015.
- Demonstrate the City's commitment to global efforts to address climate change.
- Illustrate the relationship between the City's reduction target and the State's own reduction goals for compliance with State mandates for cities related to GHG reduction
- Demonstrate a level of GHG emissions below which Long Beach would have less than cumulatively considerable GHG impacts for future environmental review projects.

The City is already a leader in environmental sustainability and climate initiatives. Figure 18 illustrates a timeline with several examples of the City's sustainability-related activities, which include the following actions related to GHG commitments:

- In 2015, Mayor Robert Garcia signed the Compact of Mayors (now the Global Covenant of Mayors) to join the world's largest coalition of city governments to address climate change.
- In 2017, Mayor Garcia joined 406 mayors across the United States in pledging to continue the goals of the Paris Climate Agreement to make sustainable changes to limit global temperature rise to well below 2 degrees Celsius.
- In 2019, Mayor Garcia encouraged the city to achieve a carbon neutrality goal by 2045, consistent with California Executive Order B-55-18.

The CAAP charts a pathway to help the City fulfill these commitments. To that end, the City evaluated a series of GHG target options during the development of the CAAP. Several reduction target options were considered and were vetted by the CAAP Scientific Working Group—a body of 13 independent experts from California State University, Long Beach; Long Beach Community

**Figure 18: Timeline of Long Beach Sustainability Activities**



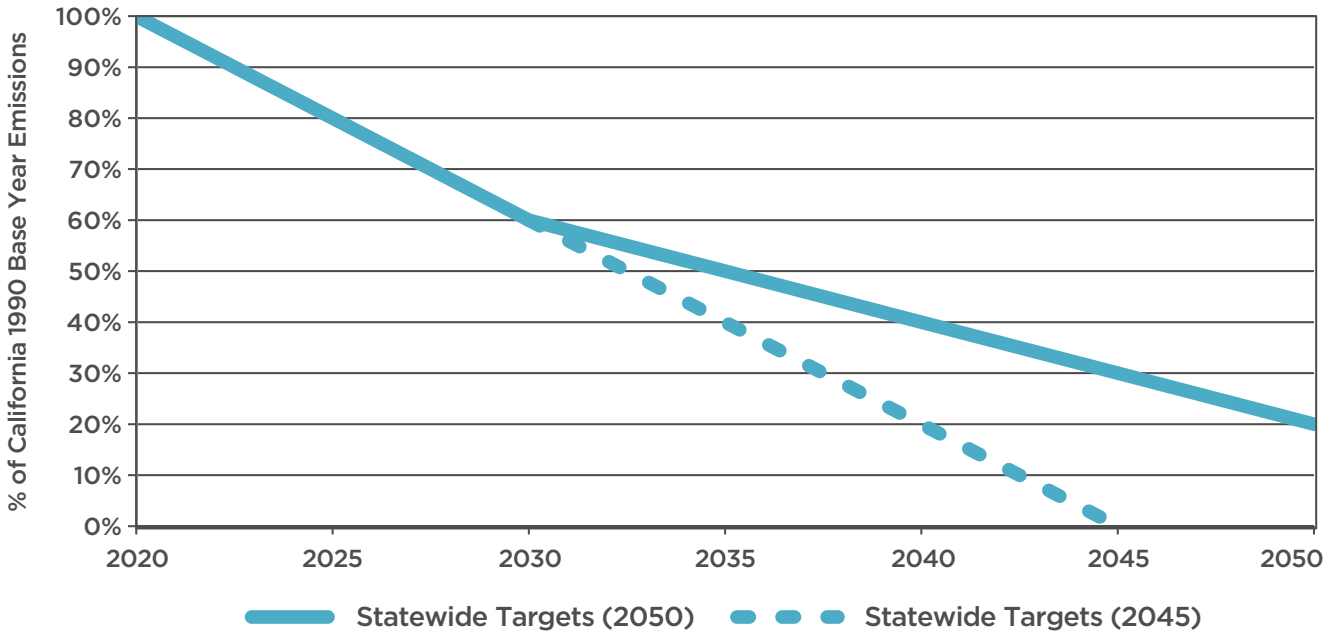
College; the University of California, Los Angeles; the Aquarium of the Pacific, and the South Coast Air Quality Management District. The targets selected represent the City's commitment to doing its fair share and meeting its requirements to help California achieve its ambitious statewide GHG targets. Table 8 outlines the State's GHG reduction commitments. Near-term targets for 2020 and 2030 have been formally adopted by the California State Legislature. Executive orders signed by previous Governors outline the state's potential long-term targets for 2045 and 2050 but do not represent official state policy at present.

Figure 19 illustrates the trajectory of California's GHG target-setting framework. The solid line shows an emissions trajectory for the 2050 executive order of 2005, and the dashed line shows a trajectory for the 2045 executive order of 2018.

**Table 8: State of California Greenhouse Gas Targets**

| Target Year | Target | Corresponding Legislation |
|---|---|---|
| 2020 | Return to 1990 GHG levels by 2020 | Assembly Bill 32, the California Global Warming Solutions Act of 2006 |
| 2030 | 40% below 1990 levels by 2030 | Senate Bill 32, the Global Warming Solutions Act of 2006 |
| 2045 | Carbon neutrality by 2045 | Executive Order B-55-18 of 2018 |
| 2050 | 80% below 1990 levels by 2050 | Executive Order S-3-05 of 2005 |

**Figure 19: Statewide Emissions Target Trajectory**



# GHG REDUCTION TARGETS

## 2030

The City's near-term 2030 target was selected based on guidance provided in CARB's 2017 California Climate Change Scoping Plan and was developed to demonstrate consistency with the statewide 2030 target shown in Figure 8. The City's 2030 target is established on a per SP basis and aims to achieve emissions rates of 3.04 MT $CO_2e$/SP. This compares to the City's 2030 business-as-usual forecast of 3.34 MT $CO_2e$/SP. Based on the City's SP growth estimates, the 2030 target emissions level is 1,984,272 MT $CO_2e$/yr. GHG reductions of approximately 192,659 MT $CO_2e$ will be required to achieve this target, or a reduction of approximately 0.3 MT $CO_2e$/SP.

## 2045

The City also used the CAAP to begin initial evaluation of a long-term aspirational GHG reduction goal and has begun considering the strategies that will be required to achieve it. The City has set an aspirational goal to achieve net carbon neutrality citywide by 2045, which is consistent with California Executive Order B-55-18, which calls for statewide net carbon neutrality in the same year. With no CAAP, under the business-as-usual emissions forecast scenario, the City's 2045 emissions are estimated to be approximately 1.5 million MT $CO_2e$. Achieving a net carbon neutrality target would require eliminating nearly all these emissions and purchasing carbon offsets for the remainder that cannot be reduced with future technologies. Table 9 summarizes the City's 2030 GHG target and its 2045 aspirational goal. Figure 20 illustrates the City's emissions forecasts and reduction targets. The gap between the emissions forecast (top line) and the target (bottom line) shows the amount of reductions needed in each year. The actions described in this CAAP will help the City achieve its near-term 2030 target and begin moving forward on its path toward the 2045 goal.

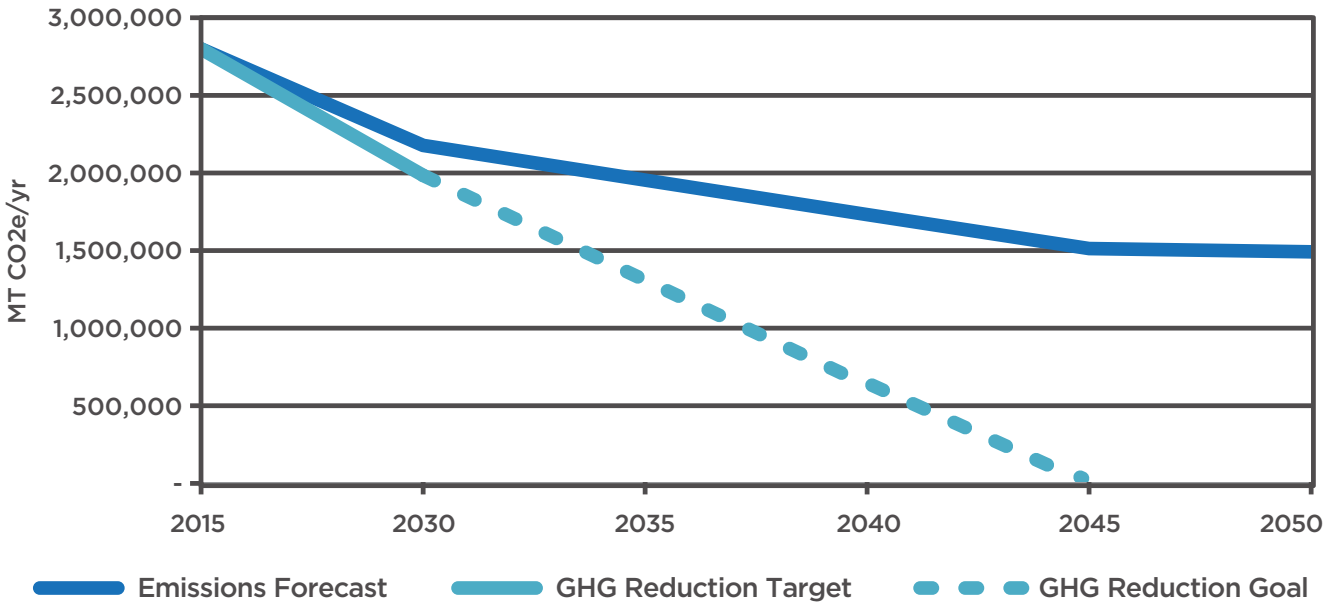
Chapter 6 identifies the actions the City will prioritize for implementation to achieve the 2030 emissions reduction target. It also contains a set of additional actions that the City could decide to implement to achieve greater reductions prior to 2030 and further support progress toward the 2045 net carbon neutrality goal. Chapter 7 includes actions the City will undertake to demonstrate climate action leadership in both reducing emissions and increasing resiliency. It also outlines the steps the City will take to establish a funding and financing strategy to secure the resources that will be necessary to implement the CAAP.

Chapter 8 outlines how the City will monitor and report on CAAP progress as well as the process that will be used to determine the regularity of inventory updates and changes and adjustments to the CAAP.

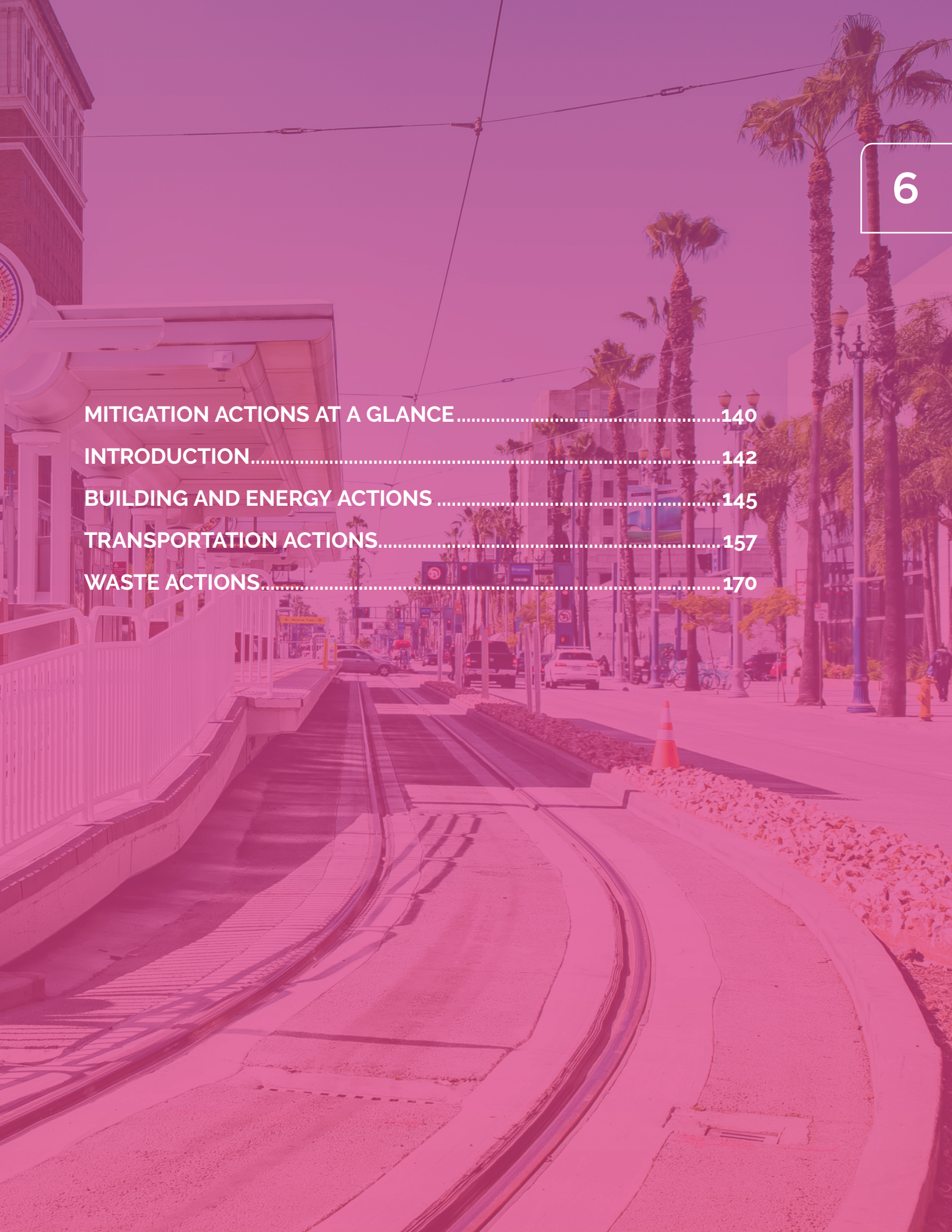
**Table 9: City of Long Beach GHG Reduction Targets**

| **2030 GHG Target** | **3.04 MT $CO_2e$/Service Population** |
|---|---|
| Emissions Business as Usual Forecast | 2,176,931 MT $CO_2e$/yr |
| Emissions Target Level | 1,984,272 MT $CO_2e$/yr |
| **GHG Reductions Needed** | **192,659 MT $CO_2e$/yr** |
| **2045 GHG Aspirational Goal** | **Net-Carbon Neutrality** |
| Emissions Business as Usual Forecast | 1,513,047 MT $CO_2e$/yr |
| Emissions Target Level | 0 MT $CO_2e$/yr |
| **GHG Reductions Needed** | **1,513,047 MT $CO_2e$/yr** |

