



SAN FRANCISCO'S

# CLIMATE ACTION PLAN 2021



# ACKNOWLEDGEMENTS

The 2021 San Francisco Climate Action Plan (CAP) is the result of a multi-year process developed by the San Francisco Department of the Environment with support and collaboration from many individuals and institutions. We would like to sincerely thank all our colleagues, organizations, and residents who were generous with their time and ideas.



## City & County of San Francisco Mayor London N. Breed

### Office of the Mayor

Tyrone Jue\*, Sarah Owens

### San Francisco Department of the Environment

Cyndy Comerford (Climate Program Manager), Richard Chien (Climate Action Plan Project Manager), Silvia Pac\*, Brian Reyes\*, Sraddha Mehta, Elizabeth Felter, Anne Wong, Barry Hooper, Eden Brukman, Paris Smith\*, Kelsey Berger\*, Lowell Chu, Suzanne Loosen, Robert Haley, Jack Macy, Alexa Kielty, Peter Brastow, Shawn Rosenmoss, Asia Meshak, Alexandra Bogdan, Jennifer Tsang, Mark Nicholas

### Office of Racial Equity

Shakirah Simley\*, Sami Iwata, Sarah Tseng

### Office of the City Attorney of San Francisco

Andrea Ruiz-Esqueda

### San Francisco Planning Department

Lisa Fisher, Tam Tran, James Pappas, Doug Johnson, AnMarie Rodgers, Maia Small, Danielle Ngo, Claudia Flores, Celia Chan, Jessica Range, Megan Calpin

### San Francisco Municipal Transportation Agency

Tim Doherty, Emmanuel Stamatogiannakis, Sarah Jones\*, Keith Tanner, Darryl Yip

### San Francisco County Transportation Authority

Aliza Paz, Amber Crabbe, Hugh Louch\*, Drew Cooper, Joe Castiglione, Linda Meckel\*, Camille Guiriba

### San Francisco Public Utilities Commission

Catherine Spaulding, Sandy Carter\*, Karri Ving, Manon Fisher\*, Mike Brown, Daniel Fuchs

### San Francisco Department of Public Health

Matt Wolff, Carmen Olmedo

### Recreation and Parks Department

Spencer Potter, Taylor Emerson

### Mayor's Office of Housing and Community Development

Mara Blitzer, Erin Carson, Amy Chan\*

### Mayor's Office on Disability

Deborah Kaplan, Nicole Bohn

### San Francisco Department of Building Inspection

James Zhan, Mohsin Shaihk

### Office of Contract Administration

Sailaja Kurella

### Office of Resilience and Capital Planning

Brian Strong, Alex Morrison, Melissa Higbee

### Controller's Office of Public Finance

Anna Van Degna

### Port of San Francisco

Brad Benson, Rich Berman

### San Francisco International Airport

Erin Cooke, Nile Ledbetter, Daniel Wu, Ronda Chu, Patrick Liberatore

### San Francisco Unified School District

Darya Soofi

## Consultants

### Community Engagement

Cascadia Consulting Group, InterEthnica

### Transportation & Land Use (TLU) GHG analysis

Cambridge Systematics

### Jobs Analysis

Inclusive Economics

### Community Co-benefits; Funding & Financing analysis

Arup

### Report Design

lowercase productions

### Copy Editor

Aaron Huertas

Authors and major contributors are listed by affiliation at the end of 2020. Individuals with an asterisk have new affiliations.



## MESSAGE FROM MAYOR LONDON N. BREED

In keeping with our role as a leader in sustainability, I am pleased to present the City and County of San Francisco's updated Climate Action Plan. Since adopting our initial Climate Action Plan in 2004, San Francisco has made great strides in reducing our greenhouse gas emissions. We have achieved this success by working with residents, community-based organizations, and businesses to use cleaner electricity, invest in energy efficiency, and recycle and compost more materials.