**Figure 20: Emissions Targets versus Business-as-Usual Forecasts 2015-2050**



# 6 Mitigation Actions



# 6

# MITIGATION OBJECTIVES AND ACTIONS AT A GLANCE

## BE Building + Energy

**Goal: Long Beach buildings are energy-efficient and our communities run on affordable, renewable electricity**

GHG Reductions 247,700 MT $CO_2e$

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| Transition to a carbon-free, more resilient electricity system | BE-1 | Provide access to renewably generated electricity |
| | BE-2 | Increase use of solar power |
| | BE-3 | Promote community solar and microgrids |
| Increase the energy efficiencyof existing buildings/facilities | BE-4 | Develop a residential and commercial energy assessment and benchmarking program |
| | BE-5 | Provide access to energy efficiency financing, rebates, and incentives for building owners |
| | BE-6 | Perform municipal energy and water audits |
| Ensure new buildings are low-carbon or carbon-neutral | BE-7 | Update building codes to incentivize electric new residential and commercial buildings |
| Reduce emissions from local oil and gas extraction | BE-8 | Implement short-term measures to reduce emissions related to oil and gas extraction |

## T Transportation

**Goal: Affordable, safe, carbon-free transportation choices connect all Long Beach communities to opportunity, clean air, and improved health**

GHG Reductions 30,480 MT $CO_2e$

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| Decrease reliance on personal motor vehicles and increase transit, biking, andwalking trips | T-1 | Increase the frequency, speed, connectivity, and safety of transit options |
| | T-2 | Expand and improve pedestrian infrastructure citywide |
| | T-3 | Increase bikeway infrastructure citywide |
| Shift to low- and zero-emissions vehicles to move people and freight | T-4 | Implement the Port of Long Beach Clean Trucks Program |
| | T-5 | Develop an Electric Vehicle Infrastructure Master Plan |
| Prioritize the development of transit-oriented neighborhoodswith a mix of jobs, services, and housing | T-6 | Increase employment and residential development along primary transit corridors |
| | T-7 | Update the Transportation Demand Management Ordinance |
| | T-8 | Increase the density and mixing of land uses |
| | T-9 | Integrate SB 743 planning with the CAAP process |

# W Waste

## Goal: Long Beach is a zero-waste city

GHG Reductions 85,070 MT $CO_2e$

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| Materials that can be recycled are recycled | W-1 | Ensure compliance with state law requirements for multifamily and commercial property recycling programs |
| | W-2 | Develop an organic waste collection program for City-serviced accounts |
| Collect all organic waste for composting or clean energy generation | W-3 | Partner with private waste haulers to expand organic waste collection community-wide |
| | W-4 | Identify organic waste management options |

# INTRODUCTION

This chapter presents the City of Long Beach greenhouse gas (GHG) emission reduction actions identified through extensive engagement with City staff, subject matter experts, local stakeholders, and Long Beach residents and businesses. As detailed in the GHG Inventory Chapter, the City has established a target to reduce per-service population (i.e., residents plus employees) emissions from a baseline of approximately 4.48 MT $CO_2e$ per service population in 2015 to 3.04 MT $CO_2e$ per service population (2.0 million MT $CO_2e$) in 2030, and by 2045 the City has established a goal of achieving net carbon neutrality.

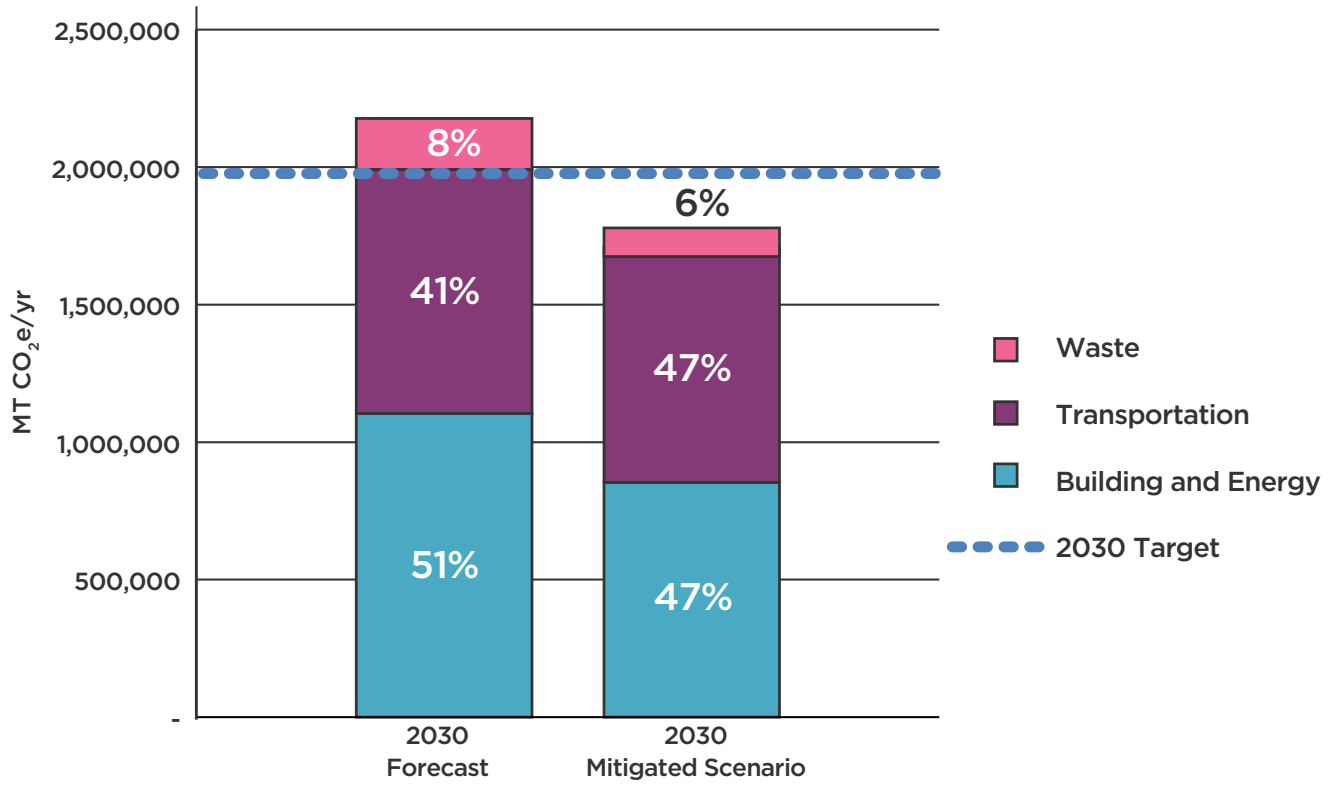
## Meeting And Exceeding Our 2030 Emissions Reduction Target

21 priority actions have been identified in the following sectors:

- Building and Energy
- Transportation
- Waste

These priority actions, combined with reductions from state and federal initiatives, are estimated to result in the City meeting and slightly exceeding the 2030 target. Actions from the Building and Energy, Transportation, and Waste sectors are cumulatively estimated to achieve reductions totaling approximately 363,250 MT $CO_2e$, which represents emissions levels of 2.78 MT $CO_2e$ per service population in 2030, compared to the target of 3.04 MT $CO_2e$ per service population. Figure 21 shows the distribution of emissions by sector in the 2030 forecasts and the 2030 mitigated scenario, which reflects implementation of the priority actions.

**Figure 21: 2030 Reduction Target**



Approximately 68 percent of the reductions come from Building and Energy actions, 8 percent from Transportation actions, and 24 percent from Waste actions. This distribution of reductions by sector reflects the fact that significant GHG reductions are already included in the GHG forecasts which are attributed to the state's renewable electricity requirements and vehicle fuel efficiency requirements, as well as the expected vehicle use reductions from implementation of the City's General Plan 2040.

As newer and more local data becomes available in the future, these emission reduction estimates will be further refined. Data revisions will include aspects such as changes to the percentage of carbon-free energy sources included in SCE's energy portfolio. For example, SCE has committed to providing 80 percent carbon free energy by 2030 and this commitment is considered in the CAAP's GHG reductions estimates for the 2030 target. The City's monitoring activities and future inventories will incorporate the most up-to-date information available, along with other data updates related to the energy, transportation, and waste sectors to track GHG target progress and identify further opportunities for local climate action.

## Moving Beyond 2030 to Carbon Neutrality in 2045

Full implementation of all 21 priority actions will not be enough to achieve carbon neutrality in 2045. If emission reductions from these actions were maximized by 2045, total emissions would still be approximately 1.1 million MT $CO_2e$ based on preliminary estimates (see Figure 22). As a result, additional action will be needed to achieve the City's ambitious carbon neutrality goal. The primary emissions sources estimated to remain in 2045 include natural gas use in existing buildings, on-road vehicle emissions, operations at the city's energy industries, and off-road vehicles and equipment. New actions may be developed in future CAAP updates to reduce these emissions sources. Some current priority actions may also be strengthened to begin implementation sooner or increase estimated participation rates. New state legislation and programs may also be developed in the future to help address these remaining emissions sources in support of the state's long-term GHG targets.

## Process For Selecting and Prioritizing Actions

Priority actions were identified and included based on the following factors:

- Contribution to achieving necessary GHG reductions
- Technical feasibility and City implementation capacity
- Public and stakeholder feedback
- Equity analysis
- Implementation costs

Public and stakeholder feedback played a prominent role in identifying both the priority and the additional actions. Broadly, common feedback themes included expanding transportation choices, increasing access to renewable electricity, reducing waste, reducing costs and preserving and enhancing affordability, and investments that would improve public health and overall quality of life.

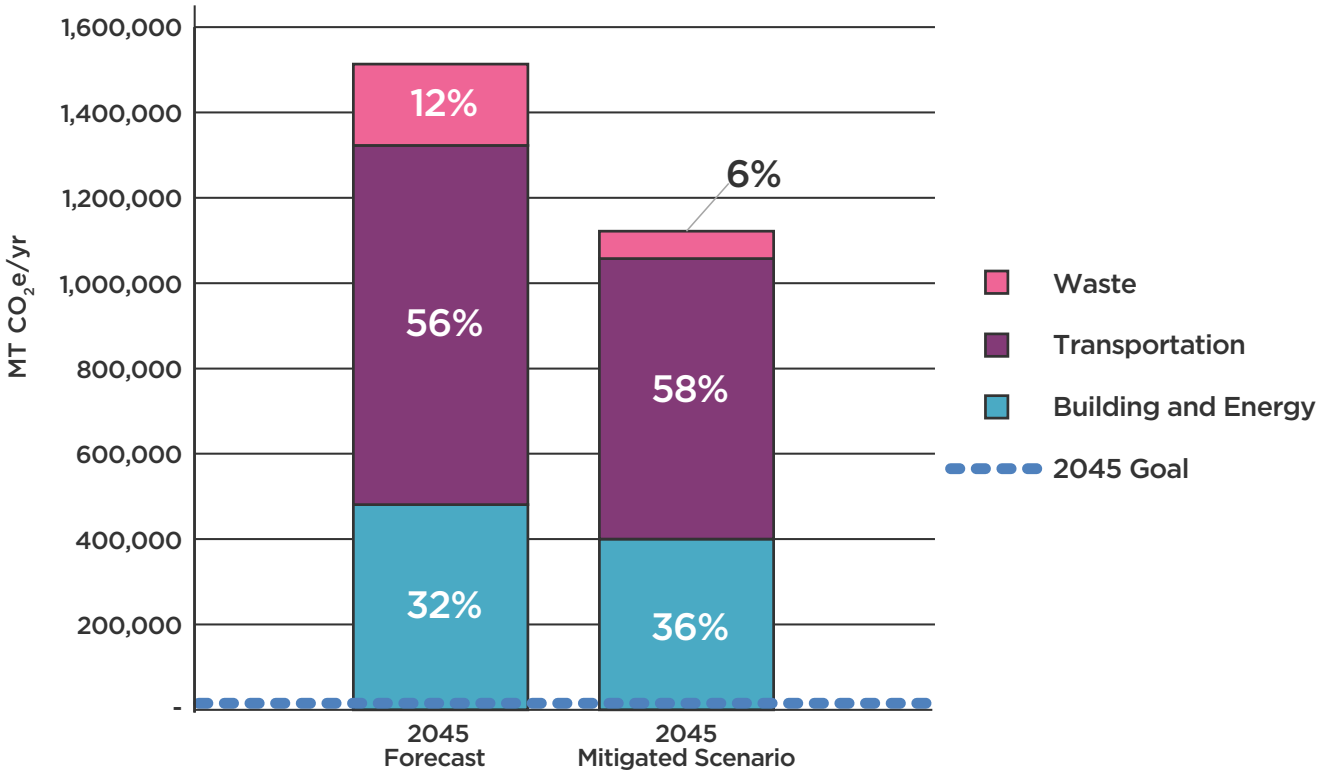
Public feedback also broadened the scope of issues examined in the CAAP process, most notably regarding the issue of oil and gas extraction in Long Beach. Issues related to oil and gas extraction were raised in a variety of public meetings and led to the City preparing an informational memorandum to evaluate at a high level the lifecycle emissions from the use of oil and gas extracted in Long Beach and to identify measures the City could take to address them. This was a focused, high level analysis of lifecycle oil intensity that leveraged the Oil Climate Index (OCI) methodology for assessing the lifecycle impacts of global oils. The evaluation did not include considerations about the economic benefits to the City from its oil production activities, local public health impacts, domestic energy security, human rights records, or other socio-political factors.

The Oil and Gas Memo includes a range of measures that the City could take to further address GHG emissions from extraction activities. The City has included all near-term measures in action BE-8. Additionally, some of the recommended medium and long-term measures aimed at reducing oil and gas consumption within the city, such as electrifying public and passenger vehicle transportation and pursuing energy efficiency upgrades of end-use appliances, are addressed in other mitigation actions in this chapter. The City has already made a number of investments to reduce GHG and air pollutant emissions and improve the environmental sustainability of extraction activities.

The Priority Mitigation Actions table lists the actions for each of the three sectors along with the estimated total GHG reductions. Appendix A describes the methodology used to estimate reductions for each sector, and the Implementation and Monitoring Chapter outlines the tools and process that will be utilized to monitor emissions reduction progress and identify adjustments that may be needed to ensure the City is on track to meet its 2030 CAAP targets. Each action identifies an implementation lead and partners, general timeline (short, medium, long) and City costs (low, medium, high), co-benefits, implementing subactions, and an equity strategy. In general, City operational costs and one-time costs associated with tasks such as updating ordinances and conducting studies are considered to be low while actions that include capital costs and/or significant ongoing operational costs range from medium to high. It is important to note that a number of actions with medium to potentially high cost ranges such as expanding and improving bikeway and pedestrian infrastructure or implementing the Port of Long Beach Clean Air Action Plan have primary objectives such as improving safety and air quality with GHG reductions as an important additional benefit. In other cases, such as municipal building energy and water audits, upfront implementation costs are likely to be outweighed by long-term energy and water savings.

The City has included a preliminary set of potential performance metrics associated with each action that will be considered in Appendix F. These will be used to measure implementation outcomes related to GHG reductions, co-benefits, and equity, and complement GHG monitoring as outlined in the Implementation and Monitoring Chapter.

**Figure 22: 2045 Reduction Goal**



# BUILDING AND ENERGY ACTIONS

Reducing building energy use and using clean, renewable energy are necessary to meet the CAAP's 2030 targets. Electricity and natural gas use in residential and commercial buildings are responsible for about 25 percent of the emissions in the Long Beach GHG inventory. The electricity sector in California is rapidly evolving towards renewable energy. This evolution is the result of California's aggressive Renewables Portfolio Standard (RPS) as well as market and technology changes that are making renewables increasingly cost-competitive with fossil fuels. The RPS requires utilities to achieve a 33 percent renewables power mix by 2020, a 60 percent mix by 2030, and a 100 percent mix by 2045. One of the primary ways cities around the state are aiming to meet their near-term emissions reduction targets is to transition to 100 percent local consumption of renewable electricity before 2045. A renewable electricity transition will significantly reduce but not eliminate energy emissions from buildings because of the prevalence of natural gas in existing buildings. The use of renewable natural gas is also increasing but is not expected to reach levels that would allow for a similar replacement of traditional supplies with renewables. To make progress and ultimately achieve net carbon neutrality by 2045, natural gas emissions from existing and new buildings, which make up approximately 13 percent of the GHG inventory, must be addressed. Although energy-efficiency improvements in buildings will reduce natural gas emissions and result in cost savings for residents and businesses, it will ultimately be necessary to transition from all natural gas uses to electricity in both existing buildings and new buildings.

The core focus of building energy actions is on transitioning Long Beach to renewable energy and increasing energy efficiency in existing and new residential, commercial, and municipal buildings. Energy-efficient buildings that are powered by clean, renewable energy will also improve outdoor and indoor air quality, improve overall comfort, and provide utility cost savings, which are important co-benefits for residents and businesses. This section includes the action (BE-8) incorporating the Oil and Gas Memo's suite of near-term measures to address emissions associated with local oil and gas extraction. The City will work to ensure that key populations, such as low-income households, renters, and communities most impacted by climate change, are prioritized in the implementation of these actions.

# BE Building + Energy

**Goal: Long Beach buildings are energy-efficient and our communities run on affordable, renewable electricity**

GHG Reductions 247,700 MT $CO_2e$

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| Transition to a carbon-free, more resilient electricity system | BE-1 | Provide access to renewably generated electricity |
| | BE-2 | Increase use of solar power |
| | BE-3 | Promote community solar and microgrids |
| Increase the energy efficiencyof existing buildings/facilities | BE-4 | Develop a residential and commercial energy assessment and benchmarking program |
| | BE-5 | Provide access to energy efficiency financing, rebates, and incentives for building owners |
| | BE-6 | Perform municipal energy and water audits |
| Ensure new buildings are low-carbon or carbon-neutral | BE-7 | Update building codes to incentivize electric new residential and commercial buildings |
| Reduce emissions from local oil and gas extraction | BE-8 | Implement short-term measures to reduce emissions related to oil and gas extraction |

# BE-1 Provide Access to Renewably Generated Electricity

Explore and pursue various options to increase the community's access to renewable electricity that exceeds the State's Renewables Portfolio Standard in the near-term.

**Implementation Lead:** City Manager; Office of Sustainability; Energy Resources
**Partners:** Utilities (Southern California Edison and/or a Community Choice Aggregation utility)
**Timeline:** Short
**Potential Cost Level:** Low to High

## Description

The City will explore options for increasing the community's access to and utilization of renewable electricity to exceed the State's Renewables Portfolio Standard (RPS) of 60 percent by 2030. At the utility level, there are a few options available to increase local use of clean electricity. Currently, Southern California Edison (SCE) offers its Green Rate program to residential and commercial customers that want to voluntarily purchase 50 percent or 100 percent clean electricity. It is important to also note that SCE has committed to an 80 percent carbon free energy supply by 2030, along with other actions to meet and exceed the State's GHG reduction goals.

Alternatively, the City could establish its own Community Choice Aggregate (CCA) or join an existing one such as the Clean Power Alliance (CPA), which would automatically enroll customers in receiving up to 100 percent of their electricity from cleaner energy sources. CCAs are programs that allow local governments to 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. Similar to SCE's existing Green Rate program, members have tiered rate options based on their desired share of renewable energy, however data shows that CCAs, which are "opt-out" (where clean electricity is the default option), have much higher rates of participation in clean electricity usage compared to SCE's existing "opt-in" program.

Electricity use contributed more than 20 percent of Long Beach's total community emissions in 2015, so reducing electricity-related emissions is critical to the CAAP. To demonstrate leadership, the City will commit to 100 percent clean electricity for all municipal accounts. The City will then evaluate how it can best facilitate communitywide participation in clean electricity use. Since SCE's renewable portfolio in 2030 is anticipated to exceed state requirements, GHG reductions may be comparable to the reductions that could be achieved by a CCA. The City will monitor SCE's progress toward its 80 percent carbon free energy supply goal and consider this when assessing future renewable electricity programs.

## Co-benefits:

- ✓ Improved air quality
- ✓ Grid resilience, if energy storage is an added element

## Implementing Actions

**BE-1.1:** Continue to assess the risks and benefits associated with joining a CCA such as through updated feasibility studies taking into account local electricity emissions factors from SCE.

**BE-1.2:** Develop a comprehensive economic impact analysis to understand the full benefits and costs of joining or developing a CCA and investing CCA revenues in local community climate projects.

**BE-1.3:** Work with SCE to collect Green Rate participation information and promote SCE Green Rate enrollment.

**BE-1.4:** Purchase 100 percent renewable electricity for all municipal accounts.

## Equity Strategy

Ensure that local programs funded through increased use of renewably generated electricity benefit low-income communities most impacted by climate change including a focus on job creation, job training, and workforce development.


## Existing Program: Citywide Solar

The City has a Solar Energy Power Purchase Agreement to install 10 solar arrays at various City-owned properties, including the Long Beach Gas & Oil Headquarters, Airport Garage, and the Public Works Yard. Together these solar arrays will generate 6,069 kilowatts of solar energy, decreasing the City's energy costs while reducing its carbon footprint through the use of renewable energy.

# BE-2 Increase Use of Solar Power

Incentivize and facilitate an increase in solar power infrastructure installation and usage.

**Implementation Lead:** City of Long Beach Office of Sustainability
**Partners:** Pacific Gateway Workforce Innovation Network; SCE; GRID Alternatives
**Timeline:** Medium
**Potential Cost Level:** Low to Medium

## Description

To increase the use of renewable power in Long Beach, the City will promote increased installation of solar power infrastructure in buildings across the city and in municipal projects. According to Google Project Sunroof, a solar calculator from Google that estimates every rooftop's solar potential, only 2 percent of Long Beach's solar potential is being used for solar. Although there can be a substantial upfront cost associated with solar installation, a variety of rebate, incentive, alternative financing (such as power purchase agreements), and grant programs exist. Moreover, in addition to environmental benefits, the financial savings from solar power over time can cover the costs of solar installation.

GRID Alternatives, a California-based nonprofit organization, has assisted low-income communities and communities of color in Long Beach in getting affordable solar power while creating solar jobs. A frequent barrier to solar installation is aging and damaged roofs. To safely install solar panels, roofs that are damaged or nearing the end of their life span must be replaced.

## Equity Strategy

Identify and maximize use of resources to provide solar installation at a free or reduced cost for the low-income communities most impacted by climate change in Long Beach. Partner with the Pacific Gateway Workforce Innovation Network and/or other workforce entities to increase solar power infrastructure installation and usage in the community while expanding local green job development opportunities

## Co-benefits:

- ✓ Reduced household costs associated with energy consumption
- ✓ More equitable access to the economic benefits of solar energy
- ✓ Local job creation in installation of solar infrastructure

## Implementing Actions

**BE-2.1:** Assess solar installation trends by housing typology, neighborhood, and use of incentive program to understand strengths and

**BE-2.2:** Identify, assess, and reduce any barriers to solar installation due to the City's building permit or zoning requirements.

**BE-2.3:** Require that municipal projects include solar infrastructure installation to the maximum extent feasible.

**BE-2.4:** Partner with SCE to explore options for supporting increased installation and use of solar power.

**BE-2.5:** Partner with GRID Alternatives and other community partners to encourage and promote free and reduced-cost solar installation options for low-income or qualified households.

**BE-2.6:** Partner with local workforce and economic development entities such as Pacific Gateway Workforce Innovation Network and educational institutions like Long Beach Community College and Long Beach Unified School District (LBUSD) to identify and create job training and workforce development programs in emerging green industry sectors for the communities most impacted by climate change.

# BE-3 Promote Community Solar and Microgrids

Leverage partnerships and private developers to expand participation in community solar programs. Identify optimum locations and funding mechanisms for implementing microgrid pilot projects.

**Implementation Lead:** City of Long Beach Office of Sustainability; Disaster Preparedness and Emergency Communications
**Partners:** SCE; Harbor Department
**Timeline:** Medium
**Potential Cost Level:** Low

## Description

Community solar refers to local solar systems shared by multiple community subscribers. Community solar programs provide access to the benefits of solar energy for renters, residents of multifamily properties, and other customers for whom rooftop solar installations are not an option.

Local solar development can also be used to increase community resilience during utility grid outages through development of microgrids. A microgrid is a localized energy grid powered by on-site energy sources that can disconnect from the traditional utility grid to operate autonomously. This means that during outages or other times of crisis, customers and critical facilities connected to the microgrid still receive power, increasing resilience and energy independence. The Port of Long Beach is implementing a microgrid pilot project that will serve as learning lab for the technology. The City will monitor the results of the Port's microgrid project and analyze other opportunities for microgrids, with a focus on critical facilities that require power during emergencies, such as fire stations and hospitals.

## Equity Strategy

Promote community solar opportunities that can benefit the low-income communities most impacted by climate change. Locate microgrid projects associated with support services in the neighborhoods most impacted by climate change to promote community resilience by augmenting the energy supply during disasters and other interruptions in service.

## Co-benefits:

- ✓ Reduced household costs associated with energy consumption
- ✓ Increased and more equitable access to the economic benefits of solar energy
- ✓ Local job creation in installation of solar and microgrid infrastructure
- ✓ Increased backup power for critical facilities during utility grid outages

## Implementing Actions

**BE-3.1:** Partner with SCE to increase participation in its community solar program, which connects customers with solar developers on projects in their community.

**BE-3.2:** Monitor the results of the Port microgrid project to inform potential future projects.

**BE-3.3:** Identify potential partnerships, funding, or financing sources for microgrids.

**BE-3.4:** Promote microgrid development to private agencies and organizations in Long Beach and work with applicants to minimize permitting barriers, where possible.

**BE-3.5:** Identify critical facilities that require power during emergencies, such as fire stations and hospitals, as candidates for a microgrid project.

# BE-4 Develop a Residential and Commercial Energy Assessment and Benchmarking Program

Develop an energy assessment and benchmarking program for commercial and residential properties to identify opportunities for energy efficiency and evaluate options to increase energy efficiency retrofits.

**Implementation Lead:** City of Long Beach Office of Sustainability; Development Services Department
**Partners:** Pacific Gateway Workforce Innovation Network
**Timeline:** Short
**Potential Cost Level:** Low

## Description

The City will establish its own residential and commercial energy assessment and benchmarking program to assess the consumption of electricity and natural gas used to power appliances and lights, produce hot water, and heat and cool rooms in residential and commercial buildings throughout the city. This is important because the building sector represents 45 percent of the greenhouse gas (GHG) emissions in the city. As part of program development, the City will evaluate whether to go beyond the requirements of Assembly Bill (AB) 802 and require energy benchmarking for buildings that are smaller than 50,000 square feet. The City will also evaluate and define any additional energy assessment requirements or incentives for commercial and residential properties, including time-of-sale and time-of-rent energy disclosure requirements for all residential and commercial properties.

Opportunities to leverage existing resources and partnerships, such as the City of Long Beach Office of Sustainability's Residential Direct Install Program and the Pacific Gateway Workforce Innovation Network, will be evaluated and integrated into the program to increase the number of certified Home Energy Rating System (HERS) raters in the community and expand local green job development opportunities. Given that approximately 60 percent of Long Beach residents currently live in rental housing, the City will need to work with landlords and property management companies to ensure energy assessments are prioritized improvements in rental housing units, so that more residents can experience the cost savings and housing quality benefits associated with improved energy efficiency.

## Co-benefits:

- ✓ Reduced household and business costs associated with energy consumption
- ✓ Local job creation in energy audits and efficiency improvements

## Implementing Actions

**BE-4.1:** Establish a program to comply with AB 802 and investigate a residential and commercial energy assessment program.

**BE-4.2:** Implement a pilot program for residential and commercial energy assessment to identify potential energy savings opportunities.

**BE-4.3:** Identify opportunities to leverage existing resources and partnerships to help expand local workforce development.

**BE-4.4:** Explore opportunities to require audits and time-of-sale and/or time-of-rent energy and other utility use disclosures for residential and commercial buildings.

**BE-4.5:** Partner with local workforce and economic development entities such as the Pacific Gateway Workforce Innovation Network and educational institutions like Long Beach Community College and LBUSD to identify and create job training and workforce development programs in emerging green industry sectors for the communities most impacted by climate change.

## Equity Strategy

To remove barriers to participation, develop targeted engagement programs and explore options for subsidies or benefits for the low-income communities most impacted by climate change. Ensure that improvements are not a precursor to rent hikes and evictions through robust anti-displacement strategies. Partner with the Pacific Gateway Workforce Innovation Network and/or other workforce entities to increase the number of certified HERS raters in the community while expanding local green job development opportunities.