In the years since we created the first Climate Action Plan, we have seen marked consequences of a warming planet. Natural disasters like fires throughout California, dramatic hurricanes in the South, and devastating floods in the Midwest have exposed the massive human and economic toll climate-related disasters bring to our communities. These unfolding catastrophes demonstrate the need to accelerate our response to a changing climate — and to do all we can to mitigate the threat while preparing our City to be more resilient.

As of 2019, we have cut our emissions 41% below 1990 levels — reaching our goal six years ahead of schedule. Now we have a responsibility to keep moving forward, to reduce emissions by 61% below 1990 levels by 2030 and reach net-zero emissions by 2040. To reach these ambitious targets, we need to tackle climate change from all angles: housing, transportation and land use, energy, buildings, zero waste, and healthy ecosystems.

Climate change is one of our greatest challenges and meeting these new targets will not be easy. However, there is room for optimism. If our response to the COVID-19 pandemic has shown us anything, it is that when San Franciscans stand together, we can meet any challenge. I am proud of the courage we have shown. We listened to the scientists and took care of our most vulnerable neighbors. We had the drive to meet the pandemic head on and we will do the same in our ongoing response to climate change.

As we seek to reduce our emissions and reach net-zero, it is imperative that we advance climate action goals that will also build a more just, equitable society. One of San Francisco's greatest assets is our diversity, and the steps we take to address climate change must be rooted in equity and ensure that all our communities are supported throughout the transition to a climate-just future. While moving forward demands that we continue reducing emissions, strategies in this plan have multiple benefits for our most vulnerable communities — reduced asthma and respiratory illnesses, access to nature, housing security, and improved access to fresh food for all San Franciscans.

This Climate Action Plan was created with the input and feedback from a diverse cross-section of San Franciscans. Thank you to the thousands of residents, businesses, City agencies, and community institutions that gave their time to create this ambitious plan. We are grateful to have had the engagement of those with decades of experience on the front lines of the environmental movement. Now we must continue to work together to protect our communities, save our planet, and achieve a healthier, more just and sustainable future. I hope that you will join me in implementing this Climate Action Plan and adding to the collective courage required to create a future built on justice, equal opportunity, and environmental protection.





**SF Environment**

## **MESSAGE FROM DIRECTOR DEBBIE RAPHAEL**

The 2021 San Francisco Climate Action Plan is the result of meticulous work and collaboration among City agencies, community members, local businesses, consultants, and international subject matter experts. The strategies outlined in this report present opportunities to ensure we continue building a city that serves all San Franciscans.

While we have made substantial progress in reducing our emissions, we know there is much more to do. In the last year, we have been asked to reckon with systemic racism built into our institutions while confronting a global pandemic. We have seen just how fragile our societal bonds can be. This past year has taught us that it is truly a moral imperative to create strategies that benefit all of us and our 2021 Climate Action Plan is grounded in equity and inclusion. It recognizes our combined power to ensure that no one is left behind as we deliver on our climate goals.

The Plan articulates strategies that get us to our goals of sending zero waste to landfills; making 80% of all our trips outside of our cars; powering our homes, vehicles, and businesses with 100% renewable energy; and drawing down carbon from the atmosphere. With its focus on equity, the Plan uses our climate goals to create more equitable housing and increase our green infrastructure to draw down carbon. It recognizes the tremendous strength in our communities and allows us to develop even more opportunities to drive implementation and create jobs.

And while it is exciting to see our federal administration stepping up and to witness the tremendous international commitment to climate action, we know that cities will continue leading the way to a carbon-free future. We are proud to join cities across the globe in taking responsibility for our greenhouse gas emissions.

I express my sincere appreciation to the residents, community organizations, city departments and businesses who participated in creating, guiding, and assembling this update. Join us in our commitment and lend your expertise to making sure San Francisco remains a vibrant and livable city for generations to come.



## LAND ACKNOWLEDGEMENT<sup>1</sup>

The Commission on the Environment acknowledges that we occupy the unceded ancestral homeland of the Ramaytush Ohlone peoples, who are the original inhabitants of the San Francisco Peninsula. We recognize that the Ramaytush Ohlone understand the interconnectedness of all things and have maintained harmony with nature for millennia. We honor the Ramaytush Ohlone peoples for their enduring commitment to wahrep, mother earth. As the indigenous protectors of this land and in accordance with their traditions, the Ramaytush Ohlone have never ceded, lost, nor forgotten their responsibilities as the caretakers of this place, as well as for all peoples who reside in their traditional territory. We recognize that we benefit from living and working on their traditional homeland. As uninvited guests, we affirm their sovereign rights as First Peoples and wish to pay our respects to the Ancestors, Elders and Relatives of the Ramaytush Community. As environmentalists, we recognize that we must embrace indigenous knowledge in how we care for San Francisco and all its people.

## DISCLAIMER

This Climate Action Plan (CAP) articulates broad policy objectives to achieve equitable climate action. The CAP does not approve, fund, or authorize implementation of any specific projects. Each implementation project will be reviewed and approved over time and follow protocols and best practices for adoption, which may require additional public review, review by City decision-makers, and/or environmental review under the California Environmental Quality Act. As a result of those reviews, there may be alternatives and mitigation measures developed that may be implemented as well.

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SECTION 1:

# EXECUTIVE SUMMARY



**The consequences of a changing climate are all around us. Rising seas and extreme weather are creating increased flooding and more frequent heat waves, which inflict the most harm on the city's most vulnerable populations. Reduced snowpack in the Sierra Nevada mountains is threatening the City's water and hydropower supplies. Ever more destructive fires are polluting the air throughout the state and overwhelming its emergency resources and ability to respond to multiple disasters.**

San Francisco, like cities around the world, is faced with the threat of a climate emergency, coupled with long-standing challenges of economic inequality and racial injustice. Local skies have turned orange from wildfires, fueled by decades of unchecked carbon pollution. The American economy is more precarious for working people than it has been in decades, with inequities exacerbated by COVID-19. Demands for action are growing louder, including calls for climate justice, racial justice, disability justice, and economic justice. The most recent [Intergovernmental Panel on Climate Change \(IPCC\) report](#), an international scientific assessment of the threats presented by climate change, was released in August 2021 and indicates that the window in which to act continues to shrink. The most important thing to limit the worst impacts is to rapidly reduce greenhouse gas (GHG) emissions, especially carbon dioxide and methane. This summer, Mayor London Breed sponsored legislation to address the urgent threat of climate change and set new, ambitious goals to slash GHG emissions in San Francisco and reach net-zero emissions by 2040.

While San Francisco is proud of its record on local climate action and pursuit of environmental justice, there is an opportunity to make San Francisco a more affordable, equitable, just and sustainable city for all. The window to avoid climate catastrophe is closing, but there is still time to act. There is an urgent need — and opportunity — to not only reduce emissions, but to build equity,

resilience, and opportunity for the entire city. Bold climate action must give everyone a seat at the table to create a more just society and ensure communities can thrive by guaranteeing clean air and access to good jobs, green space, and healthy housing, and by developing and implementing a shared vision of how to live better together in the face of the growing climate crisis.

## LEADING ON CLIMATE ACTION

Since its first Climate Action Plan in 2004, San Francisco has been leading the way on local climate action, environmental justice, and launching innovative community programs and outreach campaigns for residents and businesses.

For decades, San Francisco has created plans, implemented policies, and crafted engaging frameworks to reduce emissions. As of 2019, the city has achieved a 41% reduction in emissions from 1990 levels, while its economic productivity as measured by gross domestic product (GDP) has increased by 199%, and its population has grown by 22%. Its emissions reductions have been driven primarily by cleaner electricity supply, improved energy codes, and city-wide energy efficiency. This progress has not just reduced emissions, but has also come with additional important benefits, such as cutting air pollution and limiting other environmental stressors.