# BE-5 Provide Access to Energy Efficiency Financing, Rebates, and Incentives for Building Owners

Identify funding sources to increase energy efficiency improvements in the community's existing building stock and develop an outreach strategy to promote opportunities to all segments of the community.

**Implementation Lead:** Energy Resources Department; Economic Development Department; City of Long Beach Office of Sustainability
**Partners:** SCE; Southern California Regional Energy Network (SoCalREN)
**Timeline:** Short
**Potential Cost Level:** Low

## Description

In order to provide access to energy efficiency financing, rebates and incentives, the City will develop a building energy resource center that helps residents and businesses identify financing or rebate opportunities and estimate cost savings. While the City does not provide funding directly, it will take an active role in cataloguing and promoting the various rebate and assistance programs available to residents and businesses in Long Beach, such as those offered through the property assessed clean energy (PACE) program, SCE, and SoCalREN. It will also seek to identify new or additional programs that are or could be accessible to residents, businesses, and building owners. Engagement activities will include creating energy resource kiosks in certain City facilities, such as libraries, and partnering with community-based organizations, business improvement districts, and other stakeholders to spread this information. This action is critical because the vast majority of GHGs from the building sector come from older, less energy-efficient buildings, since new buildings must be built to much higher energy efficiency standards with today's technology.

## Equity Strategy

Develop targeted engagement programs, including programs for the low-income communities most impacted by climate change, to remove barriers to participation. Track participation based on these factors to measure and increase utilization by targeted communities.

## Co-benefits:

- ✓ Reduced household and business costs associated with energy consumption
- ✓ Local job creation in efficiency improvement installation

## Implementing Actions

**BE-5.1:** Develop a building energy resource center to provide residents and businesses with information on available rebates, financing options, and technical assistance programs.

**BE-5.2:** Implement an engagement campaign that increases awareness of financial and technical assistance options for all segments of the community, including the translation of materials into Spanish, Khmer, and Tagalog.

**BE-5.3:** Establish data-sharing processes with SoCalREN, SCE, and other agencies to track participation in energy efficiency rebate/finance programs, and estimate annual energy savings.

**BE-5.4:** Identify and/or seek out new or additional energy efficiency programs that are or could be accessible to residents, businesses, and building owners.

**BE-5.5:** Partner with local workforce and economic development entities such as the Pacific Gateway Workforce Innovation Network and educational institutions like Long Beach Community College and LBUSD to identify and create job training and workforce development programs in emerging green industry sectors for the communities most impacted by climate change.


## Existing Program: Civic Center Energy and Water Efficiency

City Hall and the Port Headquarters meet LEED (Leadership in Energy and Environmental Design) standards through sustainable features and practices, including energy-efficient cooling and design that allows natural light into the buildings. The new City Hall consumes 25 percent of the energy of the old City Hall. The Civic Center produces its own renewable energy with roof top photovoltaic panels on the Billie Jean King Main Library that generate 930 kilowatt-hours of solar energy, which is enough electricity for 119 average homes. The Civic Center site captures rainwater and stores it in an underground cistern that is used to irrigate landscaping.

# BE-6 Perform Municipal Energy and Water Audits

Establish a municipal building/facility energy and water audit program, establish targets for decreasing annual energy use, and track progress.

**Implementation Lead:** City Manager; City of Long Beach Office of Sustainability; Public Works Department

**Partners:** SCE; SoCalREN; Long Beach Parks, Recreation and Marine; Library; Health and Human Services Department

**Timeline:** Short

**Potential Cost Level:** Low

## Description

The City will undertake actions to continue to increase efficient energy and water use in its buildings. These will include establishing a municipal building energy and water audit program and developing a schedule to produce a complete evaluation of energy and cost-saving opportunities across the City's building portfolio. Energy audits will be required every 5 years along with operational improvements to optimize energy efficiency. Targets to decrease annual energy use and make progress towards those targets will be tracked and made publicly available.

California has set a target to double cumulative energy efficiency in electricity and natural gas end uses by 2030 (Senate Bill [SB] 350). Energy efficiency in buildings is a core focus of California's efforts to achieve this goal. Though a very small proportion of citywide emissions, increased efficiency at City facilities will reduce the City's carbon footprint while eventually saving taxpayer dollars through reduced utility costs. In addition, increased efficiency will likely improve thermal comfort for City employees.

## Co-benefits:

- ✓ Reduced City costs associated with energy consumption
- ✓ Reduced City water consumption

## Implementing Actions

**BE-6.1:** Conduct energy and water audits of all City-owned or City-leased buildings and facilities

**BE-6.2:** Establish a municipal energy benchmarking efficiency policy that includes efficiency targets.

**BE-6.3:** Incorporate energy and water audits into Facilities Conditions Assessments.

**BE-6.4:** Maximize to the extent feasible the attainment of green building standards that improve energy and water efficiency in municipal projects.

**BE-6.4:** Partner with local workforce and economic development entities such as Pacific Gateway Workforce Innovation Network and educational institutions like Long Beach Community College and LBUSD to identify and create job training and workforce development programs in emerging green industry sectors for the communities most impacted by climate change.

## Equity Strategy

Develop local hire goals and strategies, where feasible, to facilitate increased economic opportunity through municipal energy and water audits. Prioritize audits to take place first in the low-income communities most impacted by climate change.

# BE-7 Evaluate Building Codes to Incentivize Electric New Residential and Commercial Buildings

Identify and implement building energy code options to establish incentives and/or requirements for all electric residential and commercial buildings.

**Implementation Lead:** Department of Planning and Building
**Partners:** Undefined
**Timeline:** Short
**Potential Cost Level:** Low to Medium

## Description

Because cities and counties across the state have recognized the importance of reducing emissions in new buildings, at least 50 have adopted building codes that exceed or reach beyond these standards. While these "reach codes" vary by jurisdiction, they generally focus on encouraging or requiring building electrification, installation of electric vehicle (EV) infrastructure, and/or solar installation. The City will evaluate a range of reach code components, including those that would incentivize and/or require buildings to include increased EV readiness and/or infrastructure and be solar-ready and/or have solar installations. The City will also conduct an analysis of the cost-effectiveness of reach code components and engage stakeholders to inform reach code development.

Reducing and eventually eliminating GHG emissions from new residential and commercial buildings is an important component in achieving both the CAAP's 2030 target and the City's aspirational goal of net carbon neutrality by 2045. Even as existing buildings move to using renewable electricity, new buildings that incorporate natural gas would result in substantial emissions (and further carbon lock-in). In addition to reducing carbon emissions, a move toward all-electric buildings will also have beneficial public health impacts as a result of improved outdoor and indoor air quality. Requiring or incentivizing EV readiness and infrastructure will also support the transition from vehicles dependent on fossil fuels to those that run on clean, renewable electricity.

## Equity Strategy

Pursue funding opportunities to help offset costs associated with energy-efficient electric buildings when constructing affordable housing in order to ensure an adequate supply of affordable housing.

## Co-benefits:

- ✓ Improved outdoor and indoor air quality
- ✓ Increased energy cost savings
- ✓ Improved public health

## Implementing Actions

**BE-7.1:** Evaluate a range of reach code components that incentivize between 50 and 100 percent of all new commercial and residential buildings to be 100 percent electric, and conduct an analysis of the cost-effectiveness of various measures.

**BE-7.2:** Establish an outreach strategy to engage stakeholders in reach code development.

# BE-8 Implement Near-Term Measures to Reduce Emissions Related to Oil and Gas Extraction

Implement the suite of near-term measures included in the CAAP Oil and Gas Technical Memorandum to reduce oil and gas extraction emissions per the memorandum.

**Implementation Lead:** Energy Resources
**Partners:** Office of Sustainability; City Manager's Office; California Air Resources Board (CARB); South Coast Air Quality Management District SCAQMD)
**Timeline:** Medium
**Potential Cost Level:** Medium to High

## Description

The City will implement the recommended short-term measures for reducing emissions related to oil and gas extraction, as outlined in the CAAP Oil and Gas Technical Memorandum and recommended by the City's Energy Resources Department. Under this action, the City will implement the seven upstream (i.e. extraction), midstream (i.e. oil refining), and downstream (i.e. transport to consumers and end use of fuel) near-term emissions reduction actions the Oil and Gas Technical Memorandum recommends and establish corresponding implementation strategies. The recommendations include a range of infrastructure, technology, reporting, and regulatory efforts. Generally, successful implementation of the near-term recommendations will require the City to identify strategies it can devise and pursue under its own authority, those it will need to pursue through existing and/or expanded partnerships with federal, state, and regional agencies that have regulatory authority, and those that it can partner on with the private sector. The CAAP also considers the GHG emissions reductions that will result from a 20 percent decrease in local oil production by 2030 due to depletion, as well as ongoing efforts to maximize renewable energy production opportunities at the City's oil fields, including development of solar photovoltaics and gravity energy storage in oil wellbores.

Although most oil and gas life cycle emissions occur downstream during fuel transport to consumers and in fuel end uses, this action is critical to reducing the City's overall carbon footprint, since life cycle emissions associated with drilling for oil and gas are roughly 2.7 times greater than the entire citywide 2015 production-based inventory for Long Beach.

## Equity Strategy

Prioritize actions that would provide air quality and public health co-benefits to low-income communities most impacted by climate change.

## Co-benefits:

- ✓ Improved air quality

## Implementing Actions

**BE-8.1:** Establish strategies to implement the near-term actions recommended by the CAAP Oil and Gas Technical Memorandum to reduce oil and gas extraction emissions.

**BE-8.2:** Partner with regulatory agencies to share information and report on oil and gas extraction emissions.

**BE-8.3:** Develop and implement state and federal legislative agendas to help implement the developed strategies.

## Existing Program: Synergy Oil Wetlands Restoration and Oil Consolidation Project

The Synergy Oil Wetlands Restoration and Oil Consolidation Project restores significant coastal wetlands habitat in Long Beach while improving the efficiency of local oil production by modernizing equipment and removing legacy wells to reduce their environmental impact.

# TRANSPORTATION ACTIONS



The transportation sector is typically the largest source of GHG emissions at the state, regional, and local level. Decades of transportation policy and investment decisions in California – including in Long Beach – have produced a transportation system that is heavily dependent on fossil fuels and communities that are too reliant on single-passenger vehicles. In the last 15 years California has put in place regulations and policies and increased State funding to reduce transportation sector emissions through expanded public transit, the development of walkable communities, and a shift to cleaner passenger vehicles and freight networks. Despite these efforts, statewide transportation GHG emissions have been on the rise since the end of the Great Recession, primarily driven by an increase in passenger vehicle emissions. While reversing this trend requires action at all levels of government, cities have an important role to play in providing residents and businesses with real transportation choices that support a healthy climate and improved quality of life now and in the future.

The CAAP transportation actions incorporate current City efforts to reduce GHG transportation emissions and new efforts to achieve greater reductions. The San Pedro Bay Ports Clean Air Action Plan, the Long Beach Transit Systemwide Transit Analysis and Reassessment (STAR) Initiative to improve transit service, continued expansion of the City's bikeway and pedestrian networks, and increased housing and employment density along major transit corridors are existing efforts that not only have public health, mobility, and quality of life benefits but also reduce GHG emissions. New actions such as increasing rapid bus service, establishing bus-only lanes, and expanding electric-vehicle charging infrastructure will result in additional reductions.

## T Transportation

**Goal: Affordable, safe, carbon-free transportation choices connect all Long Beach communities to opportunity, clean air, and improved health**

GHG Reductions 30,480 MT $CO_2e$

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| Decrease reliance on personal motor vehicles and increase transit, biking, andwalking trips | T-1 | Increase the frequency, speed, connectivity, and safety of transit options |
| | T-2 | Expand and improve pedestrian infrastructure citywide |
| | T-3 | Increase bikeway infrastructure citywide |
| Shift to low- and zero-emissions vehicles to move people and freight | T-4 | Implement the Port of Long Beach Clean Trucks Program |
| | T-5 | Develop an Electric Vehicle Infrastructure Master Plan |
| Prioritize the development of transit-oriented neighborhoodswith a mix of jobs, services, and housing | T-6 | Increase employment and residential development along primary transit corridors |
| | T-7 | Update the Transportation Demand Management Ordinance |
| | T-8 | Increase the density and mixing of land uses |
| | T-9 | Integrate SB 743 planning with the CAAP process |

# T-1 Increase the Frequency, Speed, Connectivity, and Safety of Transit Options

Evaluate transit service and routes, and identify opportunities to increase to ridership by increasing the transit frequency, speed, connectivity, and safety.

**Implementation Lead:** Long Beach Transit
**Partners:** Los Angeles County Metropolitan Transportation Authority (Metro); other regional transit providers; Development Services Department; Public Works Department
**Timeline:** Medium
**Potential Cost Level:** Low to High

## Description

Long Beach has ample public transit infrastructure and service, yet like many other cities in the U.S. most trips are taken by automobile. The Metro A Line has nine stations in Long Beach, and Long Beach Transit boasts more than 30 routes, including specialized options like the free downtown Passport bus, water taxis, the Museum Express, and the Galaxy/Chargers Express. Many areas of Long Beach also have service from Torrance Transit, Bellflower Bus, Los Angeles Department of Transportation (LADOT) Commuter Express, the Orange County Transportation Authority (OCTA), and Metro bus routes. When Long Beach individuals were asked about their primary mode of transportation as part of an online CAAP survey, 75 percent of respondents stated that driving alone remained their primary mode and cited three primary issues as barriers to increased transit usage: frequency of service, connectivity of routes, and safety. Increasing the frequency, speed, connectivity, and safety of transit options will encourage greater use of transit and decreased dependency on single-passenger auto trips.

## Co-benefits:

- ✓ Increased access to key major destinations and job centers
- ✓ Increased air quality
- ✓ Increased safety and perception of safety

## Equity Strategy

Improve transit services, prioritizing core and low-income transit riders

## Implementing Actions

**T-1.1:** Collaborate with Long Beach Transit to advance the Systemwide Transit Analysis and Reassessment (STAR) Initiative goals and strategies (e.g., increase operating hours by 50 percent, reduce headways to 15 minutes on key routes and corridors).

**T-1.2:** Collaborate with Long Beach Transit, other transit providers, and the public to better understand origin and destination patterns for shorter trips that could be made by transit.

**T-1.3:** Collaborate with Long Beach Transit, other transit providers, and the public to better understand which destinations Long Beach residents would like to access by transit in order to inform future land use and transit planning.

**T-1.4:** Collaborate with transit providers to assess current bus routes and identify opportunities to create and/or enhance rapid bus and regional connector routes.