Cities are rapidly growing across the world. Most people live in cities and the cities, in turn, create 70% of global emissions. This means cities have great responsibility and great potential for providing solutions. Further, cities are engaged in international diplomacy on climate change and as a respected leader on the world stage, San Francisco has a vital role to play in modeling climate action for cities around the world.

## CLIMATE ACTION PLAN OVERVIEW

**Net-Zero Emissions means cutting the overwhelming majority of emissions to zero while relying on biological and technological solutions and offsets to balance out remaining emissions**

Tackling the interwoven climate, equity, and racial justice challenges we face has been the driving force for the development of this Climate Action Plan (CAP). It provides a summary of progress through existing programs, and a detailed list of priority actions that San Francisco can take that will have the greatest potential to reduce emissions, while also having the greatest potential to provide an equitable distribution of benefits. The process of creating the CAP brought City departments, residents, community-based organizations, and businesses together to craft a plan focused on science and equity and grounded in compassion and lived experience. This data-driven, community-based plan outlines a detailed list of strategies and actions to achieve net-zero emissions by 2040, while creating solutions that serve intersectional challenges of racial and social equity, public health, economic recovery, and resilient communities (Figure 1).



# SAN FRANCISCO'S CLIMATE ACTION FRAMEWORK

Net-Zero Emissions Citywide By 2040  
Racial, Social & Economic Equity

## SECTORS



## THE PATH TO REACH NET-ZERO BY 2040

The imperative to address climate change is simple: cut emissions as quickly as possible. But achieving these goals is complex and demands an integrated approach across society. San Francisco's approach to reaching net-zero emissions is first and foremost grounded in equity. The most significant consequences of climate change will be felt by Black, Indigenous, and People of Color (BIPOC) communities, people with disabilities, and other vulnerable populations. Climate action must also prioritize a just transition, which calls for a strategic, people-focused approach to phasing out polluting industries while creating employment pathways for workers in those industries and a new generation of workers to transition to quality jobs that support economic and climate justice. Further, communities that have been and will continue to be most harmed by climate change have not historically benefited from climate solutions in the past.

To advance climate justice, the CAP makes four core commitments:

- Build greater racial and social equity
- Protect public health
- Increase community resilience
- Foster a more just economy

By integrating these four climate justice commitments, the CAP proposes two ambitious and achievable climate emission reduction targets:

- An interim target of cutting sector-based emissions 61% below 1990 levels by 2030; and
- Net-zero sector-based emissions by 2040, a 90% reduction from 1990 levels

Sector-based emission inventories track traditional emissions in categories produced within municipal boundaries such as transportation, energy use in buildings, and solid waste. The City is beginning to account for the impacts of its "upstream" emissions, which include emissions from the consumption of services and goods produced outside San Francisco. In essence, these emissions are outsourced to other communities, generating harmful climate pollution and exacerbating environmental injustice. In keeping with its commitment to equity, San Francisco is determined

to reduce the impacts of these outsourced emissions and has set two targets:

- A 40% reduction in consumption-based emissions by 2030
- An 80% reduction in consumption-based emissions by 2050
- In total, the Climate Action Plan provides an innovative framework to reach its sector-based (Figure 2) and consumption-based emission targets, while also removing carbon from the atmosphere.

## ENGAGING OUR DIVERSE COMMUNITIES

Led by the San Francisco Department of the Environment (SF Environment), crafting the CAP was a highly collaborative process, which engaged expert City staff, community-based organizations, residents, businesses, and other stakeholders to identify high-impact opportunities to reduce emissions and support equity. The CAP public engagement process brought together San Francisco residents with honesty, transparency, and respect. It reached hundreds of thousands of people through social media, websites, surveys, web-based workshops and presentations, and online open houses. Over the course of four months, SF Environment hosted a kick-off webinar with Mayor London Breed, which was followed by eleven public workshops, including in-language sessions in Spanish and Chinese, and eleven additional community presentations. Further, the Department received more than 1,400 comments on the online open house platform as well as nine emailed comment letters from different stakeholder groups. This process ensured the community could identify new actions and integrate their priorities, data, and best practices into the plan.

# SAN FRANCISCO'S CLIMATE ACTION GOALS

## BUILDINGS

By 2021, require zero onsite fossil fuel emissions from all new buildings; By 2035, require zero onsite fossil fuel emissions from all large existing commercial buildings and all buildings by 2040

'21

## ZERO WASTE

By 2030, reduce solid waste generation by at least 15% and reduce the amount of solid waste disposed of by incineration or landfill by at least 50% below 2015 levels

## TRANSPORTATION

By 2030, increase low-carbon trips to at least 80% of all trips and increase EVs to at least 25% of all private vehicles registered, and by 2040, increase EVs to 100% of all private vehicles registered

## ROOTS

Sequester carbon through ecosystem restoration, including increased urban tree canopy, green infrastructure, and compost application

## CLEAN ENERGY

By 2025, supply 100% renewable electricity, and by 2040, supply 100% renewable energy

## HOUSING

Build at least 5,000 new housing units per year with maximum affordability, including not less than 30% affordable units, and with an emphasis on retaining and rehabilitating existing housing

## PRIORITY SOLUTIONS

Through this robust engagement process the CAP identified 31 strategies (Table 1) and 159 supporting actions for San Francisco to achieve its climate and equity goals across six key areas, or sectors: Energy Supply, Building Operations, Transportation and Land Use, Housing, Responsible Production and Consumption, and Healthy Ecosystems.

Along with stakeholder input, key criteria used to inform the development of the strategies and supporting actions included their emissions reduction potential and their contribution to the four lenses of racial and social equity, public health, community resilience, and a just economy. While the CAP identifies hundreds of possible pathways needed to reach San Francisco's slated target of achieving net-zero emissions by 2040, not all have the same impact. The most critical stand-alone or subsets of strategies and actions have been summarized in the **top ten climate solutions:**

**Energy Supply:** Use 100% renewable electricity and phase out all fossil fuels

**Building Operations:** Electrify existing buildings

**Transportation and Land Use:**

- Invest in public and active transportation projects
- Increase density and mixed land use near transit
- Accelerate adoption of zero emission vehicles and expansion of public charging infrastructure
- Utilize pricing levers to reduce private vehicle use and minimize congestion
- Implement and reform parking management programs

**Housing:** Increase compact infill housing production near transit

**Responsible Production and Consumption:** Reduce food waste and embrace plant-rich diets

**Healthy Ecosystems:** Enhance and maintain San Francisco's urban forest and open space

Now that San Francisco has laid the foundation for a new, more inclusive climate agenda, it is time to move forward from planning to execution. New approaches will be needed to spur action across City departments and change underlying systems to embed climate considerations into municipal operations and ensure the timely delivery of projects.

## TRANSPARENCY AND REPORTING

The CAP is not a "stand-alone" document. It leverages progress and momentum from complementary plans and policy initiatives, such as CleanPowerSF; building electrification code efforts; the [Housing](#) and [Transportation Element](#) updates of the General Plan; [urban forest](#) and [biodiversity plans](#); and [zero waste](#) work. These other plans and policies give the CAP a solid platform to help the city meet these pressing issues.

The CAP must and will be revisited and updated regularly, with a formal update every five years. Transparency is crucial for creating a plan that serves all San Franciscans. Further, the CAP is not just a summary of actions government will take on its own. Addressing climate change will require ongoing engagement with the entire community. Indeed, residents are parts of the implementation process too. To that end, the City will create a robust and accessible monitoring, evaluation, and reporting system to track and review the intended results and real progress of the targets, goals, strategies, and actions. This is essential to monitoring the success and effects of climate actions across the city, quantifying the benefits of the policies, and ensuring stakeholders can actively contribute to progress toward our climate goals.