**T-1.5:** Pursue opportunities to increase rapid bus service and establish bus-only lanes (e.g., pursue federal and state transit funding to establish bus-only lanes).

**T-1.6:** Improve rider safety when making transit improvements (to include anti-bias training and de-escalation methods).

**T-1.7:** Collaborate with Long Beach Transit to prioritize riders with disabilities and "Dial-A-Lift" Access Service users in the Future Emerging Mobility Zones.


## Existing Program: Metro A Line (Blue) and Long Beach Transit STAR Program

Metro recently completed a major renovation of the A Line (Blue) light rail between Downtown Los Angeles and Long Beach, improving service reliability and making station upgrades. The upgrades included installing interactive digital screens with real-time arrival information, maps, and service alerts. The City is also partnering on the Long Beach Transit STAR program to increase bus service and ridership. The City continues to work to improve first mile/last mile experiences for transit riders.

# T-2 Expand and Improve Pedestrian Infrastructure Citywide

Ensure safe and convenient pedestrian infrastructure is provided citywide, including uninterrupted sidewalk connections, adequate lighting and visibility, shading, and safe intersections.

**Implementation Lead:** Public Works Department
**Partners:** Health and Human Services Department – Healthy Active Long Beach; Development Services Department; Long Beach Transit; Metro; nonprofit transportation organizations; and neighborhood groups
**Timeline:** Medium
**Potential Cost Level:** Medium to High

## Description

Expanding and improving pedestrian infrastructure in neighborhoods can increase walking and reduce driving. Walkable neighborhoods are also generally safer for users of other modes, such as wheelchairs, bicycles, scooters, and public transit. People are less likely to walk in places that lack sidewalks or that have sidewalks that are uneven, too narrow, and lack Americans with Disabilities Act ramps and other amenities, such as safety infrastructure. Pedestrian infrastructure improvements should address those basic issues and can also include installing sidewalk amenities, such as street trees and other landscaping, lights, street furniture (e.g., benches, trash and recycling bins), and transit shelters. Pedestrian safety improvements can include streetlight crossings or designated bike lanes (to minimize biking and e-scooters on sidewalks). In addition, traffic-calming features like medians, bulb-outs, and curb extensions can discourage high-speed, cut-through traffic and result in safer routes for pedestrians.

## Co-benefits:

- ✓ Increased public health benefits through active transportation and active lifestyles
- ✓ Decreased vehicle-pedestrian collisions, injuries, and deaths
- ✓ Improved local air quality
- ✓ Increased walkability, spurring economic development
- ✓ Increased development of neighborhood character

## Implementing Actions

**T-2.1:** Implement the Mobility Element of the General Plan, the Communities of Excellence in Nutrition, Physical Activity, and Obesity Prevention (CX3) Pedestrian Plan, and the Downtown Transit-Oriented Development (TOD) Pedestrian Plan to achieve GHG emissions reduction targets from infrastructure investment and other efforts to encourage walkability and active transportation.

**T-2.2:** Leverage the development review and environmental review processes to implement pedestrian infrastructure improvements.

**T-2.3:** Integrate the financing, design, and construction of pedestrian facilities within other street projects to install pedestrian improvements alongside vehicle, transit, and bikeway improvements.

**T-2.4:** Ensure that all planning processes, such as neighborhood and specific plans, identify opportunities for pedestrian improvements.

**T-2.5:** Pursue funding opportunities, including the California Department of Transportation's Active Transportation Grants and cap-and-trade revenue programs, for development of pedestrian infrastructure.

**T-2.6:** Identify infrastructure gaps in neighborhoods not analyzed in the City's other pedestrian plans, and develop pedestrian improvement plans accordingly.

## Equity Strategy

Work with local neighborhoods, such as nonprofit, community and neighborhood organizations, to identify and prioritize areas for pedestrian infrastructure and safety enhancements. Seek resources that will support the City in advancing equity in pedestrian infrastructure.

# T-3 Increase Bikeway Infrastructure Citywide

Expand the bikeway system and associated infrastructure throughout the city in order to encourage safe and convenient use of active and sustainable travel modes.

**Implementation Lead:** Public Works Department
**Partners:** Long Beach Bike Share; e-scooter companies; nonprofit transportation organizations
**Timeline:** Medium
**Potential Cost Level:** High

## Description

Expansion of bikeway infrastructure creates active mobility networks and helps ensure rider safety for healthy, nonpolluting, and low-cost forms of transportation. Improvements that expand bikeway infrastructure can include bike lanes multimodal facility improvements; e-scooter, e-bike, and micro-mobility charging infrastructure; and education and engagement for active transportation riders and drivers alike to encourage safe road behavior. Investments in bikeway infrastructure can also help address first mile/last mile challenges (i.e., getting to and from transit stations and stops).

## Co-benefits:

- ✓ Improved local air quality
- ✓ Increased public health benefits from active transportation and active lifestyles
- ✓ Reduced transportation expenses
- ✓ Increased safety
- ✓ Increased transit use

## Equity Strategy

Assess existing and planned bikeway infrastructure to ensure equitable distribution based on CalEnviroScreen and other environmental justice indicators. Increase accessibility of active transportation and micromobility options for low-income individuals by working with providers and by exploring subsidies and specialized programs.

## Implementing Actions

**T-3.1:** Implement the Mobility Element of the General Plan and the Bicycle Master Plan to achieve GHG emissions reduction targets from infrastructure investment and other efforts to encourage active transportation and micromobility use.

**T-3.2:** Leverage the development review and environmental review processes to implement bikeway infrastructure improvements.

**T-3.3:** Integrate the financing, design, and construction of bikeway infrastructure into other street projects to expand bikeways alongside vehicle and transit improvements.

**T-3.4:** Seek funds from federal agencies, state departments, Metro, Long Beach Measure A, and private foundations to increase bikeway infrastructure and facilities.

**T-3.5:** Conduct community outreach and education to encourage safe driving, bicycling and other active transportation, and micromobility user behavior.

**T-3.6:** Prioritize human-powered trips in facility design while assessing and accommodating emerging technologies and their potential benefits.

**T-3.7:** Monitor travel mode patterns through surveys (e.g., the City's annual bicycle, pedestrian, and e- scooter count) and/or travel studies sponsored by the Southern California Association of Governments (SCAG) to assess opportunities for greater mode shifts.

**T-3.8:** Explore options to incentivize or require emerging technology companies to achieve a more sustainable product life cycle, such as by reducing electronic waste and investing in bikeway infrastructure.


## Existing Program: Bikeshare Program and Promoting Multimodal Transportation

Long Beach has 165 miles of bike lanes, including nine protected bike lanes and four bike boulevards. Launched in 2016, the City's bikeshare program now boasts 40,841 members. The bikeshare program includes partnerships that offer low-cost memberships to college students. As of July 2020, there have been 237,069 total trips taken, resulting in an estimated reduction of 566,497 pounds of carbon.

# T-4 Implement the Port of Long Beach Clean Trucks Program

Implement the Port of Long Beach Clean Trucks Program, which is described in the San Pedro Bay Ports Clean Air Action Plan, to reduce the GHG emissions associated with goods movement through trucks serving the Port of Los Angeles and Port of Long Beach.

**Implementation Lead:** Harbor Department
**Partners:** Terminal operators
**Timeline:** Ongoing
**Potential Cost Level:** High

## Description

In 2017, the Mayors of the City of Los Angeles and City of Long Beach committed to zero emissions by 2035 for on-road drayage trucks serving the ports in both cities. Trucks are a significant source of emissions at the ports. According to the ports' 2017 Clean Air Action Plan Update, port trucks contribute 23 percent of the total NOx emissions, making them the second largest source of NOx emissions at the ports. Furthermore, port trucks are the largest contributor of port-related GHG emissions, representing 40 percent of total port-wide GHG emissions. The Clean Trucks Program was adopted in 2007 to phase out the oldest, dirtiest trucks serving port terminals between 2 and 6 years in advance of the State Drayage Truck Rule. Beginning in 2008, the ports banned pre-1989 trucks; that ban was followed by a progressive ban on all trucks that did not meet 2007 emissions standards by 2012.

The Port of Long Beach and Port of Los Angeles Clean Trucks Program reduced air pollution from on-road drayage trucks by more than 90 percent in a little over 3 years. Implementation of the ports' Clean Trucks Program is estimated to result in a 10 percent reduction in diesel heavy-duty truck emissions by 2030.

## Co-benefits:

- ✓ Improved air quality
- ✓ Improved public health

## Implementing Actions

**T-4.1:** Collaborate with the Port to ensure implementation of the Clean Trucks Program to reduce GHG emissions while maximizing air quality emissions reductions.

**T-4.2:** Collaborate with the Ports, regulatory agencies, industry stakeholders and others to identify and pursue grants, financial incentives, bulk purchasing, and other opportunities to transition to a zero- and near-zero-emissions truck fleet and drayage system that does not place an undue burden on truck drivers or other relevant stakeholders.

**T-4.3:** Collaborate with the Ports to support a path to zero emissions.

**T-4.4:** Collaborate with the Port to further reduce shipping-related emissions through use of 100% emissions-free cargo handling equipment by 2030 and implementation of state's shore power regulation for at-berth vessels.

## Equity Strategy

Focus on improvements that provide the most direct air quality benefits to neighborhoods in close proximity to and most impacted by port-related emissions.

# T-5 Develop an Electric Vehicle Infrastructure Master Plan

Develop an EV infrastructure plan that aligns with county-wide efforts to guide investment and policy decisions that will result in a distributed network of EV chargers to incentivize and facilitate EV ownership and use.

**Implementation Lead:** Public Works Department; Development Services Department
**Partners:** City of Long Beach Office of Sustainability; SCE; Los Angeles County
**Timeline:** Short
**Potential Cost Level:** Low

## Description

To date, California has been a leader in EV adoption. In 2019, EV and plug-in hybrid sales constituted nearly 8 percent of all cars sold in the state. In Long Beach, on-road emissions are the largest source of total emissions. Expanding EV use is a core transportation sector GHG reduction strategy facilitated by ensuring clean electricity is available to recharge EVs. An EV Infrastructure Master Plan guides investment and policy decisions that result in a distributed network of EV chargers. A plan analyzes the numerous technology and ownership options for charging stations, considers location and network density needs, and analyzes case studies from other jurisdictions that have been successful in removing barriers to broad installation. A plan will also establish the policies for EV charging related to zoning, curbside charging, and workplace charging. Finally, it will account for infrastructure projects for EVs in the City fleet.

## Equity Strategy

Provide equitable access to EV infrastructure by installing charging stations and providing EV car sharing in low-income areas and neighborhoods impacted by poor air quality and by pursuing low-cost or no-cost EV car-sharing options for income-qualified residents.

[1] https://www.latimes.com/business/story/2019-12-01/electric-vehicle sales-in-california-on-the-rise-but-is-it-enough-to-reach-the-5-million-goal-by-2030

## Co-benefits:

- ✓ Improved air quality
- ✓ Reduced urban heat from decreased vehicle waste heat

## Implementing Actions

**T-5.1:** Develop an EV Infrastructure Master Plan in coordination with residents and other key stakeholders to better understand needs, locations, and opportunities to further reduce barriers to EV use in the city.

**T-5.2:** Continue to analyze and update zoning and building code requirements for EV charging infrastructure and readiness to maximize EV infrastructure availability and usage.

**T-5.3:** Develop pilot projects, as needed, to install charging stations (e.g., increasing at-home charging opportunities in neighborhoods with constrained properties), facilitate EV car sharing, and pursue other initiatives to facilitate EV use.

**T-5.4:** Collaborate with SCE on the Charge Ready program to expand the network of publicly accessible EV charging stations at municipal facilities.

**T-5.5:** Pursue EV infrastructure projects that maximize the proportion of the City fleet that is EV.

**T-5.6:** Coordinate with Los Angeles County on the EV infrastructure plan.

**T-5.7:** Pursue funding opportunities to pilot an EV car-sharing program, install charging stations, and implement other initiatives to facilitate EV use.

**T-5.8:** Collaborate with the Port regarding potential convenient charging points for trucks as part of the development of the EV Infrastructure Master Plan.

## Existing Program: Green City Fleet

The City of Long Beach Fleet Services has been recognized for its green fleet of City-owned vehicles. The City's alternative fuel vehicles include vehicles powered by compressed natural gas, electric, hybrid, liquefied natural gas, biodiesel, and propane. In addition, the City and Long Beach Transit have made significant investments in electric buses and other vehicles.


## Existing Program: Citywide Electric Vehicle Charging

The City is partnering with Southern California Edison through the Charge Ready Program to install electric infrastructure for charging stations at public and City fleet locations. From 2018 to 2020, the City installed 140 electric vehicle (EV) charging ports at public and City fleet locations. By the end of 2020, 65 more charging ports are expected to be installed. In addition, 160 Long Beach residents have received EV chargers through the City's EV Charger Giveaway Program.

# T-6 Increase Employment and Residential Development along Primary Transit Corridors

Identify land use and/or zoning changes to expand TOD opportunities along the city's primary transit corridors. Pursue strategies to increase affordable housing in these areas.

**Implementation Lead:** Development Services Department
**Partners:** Economic Development Department; Gateway Council of Governments; SCAG; neighborhood groups
**Timeline:** Long
**Potential Cost Level:** Low

## Description

People's ability to rely on transit as a primary mode of transportation depends largely on their network of destinations and whether they can be easily reached through transit. Helping address this challenge are TOD neighborhoods, which provide a mixture of housing, office, retail, and other amenities integrated into a walkable neighborhood served by high-quality transit, typically rail or high-frequency bus service. TOD neighborhoods are critical for reducing VMT. Affordable, transit-accessible housing can increase transit ridership while reducing combined housing and transportation costs for residents, especially for low-income populations that typically use transit at higher rates than the general population. Long Beach can capitalize on its strong transit network, which will continue to improve, and its many distinctive neighborhoods. Through the 2019 General Plan Update, the City is encouraging a greater mix of land uses near transit lines and stations. Through SB 375, California requires the creation of regional plans to reduce per capita VMT and prioritize transit and transit-oriented development. Cities play a key role in these efforts. TOD policies also put the City on more competitive footing for California's Affordable Housing Sustainable Communities grant funding as well as cost-saving housing policies like AB 987 and SB 743, which can speed TOD and reduce the cost of housing for consumers.

## Equity Strategy

Maximize opportunities for affordable housing development and employment uses near transit to improve the accessibility of low income residents to jobs, and combine this strategy with renter protections to prevent displacement of low-income residents.