TABLE 1: STRATEGIES IN 2021 CLIMATE ACTION PLAN

ENERGY SUPPLY (ES)	
<b>ES 1</b>	Supply 100% renewable electricity to residents and businesses.
<b>ES 2</b>	Invest in local renewable energy and energy resilience projects.
<b>ES 3</b>	Design and develop the reliable and flexible grid of the future.
<b>ES 4</b>	Develop workforce capacity to deliver clean energy resources.
<b>ES 5</b>	Plan for the equitable decommissioning of the City's natural gas system.
BUILDING OPERATIONS (BO)	
<b>BO 1</b>	Eliminate fossil fuel use in new construction.
<b>BO 2</b>	Eliminate fossil fuel use in existing buildings by tailoring solutions to different building ownership, systems, and use types.
<b>BO 3</b>	Expand the building decarbonization workforce, with targeted support for disadvantaged workers.
<b>BO 4</b>	Transition to low-global warming potential refrigerants.
TRANSPORTATION & LAND USE (TLU)	
<b>TLU 1</b>	Build a fast and reliable transit system that will be everyone's preferred way to get around.
<b>TLU 2</b>	Create a complete and connected active transportation network that shifts trips from automobiles to walking, biking, and other active transportation modes.
<b>TLU 3</b>	Develop pricing and financing of mobility that reflects the carbon cost and efficiency of different modes and projects, and correct for inequities of past investments and priorities.
<b>TLU 4</b>	Manage parking resources more efficiently.
<b>TLU 5</b>	Promote job growth, housing, and other development along transit corridors.
<b>TLU 6</b>	Strengthen and reconnect communities by increasing density, diversity of land uses, and location efficiency.
<b>TLU 7</b>	Where motor vehicle use or travel is necessary, accelerate the adoption of zero-emissions vehicles (ZEV's) and other electric mobility options.
HOUSING (H)	
<b>H 1</b>	Anchor BIPOC families and advance their return to San Francisco through robust housing and stabilization programs.
<b>H 2</b>	Support vulnerable populations and underserved communities through both the preservation and rehabilitation of existing housing and new housing development that serves their needs.
<b>H 3</b>	Advance zoning and implementation improvements that support new housing production sufficient to meet goals, especially sustainable, small, mid-sized, family, and workforce housing in lower density neighborhoods.
<b>H 4</b>	Expand subsidized housing production and availability for low-, moderate-, and middle-income households.
RESPONSIBLE PRODUCTION & CONSUMPTION (RPC)	
<b>RPC 1</b>	Achieve total carbon balance across the buildings and infrastructure sectors.
<b>RPC 2</b>	Reduce the carbon footprint of the food system by reducing waste, promoting climate friendly diets, and getting excess food to communities in need.
<b>RPC 3</b>	Promote reduction, reuse, repair, and recovery of goods and materials.
<b>RPC 4</b>	Lead the aviation sector by reducing emissions across the airline passenger journey.
HEALTHY ECOSYSTEMS (HE)	
<b>HE 1</b>	Advance citywide collaboration to continually refine nature-based climate solutions that sequester carbon, restore ecosystems and conserve biodiversity.
<b>HE 2</b>	Increase equitable community participation and perspectives in nature-based climate solutions, including meaningful efforts to prioritize Indigenous science and Traditional Ecological Knowledge.
<b>HE 3</b>	Restore and enhance parks, natural lands and large open spaces.
<b>HE 4</b>	Optimize management of the city's entire urban forest system.
<b>HE 5</b>	Maximize trees throughout the public realm.
<b>HE 6</b>	Maximize greening and integration of local biodiversity into the built environment.
<b>HE 7</b>	Conduct carbon sequestration farming pilot projects and research.