## Co-benefits:

- ✓ Improved air quality
- ✓ Increased transit ridership
- ✓ Reduced vehicle miles traveled (VMT)
- ✓ Increased economic development and increased tax base
- ✓ Increased affordable housing
- ✓ Increased walkability

## Implementing Actions

**T-6.1:** Evaluate projects through the development review process, based on consistency with the goals of the General Plan's Land Use Element and Mobility Element to maximize opportunities for higher-density, mixed-use, transit-oriented, walkable infill development.

**T-6.2:** Strengthen incentives for affordable housing development near transit and expand renter protections to prevent displacement of low-income residents near transit.

**T-6.3:** Incentivize development projects to include land uses for which residents must take regular trips, such as grocery stores, pharmacies, or restaurants.

**T-6.4:** Disincentivize driving through a variety of strategies, including reducing or eliminating parking requirements, establishing parking maximums, increasing density allowances, and removing or reducing height restrictions along transit corridors, as feasible.

**T-6.5:** Locate businesses and job centers along transit corridors to facilitate the use of public transit for commuter trips.

**T-6.6:** Continue to integrate land use and transportation planning goals and initiatives that demonstrate consistency with both the SCAG Regional Transportation Plan/Sustainable Community Strategy and the City's General Plan Land Use Element, which create complete neighborhoods and reinforce regional transit planning objectives.

**T-6.7:** Explore options to enhance renter protections to prevent displacement of low-income residents near transit.

# T-7 Update the Transportation Demand Management Ordinance

Update and implement a transportation demand management (TDM) ordinance that encourages travel by transit, vanpool/carpool, and bicycle.

**Implementation Lead:** Public Works Department; Development Services Department
**Partners:** Metro; transit providers; building managers; Business Improvement Districts
**Timeline:** Medium
**Potential Cost Level:** Low

## Description

Transportation demand management ordinances require development projects over a certain size or qualifying threshold to implement strategies for reducing single-occupancy vehicle trips anticipated from the development project, while TDM programs incentivize or improve access to alternative transportation modes, such as transit, walking, biking, and carpooling. Strategies include, but are not limited to, supplying or incentivizing transit passes and rideshare and carpool programs, and the inclusion of physical amenities such as bike parking. The ordinances generally apply to larger residential and commercial projects that have the most potential for single-occupant vehicle trip reduction. Cities with effective TDM ordinances generally combine strong trip reduction incentives and/or requirements and robust monitoring to ensure that those reductions materialize.

## Equity Strategy

Ensure equitable access to TDM benefits, including cost savings and increased affordable transportation options, for low-income individuals and those most impacted by climate change. Seek opportunities to expand TDM benefits beyond those traditionally served (people working for large employers, large residential and commercial developments).

## Co-benefits:

- ✓ Improved efficiency of existing transportation infrastructure
- ✓ Reduced traffic congestion and air pollution
- ✓ Reduced transportation cost burden for residents and employees
- ✓ Improved public health through increased physical activity (i.e., biking and walking)

## Implementing Actions

**T-7.1:** Define requirements for a TDM ordinance update, using evidence-based strategies that reduce single-occupant vehicle trips. These strategies include preferential carpool/vanpool parking, bicycle parking, and shower facilities and locker rooms; trip reduction plans; transit-supportive infrastructure development; and similar strategies.

**T-7.2:** Apply TDM strategies to new non-residential development that exceeds an established size threshold (e.g., 25,000 gross square feet) and new large multifamily developments (e.g., more than 50 units). Include a VMT reduction target and monitoring mechanisms for development, subject to the updated ordinance.

**T-7.3:** Partner with large employers, institutions, and community-based organizations to promote existing resources from Metro and Long Beach Transit, including trip-planning resources for transit, biking, and ridesharing, existing incentive programs for employers, and incentives for employees, such as the Regional Guaranteed Ride Home Program.

**T-7.4:** Subsequent to adoption of the ordinance update, develop a method for collecting data and tracking the effectiveness of TDM measures in reducing VMT and GHG emissions.

# T-8 Increase Density and the Mixing Of Land Uses

Use the City's land use authority to increase development density particularly near transit, and provide a mix of land uses, such that residents and employees in the city can easily access goods, services, and entertainment via transit or active transportation modes.

**Implementation Lead:** Development Services Department
**Partners:** Developers
**Timeline:** Long
**Potential Cost Level:** Low

## Description

To promote sustainable neighborhoods, the City will identify and designate select areas for increased development density leading to mixed-use, transit-oriented, walkable neighborhoods that meet community needs. Neighborhoods with a diverse mix of jobs and housing will improve the overall jobs/housing balance and help lower VMT by providing households with the opportunity to live and work in the same area. These neighborhoods will be consistent with General Plan's land use designations and design standards, which permit increased density near transit areas. Reduced parking requirements and shared off-street parking will also be pursued in transit-oriented neighborhoods.

Promoting sustainable neighborhoods encourages residents to access stores, healthy foods, and community services without a car. Inherently, sustainable neighborhoods mitigate GHG emissions by making residents less dependent on fossil-fueled vehicles and by lowering overall VMT.

## Co-benefits:

- ✓ Improved public health through less dependency on auto trips for short trips to goods, services, and entertainment
- ✓ Increased pedestrian activity that spurs economic development in commercial mixed-use areas
- ✓ Increased number of vibrant, complete communities with nearby access to places to live, work, and shop

## Implementing Actions

**T-8.1:** Develop a zoning code that is consistent with the General Plan place types and that designates additional TOD and mixed-use development areas.

**T-8.2:** Implement regulations to reduce parking requirements in transit-oriented neighborhoods and allow shared off-street parking for mixed-use projects.

**T-8.3:** Adopt policies and strategies to preserve and increase the supply of affordable housing and prevent displacement.

**T-8.4:** Work with large institutions such as California State University, Long Beach to include an adequate mix of uses within their campuses and near transit whenever possible.

## Existing Program: Planning for Density and a Greater Mix of Uses

Locating housing near jobs and increasing density and the mix of uses along transit corridors are actions that help reduce GHG emissions from one of the largest contributing sectors – transportation. The updated Land Use Element of the General Plan, adopted in 2019, is an example of these efforts.

## Equity Strategy

Ensure that the low-income communities most impacted by climate change benefit from investments in affordable housing incentives, rent protection, and anti-displacement policies.

# T-9 Integrate SB 743 Planning with the CAAP Process

Evaluate the effectiveness of VMT reductions resulting from SB 743 compliance in achieving the City's GHG reduction target.

**Implementation Lead:** Development Services Department
**Partners:** Long Beach Transit; Metro; other transit providers; bike share providers; schools
**Timeline:** Short
**Potential Cost Level:** Low

## Description

Senate Bill 743 creates a process to change the way that transportation impacts are analyzed under the California Environmental Quality Act (CEQA). It requires that transportation impacts of development projects be assessed using a VMT metric rather than a Level of Service (LOS) metric. State guidance also recommends a threshold of significance such that if a project would result in per capita VMT that is in excess of 15 percent below the regional average, it should then mitigate that VMT. VMT mitigation or reductions in VM could be funded directly by the project sponsor, or a central authority could collect an in-lieu fee to then fund the mitigation. Research suggests that VMT reduction is highly context-sensitive and depends on many local factors. Some of the more cost-competitive VMT reduction strategies include subsidized transit passes, bike share facilities, and employer-based "fair commuting" programs that charge fees for single-occupancy vehicle commuting and give rebates for using more sustainable modes of transportation.


## Co-benefits:

- ✓ Reduced traffic congestion and air pollution
- ✓ Reduced transportation cost burden for residents and employees
- ✓ Increased funding for transit passes and other amenities to support low-income populations

## Implementing Actions

**T-9.1:** Evaluate the effectiveness of new VMT thresholds, metrics, and mitigations as the City's updated Transportation Impact Analysis (TIA) guidelines are implemented.

**T-9.2:** Monitor what types of mitigation strategies are working in other cities that could apply in the Long Beach context to reduce emissions and meet aligned City objectives.

**T-9.3:** Consider strategies to fund the implementation of VMT mitigation strategies, such as collecting in lieu fees and participating in a regional mitigation bank program.

**T-9.4:** Evaluate VMT mitigations and adjust as needed to maximize effectiveness on an ongoing basis.

## Equity Strategy

Ensure that VMT reduction strategies benefit core and low-income transit riders, such as by providing reduced public transit fares and expanding affordable transportation options.

# WASTE ACTIONS

Solid waste disposal creates emissions when organic waste, such as food scraps, yard trimmings, and paper and wood products, is buried in landfills and decomposition occurs that emits methane. Methane from landfill waste disposal is responsible for approximately 6 percent of the city's GHG inventory.

The City, along with its franchise waste haulers, is responsible for collecting solid waste from homes and businesses. The portion of waste that the City collects is processed at the Southeast Resource Recovery Facility (SERRF), where it is sorted to remove additional recyclables and then incinerated to generate electricity. Through this process, SERRF helps to avoid landfill emissions and extends the operational life of regional landfills, while also providing energy recovery that can offset the additional use of non-renewable energy sources for electricity generation. SERRF generates enough power each year to supply 35,000 residential homes with electricity and has reduced the volume of solid waste entering landfills by more than 4 million cubic yards.

To address the city's solid waste emissions comprehensively, the CAAP includes waste actions directed at services provided by the City and by private waste haulers. These actions include ensuring compliance with State waste regulations, which set requirements for different property types, and expanding community-wide participation in organic waste collection.

## W Waste

**Goal: Long Beach is a zero-waste city**

**GHG Reductions 85,070 MT $CO_2e$**

| OBJECTIVES | NO. | ACTIONS |
|---|---|---|
| **Materials that can be recycled are recycled** | **W-1** | Ensure compliance with state law requirements for multifamily and commercial property recycling programs |
| | **W-2** | Develop an organic waste collection program for City-serviced accounts |
| **Collect all organic waste for composting or clean energy generation** | **W-3** | Partner with private waste haulers to expand organic waste collection community-wide |
| | **W-4** | Identify organic waste management options |

# W-1 Ensure Compliance with State Law Requirements for Multifamily and Commercial Property Recycling Programs

Adopt a mandatory commercial recycling ordinance that includes enforcement mechanisms to ensure that on-site recycling collection is provided at multifamily and commercial properties and that the City is in compliance with state laws.

**Implementation Lead:** Public Works Department - Environmental Services Bureau
**Partners:** Franchise waste haulers; property management companies; Code Enforcement; Business License Division
**Timeline:** Short
**Potential Cost Level:** Low to Medium

## Description

Diverting waste from landfills through recycling can reduce downstream GHG emissions from organic materials (e.g., office paper, cardboard). It can also reduce upstream emissions from all recycled materials through decreasing demand for new raw materials and avoiding emissions associated with their extraction/harvesting, processing, manufacturing, and transportation. According to CalRecycle, the commercial sector (including multifamily residences) generates nearly three-quarters of the total solid waste in California, and much of that disposed waste is readily recyclable.

California enacted AB 341 to require on-site recycling services at commercial and multifamily properties (five or more units). The legislation requires jurisdictions to implement education, outreach, and monitoring for businesses to make them aware of the recycling requirements and their compliance options. To enhance compliance with the legislation, some cities have adopted mandatory commercial recycling ordinances to enforce state law.

## Co-benefits:

- ✓ Extended landfill operating life
- ✓ Increased beneficial reuse of recycled products

## Implementing Actions

**W-1.1:** Adopt a mandatory commercial and multifamily recycling ordinance that codifies the requirements of AB 341, which mandates on-site recycling services at commercial and multifamily properties (five or more units) and includes local enforcement mechanisms.

**W-1.2:** Continue to conduct outreach to commercial and multifamily properties about state law and implementing City ordinances.

**W-1.3:** Develop technical assistance for properties found to be out of compliance with the recycling diversion requirements.

**W-1.4:** Implement a program to audit compliance and monitor attainment of recycling diversion goals.

## Equity Strategy

Ensure equitable access to recycling services and potential benefits such as cost savings by developing multilingual outreach materials and conducting targeted outreach to local businesses and low-income and multifamily tenants.

# W-2 Develop an Organic Waste Collection Program for City-Serviced Accounts

Develop an organic waste collection program and educational campaign for properties serviced by the City to divert organic waste from landfills.

**Implementation Lead:** Public Works Department - Environmental Services Bureau
**Partners:** Waste facilities
**Timeline:** Medium
**Potential Cost Level:** Low to Medium

## Description

Organic waste is an important emissions source in Long Beach, as it is in the rest of the state, where it decomposes in landfills to generate methane gas. Organic waste includes food scraps and compostable paper (like pizza boxes and used coffee filters) as well as yard waste trimmings. Based on CalRecycle data, approximately 45 percent of the residential waste stream in Southern California consists of organic materials, including food waste (21 percent) and yard waste (11 percent). Diverting these items from landfills can help reduce GHG emissions and can prolong the operable life of a landfill. There are several organic waste management options, including composting to produce soil amendments for use in residential, commercial, and agricultural applications, or anaerobic digestion to produce a low-carbon biofuel.

California has already defined a regulatory framework to reduce these emissions in support of statewide GHG targets. Senate Bill 1383 defines specific organic waste targets to help reduce the impact of short-lived climate pollutants in the state, such as methane. The bill sets a target to achieve a 50 percent reduction in statewide organic waste disposal below 2014 levels by 2020, and a 75 percent reduction by 2025. It also requires a residential organics diversion program by 2022.

## Existing Program: SERRF

Since 1988, the City of Long Beach has incinerated waste to generate electricity at its Southeast Resource Recovery Facility (SERRF), located on Terminal Island at the Port of Long Beach. The SERRF processes waste from single-family residences and most small businesses in Long Beach, and also accepts waste from other private haulers and nearby jurisdictions.

## Co-benefits:

- ✓ Increased beneficial resuse of waste products
- ✓ Increased development of local renewable energy (e.g., biofuels)

## Implementing Actions

**W-2.1:** Work with stakeholders to design an organic waste collection program for City-serviced properties to meet California's organic waste disposal goals and requirements.

**W-2.2:** Develop a pilot program for smaller multifamily and commercial properties serviced by the City to identify challenges and solutions to implementation of an organics collection program.

**W-2.3:** Continue to educate residents and businesses about the benefits of organic waste diversion, through efforts such as free composting workshops.

**W-2.4:** Adopt citywide goals for organic waste reduction and adopt an enforcement mechanism into the Long Beach Municipal Code to support state requirements.

**W-2.5:** Conduct a waste characterization study, among other future studies, that can be used to evaluate progress in organics diversion.

**W-2.6:** Monitor implementation of SB 1826, SB 1383, and all applicable state laws.

## Equity Strategy

Ensure equitable access to organic waste services and potential benefits such as cost savings by developing multilingual outreach materials and conducting targeted outreach to low-income residents.

# W-3 Partner With Private Waste Haulers to Expand Organic Waste Collection Community-Wide

Adopt a mandatory commercial and multifamily organic waste collection ordinance and partner with the City's franchise waste haulers to ensure organics collection service is provided community-wide.

**Implementation Lead:** Public Works Department - Environmental Services Bureau
**Partners:** Franchise waste haulers; Public Works Department - Environmental Services Bureau; property management companies
**Timeline:** Short
**Potential Cost Level:** Low to Medium

## Description

In Long Beach, franchise waste haulers provide collection services to many of the City's multifamily and commercial properties, and the City provides waste collection services to the remaining properties. Once a mandatory commercial and multifamily organic waste collection ordinance is adopted, City staff will ensure compliance with state law and increase participation in organics collection programs among all privately serviced properties. The City will continue to provide information on the Long Beach Recycles website to assist businesses and multifamily property managers in complying with the requirements of applicable laws.

Senate Bill 1383 defines specific targets for organic diversion and outlines the state's implementation strategy. As part of this strategy, California enacted AB 1826 to require businesses that exceed solid waste disposal thresholds to recycle their organic waste. The bill also set green waste disposal thresholds for multifamily residential properties (five or more units).

## Co-benefits:

- ✓ Increased beneficial reuse of waste products
- ✓ Increased development of renewable energy (e.g., biofuels)
- ✓ Compliance with state laws

## Implementing Actions

**W-3.1:** Adopt a mandatory commercial and multifamily organic waste collection ordinance that codifies state law and includes an enforcement mechanism.

**W-3.2:** Conduct outreach to businesses and multifamily properties to ensure they understand organic waste diversion requirements as they are adopted, and to support the specific targets and target years of SB 1383.

**W-3.3:** Conduct a waste characterization study, among other future studies, that can be used to evaluate progress in organics diversion.

**W-3.4:** Develop technical assistance for properties found to be out of compliance with the organic waste diversion regulations.

## Equity Strategy

Ensure equitable access to organic waste services and potential benefits such as cost savings by developing multilingual outreach materials and conducting targeted outreach to local businesses and low-income and multifamily residential tenants.

# W-4 Identify Organic Waste Management Options

Evaluate organic waste collection and processing options, including composting, mulching, and anaerobic digestion, and develop a plan to implement feasible options.

**Implementation Lead:** Development Services Department; Public Works Department—Environmental Services Bureau
**Partners:** Regional waste processing facilities; other local governments; franchise waste haulers
**Timeline:** Long
**Potential Cost Level:** Low

## Description

The State of California established methane reduction targets for short-lived climate pollutants in several economic sectors. These included specific targets to reduce statewide disposal of organic waste. The targets can be achieved by reducing food waste generation and by diverting organic waste away from landfills to other types of treatment (e.g., composting, anaerobic digestion). Managing organic waste through anaerobic digestion can also help offset fossil fuel use through production of biogas, which can be used to produce heat and/or electricity, support process heating at the digester facility, power alternative-fuel vehicles, or be injected into natural gas pipelines for use in homes and businesses. The City will explore opportunities for processing organic waste in collaboration with other agencies, waste haulers, and other relevant partners.

## Co-benefits:

- ✓ Increased beneficial resuse of waste products
- ✓ Increased development of local renewable energy (e.g., biofuels)
- ✓ Reduced transportation emissions through localized processing

## Implementing Actions

**W-4.1:** Evaluate options for processing organic waste in Long Beach, such as composting, mulching, and anaerobic digestion facilities.

**W-4.2:** Collaborate with other agencies to identify potential locations for organic waste processing facilities and share more information with interested parties, including how to navigate the permitting process.

**W-4.3:** If a facility is identified and ultimately established, the City will work to update waste hauler contracts and ensure that organic waste is hauled to locally sited facilities.

**W-4.4:** The City will continue to minimize the use of green waste as alternative daily cover and instead will include the use of inert materials that minimize the generation of GHG emissions.

## Equity Strategy

Ensure equitable access to organic waste services and potential benefits such as cost savings. Evaluate the siting of an organic waste facility through an environmental justice lens.

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7

# City Leadership and Funding

7

# INTRODUCTION

The City recognizes that for the CAAP to be successful, the City must both set up a governance structure that facilitates implementation of the CAAP and demonstrate leadership by integrating climate action into its operations and internal culture, public engagement, and financial decision-making processes.

Several of the CAAP adaptation and mitigation actions in Chapters 4 and 6 include implementation components defining City leadership roles. One notable example is the City's commitment to transition municipal buildings and facilities to 100 percent renewable electricity (BE-1) in the short term. Another is the City's commitment to perform energy and water audits (BE-6) in existing facilities and perform subsequent efficiency upgrades. The City has identified additional efforts, described below, that demonstrate its leadership and commitment to supporting the overall implementation of the CAAP and integrating sustainability and climate resilience into all facets of the City's operations while promoting economic resilience and job creation. These efforts will include actions such as engaging and providing education to internal staff and the general public; transitioning to net-zero municipal buildings, transitioning the City vehicle fleet to low- and zero-carbon vehicles; transitioning to zero-carbon cargo handling equipment at the Port; integrating sea level rise considerations into plans and policies; incorporating green infrastructure into city projects and properties; pursuing funding for urban greening, cooling centers, and a myriad of other programs that protect against air quality and extreme heat climate impacts and advance equity goals; and seeking opportunities to create jobs and train residents in emerging green technologies.

## City Funding and Investment

The City seeks to align its expenditures with CAAP actions and objectives. In recognition of the level of funding and investment that will be needed to implement the CAAP in the coming years, the City aims to establish a funding strategy that details the City's approach to integrating mitigation and adaptation considerations in the allocation of existing funds and when seeking and securing new funding sources. More specifically, City actions around funding will focus on identifying opportunities to better align the annual city budget, Capital Improvement Program, and other expenditures with CAAP actions and objectives. The City will also pursue new revenue sources for implementing CAAP actions by working across departments and with other public agencies, as appropriate, to successfully compete for grants and by studying options to increase local revenue and identify other financing mechanisms. This effort will include securing funding for both the staff needed to successfully implement the CAAP and dedicated staff to advance CAAP policies and programs. A more detailed discussion and specific implementing actions are outlined below.

# MITIGATION ACTIONS

## Commitment to Job Creation and Training

The City seeks to reduce greenhouse gas (GHG) emissions while promoting a prosperous local economy and creating green jobs, particularly for those who are most impacted by climate change. Actions that reduce community-wide GHG emissions also present opportunities to make investments in infrastructure. By investing in developing quality jobs locally and adopting new low-carbon technologies, the City can facilitate new sources of green job growth within the city. The City will seek opportunities to partner with local workforce and economic development entities, such as the Pacific Gateway Workforce Innovation Network, and educational institutions, such as Long Beach City College and Long Beach Unified School District (LBUSD), on identifying and creating job training and workforce development programs in emerging green industry sectors for the communities most impacted by climate change. The City will work with the local business community to identify emerging green technology opportunities in energy, transportation, land use, and general goods and services, and will facilitate connections with local job training and workforce development programs. Increasing local job opportunities will support a prosperous local economy and reduce the need for city residents to commute long distances to employment centers outside the city. Specific implementing actions are outlined in more detail below.

## City Initiatives

The City will implement a range of mitigation and adaptation actions to support the overall implementation of CAAP. Specific mitigation actions are organized below by the three main sectors—transportation, building and energy, and waste—that generate the City's GHG emissions. The mitigation actions are followed by adaptation actions that are organized by each of the four primary climate stressors—extreme heat, air quality, drought, and sea level rise and flooding.

## Transportation

The City of Long Beach has more than 5,300 employees who need to get to and from work, and operates a large vehicle fleet to support City activities. The City will identify and implement strategies to provide employees with transportation choices that reduce reliance on single-occupancy vehicles to get to and from work and reduce and eventually eliminate GHG emissions from City-owned vehicles. To ensure that this approach will be carried forward, the City will:

- Evaluate the effectiveness of existing incentives and requirements in place to manage transportation demand among employees and identify improvements to increase transit usage, walking and biking, and other options that will reduce employee commute-related vehicle miles traveled.
- Continue to explore and expand telecommute options that reduce the need for City staff to commute.
- Identify and implement a strategy to reduce and eliminate GHG emissions from the City fleet through a requirement to replace fossil-fueled vehicles with electric vehicles. Where there are no cost-effective electric vehicle replacements, whenever feasible, the City will prioritize alternative-fuel vehicles that run on renewable fuels. Where possible, smaller vehicles will be purchased that achieve more miles to the gallon and kilowatt-hour.
- Identify opportunities to replace City off-road vehicles and equipment with zero- or low-carbon alternatives, including at the Port and Airport.
- Ensure that City events with food include vegetarian and local food options.

## Building + Energy

The City's recently completed Civic Center complex showcases the City's leadership in sustainable building design. Through this and other similar projects and its commitment to 100 percent carbon-free municipal energy, the City can reduce emissions and energy use, and achieve cost savings.

To ensure that this approach will be carried forward, the City will:

- Ensure that new municipal buildings are net-zero facilities constructed in accordance with the most up-to-date green building standards; to the extent feasible, the City will also apply these standards to the rehabilitation of existing municipal facilities when upgrades are undertaken.
- Purchase 100 percent renewable electricity for all municipal accounts (see BE-1).
- Establish a municipal building/facility energy and water audit program with targets for decreasing annual energy and water use, and track progress (see BE-6).
- Require that municipal projects include solar infrastructure installation to the maximum extent feasible.
- Develop a guidance tool to help City projects incorporate mitigation and adaptation measures.
- Develop partnerships with education and jobs and workforce development entities, such as the Pacific Gateway Workforce Innovation Network, Long Beach City College, and LBUSD, to train and create jobs for residents in sectors that reduce the GHGs associated with buildings and energy use. These jobs could include conducting energy and water audits, installing solar and microgrid infrastructure, and installing other efficiency improvements for which rebates or other incentives might be offered.

## Waste

The City will continue to reduce and divert waste from its own facilities and waste collection network, and will build the capacity of key stakeholders and the general public to divert waste.

- To ensure that this approach will be carried forward, the City will:
- Audit existing public waste receptacles citywide to identify and resolve issues that lead to litter, such as overfilling or receptacles that do not contain waste effectively.
- Establish and execute a plan to install waste recycling, landfill, and composting receptacles at all City properties along with information that educates staff and the public about their benefits and how to use them.
- Conduct waste audits and public education at multifamily and commercial properties to grow awareness of the City's efforts to divert waste.

# ADAPTATION ACTIONS

## Extreme Heat

In addition to its efforts to expand and enhance the urban forest cover under EH-05, the City will pursue other projects and programs to address extreme heat, and will:

- Identify and prioritize projects at City-owned properties in environmental justice communities that will provide additional public benefits, such as enhanced green spaces and cooling centers that reduce the urban heat island effect and otherwise mitigate climate impacts, and will consult with community residents on project designs.
- Pursue funding to enhance and expand parks and green space, particularly parks and green space in those communities that are most vulnerable to extreme heat and air quality climate impacts and that lack sufficient access to parks and green space.

## Air Quality

A reduction in air pollution will be a significant co-benefit of the City's efforts to reduce GHG emissions as well as to reduce extreme heat impacts under the CAAP. In addition, the City will:

- Identify other opportunities to improve air quality data by collaborating with the Ports of Long Beach and Los Angeles, the South Coast Air Quality Management District, the California Air Resources Board, and the U.S. Environmental Protection Agency to evaluate the need for expanding or improving the existing air quality monitoring network and data.
- Phase out City-owned fossil-fuel-powered lawn and garden equipment and establish requirements for vendors contracted by the City to do the same.

## Drought

The City will seek to address drought by incorporating green infrastructure, recycled water and greywater, and rainfall capture into existing and new facilities. The City will:

- Implement green infrastructure technologies in City-owned properties to increase stormwater capture and serve as demonstration projects for community education.
- Incorporate greywater for irrigation into new City-owned properties, when possible, and evaluate the potential for incorporating greywater use in existing buildings as part of facility retrofits.
- Install rain barrels or cisterns at City-owned properties both to diversify the water supply and serve as demonstration projects for community education, such as community events to decorate rain barrels to be installed at various City-owned properties. Use the captured rainfall for irrigation purposes whenever possible.

## Sea Level Rise and Flooding

The City will identify and pursue partnerships to continue to understand and respond to the latest climate science and its potential effects on sea level rise and related impacts:

- Participate in forums and collaborate with academic institutions to ensure that City staff stay current on climate science.
- Collaborate with federal, state, and regional agencies to identify approaches and resources that can be used to pursue adaptation strategies that are more regional in nature.
- Work with federal, state, and regional partners to explore and pursue funding and other solutions related to sea level rise adaptation.
- Consider flooding and sea level rise impacts in capital improvement plans and adaptive strategies, as appropriate.

## Ongoing CAAP Education, Outreach, and Engagement

The City will engage in a range of education and outreach activities to communicate the importance of climate action at all levels: individual, organizational, City and regional. Some actions the City will take related to this objective are:

- Establish and execute an internal citywide communications and training framework to increase awareness of and support for climate action and the CAAP, and promote greater understanding of staff responsibilities and the importance of cross-departmental collaboration to achieve successful implementation.
- Develop and execute a strategy to grow public awareness of the CAAP and spur engagement in its implementation by all members of the public, especially those populations and entities that have the resources to take actions that effectively reduce climate impacts.
- Develop targeted education and outreach campaigns to raise awareness about individual actions the public can take to improve energy efficiency and reduce waste and reliance on the automobile as part of the collective effort to reduce GHG emissions and minimize climate impacts.
- Collaborate with LBUSD and other public agencies to identify opportunities to incorporate climate education and climate action into the education curriculum or other educational activities, and to identify funding needed for implementation.

## Funding and Investment

To successfully implement climate mitigation and adaptation plans, cities must strategically identify and pursue new funding and financing sources and tools. As the need for climate action has become more urgent, the number of funding programs and tools and the total resources available have proliferated. However, demand for this growing but limited pool of resources is also accelerating. Major funding sources such as the California Climate Investments Program, which has allocated more than $12 billion to GHG reduction projects since 2013, mostly through competitive grants, are highly sought after. While grants are important, a more comprehensive funding and financing approach should also include components such as evaluations of potential local funding mechanisms and alignment of existing funding resources and practices with mitigation and adaptation goals.

Upon adoption of the CAAP, the City will begin work on an integrated funding and financing strategy to support implementation of the CAAP. The City will identify opportunities to improve the alignment of existing City funding and financing resources with mitigation and adaptation actions. The annual city budget and the Capital Improvement Program will integrate consideration of mitigation and adaptation actions and objectives in both strategic improvements to the City's existing infrastructure and one-time projects designed to address important community needs. Climate mitigation and adaptation will also be integrated into the programming of other funding sources, such as Community Development Block Grants. In addition, the City will identify grant opportunities for potential funding of plans, studies, programs, and infrastructure investments. In each process, the City will prioritize those projects and programs that have the greatest potential to include mitigation and adaptation actions while also addressing environmental justice, equity concerns, and opportunities to invest in youth and the green economy.

In the medium term, the City will evaluate ways to increase local funding and financing options for investing directly in programs and infrastructure while also leveraging grants and outside funding. Regarding sea level rise, for example, some local funding sources might include special flood districts, transient occupancy taxes, and bonds that can be dedicated to flood protection within a defined area.

In making these decisions, the City will consider funding sources and their availability, community input, and the cost of inaction. Specifically, the City will:

- Evaluate the City's annual budget, Capital Improvement Program and other funding sources to identify opportunities to integrate implementation of climate mitigation and adaptation into projects, with an emphasis on investing in projects that improve infrastructure in and the health of the low-income communities disproportionately impacted by climate change to ensure that investments improve equity for the people in those communities.
- Identify available grant opportunities to fund CAAP implementation and prioritize investments in the low-income communities most impacted by climate change.
- Assess the political and financial feasibility of different local funding mechanisms through a process that engages potentially impacted stakeholders.
- Identify financing mechanisms for adaption strategies in coastal areas of the city that are funded by impacted landowners and/or other private funding sources to minimize public subsidy of impacts in "high opportunity areas."[i]
- Explore the feasibility of funding additional dedicated staff who may be required to successfully implement the CAAP.

[i] California Department of Housing and Community Development Department "High Opportunity Areas" Map

# 8 Performance and Monitoring

8

# INTRODUCTION

The CAAP is a living document, and its greenhouse gas (GHG) reduction estimations reflect a moment in time. As the City begins implementing the plan, new information will become available and previous assumptions will change. This chapter describes how the City will track progress toward the CAAP GHG target and adjust course as needed over time.

# IMPLEMENTATION MONITORING AND REPORTING

The CAAP can be monitored in two ways, with each providing different information on implementation progress. A top-down approach will show how total emissions are trending compared to the City's GHG target. A bottom-up approach will provide more granular insight into how individual actions are performing compared to their corresponding assumptions in the CAAP. The City can use one or both approaches in its future monitoring efforts, depending on the resources available and the information needed at the time.

If plan monitoring shows the City is not on track to achieve its GHG target as assumed, the City will take action to expand participation in the existing CAAP actions (e.g., some actions in Chapter 5 include implementation steps to strengthen the action if the assumed reductions are not occurring), develop new actions that can provide additional GHG reductions, and/or evaluate new State of California legislation that could result in local GHG reductions. The following sections present a framework for plan monitoring and updates.

## Top-Down Emissions Monitoring

A top-down monitoring approach can be achieved using future community-wide inventories or can follow a more streamlined approach based on collecting the most important activity data related to the quantified CAAP actions. Both approaches will help identify high-level trends in community emissions to understand if total emissions are on track toward the target and/or if individual emissions sectors are trending toward the target.

## Comprehensive Community Inventory

The City will update the production-based community-wide GHG inventories every 2 years to track total GHG emissions from all sources within the community. To the extent feasible, these inventories will follow consistent methodologies to support direct comparison with prior inventory results and establish information on community emissions trends and changes within the various sectors and subsectors. During years in which a community GHG inventory is not developed, the City will prepare a municipal GHG inventory.

## Primary Emissions Source Tracking

The City will collect a primary set of data to support tracking of several emissions sources annually. The table below lists the emissions sources to be tracked as part of this top-down monitoring approach, along with the corresponding activity data (e.g., vehicle miles traveled [VMT], kilowatt-hours [kWh] of electricity consumed), data sources, and monitoring approach. These sources combined represent approximately 98 percent of the 2015 base-year emissions. Staff can collect the energy, waste, and oil data annually with relative ease. However, the VMT values used in the GHG inventory come from the Southern California Association of Governments' (SCAG's) regional travel model, which is updated on an approximately 4- to 5-year cycle, so the frequency of monitoring based on this top-down approach will be limited to the frequency of model updates. Other data sources may be available to help support transportation sector monitoring in the year between SCAG model updates. For example, Google's Environmental Insights Explorer may be useful in harnessing "big data" to understand the city's transportation emissions on a year-to-year basis and in supporting a cost-effective analysis that is automatically updated by Google annually. This process can be used as a verification or backup to the comprehensive GHG inventories that the City will prepare on a regular basis.

**Table 10: Top-down Action Monitoring Process**

| Emissions Source | Data Needed | Data Source | Monitoring Approach |
|---|---|---|---|
| Electricity | Community-wide electricity consumption and electricity emissions factor | Southern California Edison | Compare against CAAP implementation assumption forecasts; review sector-specific actions if activity data are not following the target trend line |
| Natural Gas | Community-wide natural gas consumption | City of Long Beach Energy Resources Department | |
| Oil/Gas Extraction | Barrels of oil extracted in the city | City of Long Beach Energy Resources Department | |
| Transportation | Daily vehicle miles traveled | Southern California Association of Governments or "big data" providers | |
| Landfill Waste Disposal | Total tons of waste disposed of in landfills (diversion of recycling and organics) | California Department of Department of Resources Recycling and Recovery (CalRecycle) | |

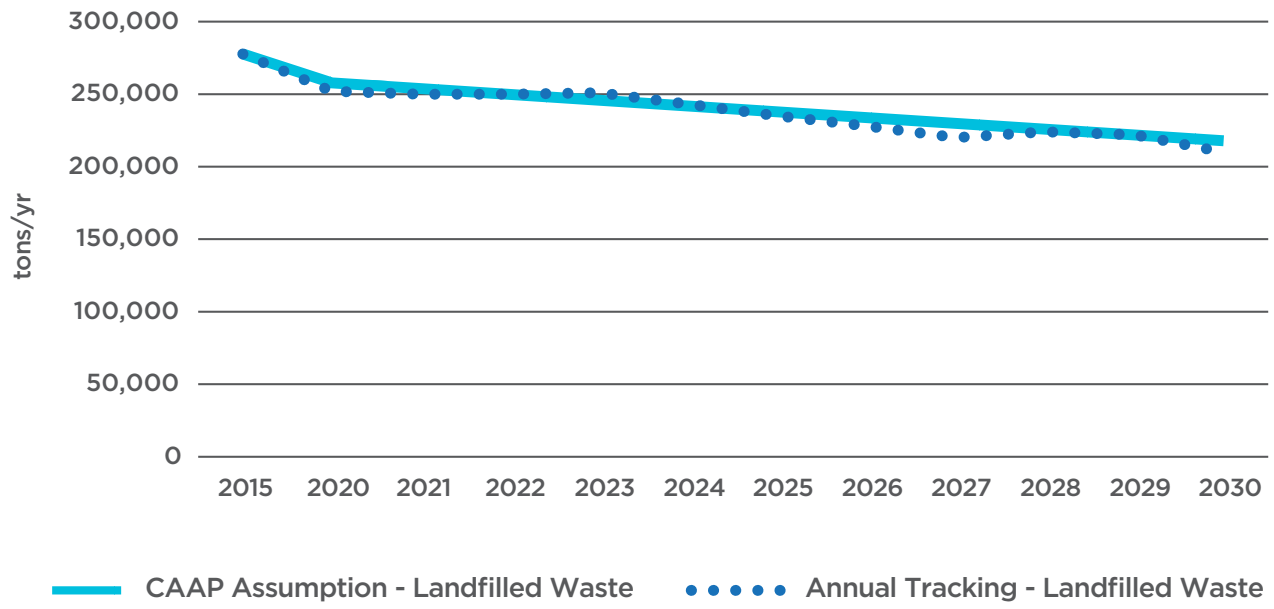
The graph below shows how the volume of waste disposed in landfills, for example, can be used to show trends in comparison to the forecasted landfill waste disposal estimates. The solid line represents the activity data trend assumed in the CAAP analysis, while the dotted line represents what annual monitoring results could look like. Progress is unlikely to occur in a linear fashion and straying from the trend line in 1 or 2 years might not signify a need for corrective action. However, consistent patterns of missing the CAAP assumption trend line or missing by a significant magnitude will alert City staff that an additional review of the corresponding CAAP actions is necessary (see the Bottom-Up Emissions Monitoring section).

It is possible that some individual emissions sources could underperform compared to assumptions, while others could overperform. If certain actions or emissions sectors are falling behind their assumed trajectory, the community may still be on track toward the overall GHG target. Future community-wide inventories will show how the city's total emissions trend compares to the CAAP target.

## Top-Down Monitoring Schedules

- **Focused emissions source monitoring** – Annual
  - Electricity consumption (kWh) Electricity emissions factor (lbs $CO_2$e/MWh)
  - Natural gas consumption (therms)
  - Oil extraction (barrels)
  - Solid waste sent to landfills (tons)
  - On-road vehicle travel, if "big data" are available (VMT or metric tons of carbon dioxide equivalent)
- **Community inventory monitoring** – Every 2 years (community and municipal inventories prepared in alternate years)
  - All emission sources from the 2015 base-year inventory

**Figure 23: Example Top-Down Monitoring Figure**



## Bottom-Up Emissions Monitoring

If the top-down monitoring shows an emissions source is off track for GHG target achievement, the City can review individual actions that address the emissions source to determine which, if any, are falling behind in implementation. This bottom-up monitoring approach can then help identify which individual actions are falling short of their implementation assumptions. When tracking individual actions, the City will consider what the primary goal of the action is intended to be as it relates to GHG reductions and will then select one or more performance metrics to monitor that outcome. The City has developed a list of potential implementation tracking metrics for each CAAP mitigation action. The list can serve as a starting point for bottom-up monitoring and the table below.

Tracking specific performance metrics can also help clarify how the City can modify its implementation approach to improve action outcomes. Depending on the overall emissions trends in the community, the City may choose to revise specific actions to increase their GHG reductions (e.g., through additional incentives or with new regulations) or may determine that the current set of actions are performing to the extent feasible and that new actions are needed to further reduce emissions. These corresponding plan updates are described in the following section.

**Table 11: Example Implementation Tracking Metrics**

| Mitigation Action | Primary Metrics | Data Sources | Additional Metrics | Data Sources |
|---|---|---|---|---|
| T-1: Increase frequency, speed, connectivity, and safety of transit options | Percent increase in ridership on Long Beach Transit, Metro Blue Line, and regional transit routes | • Long Beach Transit<br>• LA Metro<br>• Partnering transit agencies | • Long Beach Transit<br>• LA Metro<br>• Partnering transit agencies | • Long Beach Transit |
| W-3: Partner with private waste haulers to expand organic waste collection community-wide | Tons of organic waste collected from commercial and multifamily properties | • Long Beach Transit<br>• LA Metro<br>• Partnering transit agencies | • Percent compliance at commercial and multi-family properties | • Waste haulers |

## Plan Updates

The CAAP must be adapted over time to incorporate new GHG reduction technologies and strategies, new financing mechanisms to support implementation, and changes in State or federal legislation. The CAAP will also be updated in response to monitoring results if emissions are not trending toward the City's adopted GHG target. In this case, the City will assess the implications of new scientific findings, explore new emission reduction technologies or changes to existing CAAP actions, and modify the plan accordingly to help the City get back on track toward meeting its GHG target.

As part of regular CAAP updates, the City will incorporate major changes in plan assumptions or new information, which can include:

- future GHG inventory results,
- emissions forecast updates,
- important new or revised statewide policies (e.g., an increased timeline for Renewables Portfolio Strategy implementation, new adopted GHG targets), and/or
- new or revised CAAP actions and/or implementation strategies.

CAAP updates will occur approximately every 5 years and can be scheduled to align with other City milestones, such as General Plan updates to the Land Use and Mobility Elements or budgetary cycles. If regular monitoring shows the CAAP is on track toward the GHG target, then CAAP updates may not be necessary. The City will also develop a comprehensive CAAP update following the current 2030 target year to provide greater analysis of the actions and implementation steps necessary to achieve the City's 2045 carbon neutrality goal.

### Plan Update Schedule

- Every 5 years, as needed
- Plan update for any post 2030 targets

## Other Inventory Monitoring

The City also evaluated consumption-based emissions and oil and gas extraction life cycle emissions in the CAAP to provide additional lenses through which the city's contribution to global emissions can be understood. These inventories are not directly related to the City's adopted GHG target that is evaluated in the CAAP. However, the City may update these additional inventories for informational purposes, as appropriate. Both inventories are dependent, at least in part, on inputs from models that may not be updated on a regular basis, including the CoolCalifornia household carbon footprint calculator and the Oil Climate Index global oil assessment, and this lessens the usefulness of annual inventory updates. However, the City will continue to monitor both models for major updates or other enhancements that could provide additional information to the Long Beach emissions context. And as part of stakeholder engagement around CAAP implementation, the City will promote readily available tools for residents and local businesses to help them evaluate their individual carbon footprints and identify personal actions to reduce consumption-based emissions.

## Adaptation Action Monitoring

Adaptation actions do not (usually) have a GHG emission reduction associated with them, and determining what needs to be measured to demonstrate the impact of adaptation action is not always straightforward. While it is possible to monitor the level of activity related to the rollout of an adaptation action (such as increase in the number of accessible cooling centers in the city), it will often be necessary to wait for a disruptive event before the true performance can be tested (such as determining the number of users of cooling centers and the number of heat-related admissions to hospitals during extreme heat events). The City has also developed a list of potential implementation tracking metrics for each adaptation action (see Appendix F). As actions are implemented, specific metrics will be selected and tracked to enable the City to assess its overall reduction in vulnerability to climate stressors and/or ability to adapt.

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To request this information in an alternative format or to request a reasonable accommodation, please contact the Development Services Department at longbeach.gov/lbds and 562.570.3807. A minimum of three business days is requested to ensure availability; attempts will be made to accommodate requests with shorter notice.