## ACTION MOVING FORWARD

In addition to reducing emissions to net-zero over the next 18 years, the CAP strives to ensure all San Franciscans have the skills, knowledge, and resources to meet the challenges of climate change that lie ahead. Communication will be key to engaging businesses, residents, and communities in ongoing action and ensuring that all San Franciscans benefit from climate action. Climate change is inherently a complicated challenge: it encompasses major sectors of the economy, draws heavily on scientific research and data, merges private and public interests, and has outsized equity implications.

Funding the strategies and actions in the CAP is imperative for success. While the expected initial cost of implementing CAP strategies will be immense, research and the experience of cities already being confronted by climate change show that the financial consequences of inaction will be even worse.<sup>2</sup> In mid-2021, after strong advocacy from local residents inspired to act by the unfolding climate emergency, the City committed funding to develop high-level accounting of the cost of implementation and perform in-depth research and analysis to identify successful funding models to support implementation of the strategies included in this CAP.

The City must implement policies and creative financing mechanisms to provide ongoing and stable funding and build on support from the private sector and philanthropy, as well as federal, state, and regional agencies. It must continue to illustrate the case for climate action and secure commitments from a range of diverse stakeholders to invest in solutions, while creating incentives to support these investments. As a leader in global sustainability, San Franciscans have a chance to prove to the world that a net-zero future is achievable, advances justice, and creates a vibrant, diverse city where people can thrive.

## A CALL TO ACTION

This path forward will be challenging. San Franciscans will need to be bold and courageous to achieve our vision of a city that provides adequate and healthy housing, safe transportation, green space in every community, and expansive employment opportunities. While individual action is important, including each City department, business, and resident working to reduce emissions, collective action will be vital. That includes rapidly getting off fossil fuels, understanding the science of climate change, and helping others grasp the magnitude of the threats to where we live, work, worship and play. Collective action includes listening to and learning from each other, lifting one another up to move forward together, and showing the entire world that San Francisco can lead the way in addressing the climate crisis.







SECTION 2:

# OVERVIEW



**Over the past twenty years, cities around the globe have responded to the call for local action to address the climate crisis. This Climate Action Plan proposes focused solutions to eliminate greenhouse gas emissions while advancing related goals, such as racial and social equity, health, economic recovery, and resilience.**

The climate crisis is putting San Francisco's communities at risk by directly threatening infrastructure, natural resources, and public health. While the City is proud of its record on local climate action, more needs to be done. The changes brought on by the global COVID-19 pandemic, growing economic inequality, and powerful calls for racial and social justice require a renewed vision for the city and a plan that responds to the scale of the crises we face, while leaving no one behind.

## **VISION AND VALUES**

Time is running out. Climate change is accelerating as global emissions increase, causing havoc and destruction to every part of the globe. Transformational change is needed to rapidly cut emissions and limit further damage. San Francisco's future will be shaped by its response to climate change, as well as to other global crises such as the COVID-19 pandemic, systemic racism, and increasing income inequality. These interconnected challenges demand focused, flexible, and bold responses.

At the same time, scientific understanding of the climate crisis has deepened. In August 2021, the United Nations Intergovernmental Panel on Climate Change (IPCC) published the [first part of its sixth assessment report](#) which updates policymakers on our baseline understanding of

climate change. This sobering report unequivocally states human action is warming the planet, finds that many changes are already irreversible, and concludes that to stabilize the climate we must reach net-zero emissions to limit further warming. Now, more than ever, it is urgent that San Francisco take aggressive and equitable action to mitigate the catastrophic impacts of climate change.

Driven by these scientific and moral imperatives, San Francisco has embarked on a path to turn its climate challenges into opportunities and ensure that solutions work for everyone.

This need for a holistic approach is at the heart of San Francisco's response to climate change. The 2021 Climate Action Plan (CAP) charts a path to eliminate emissions while simultaneously committing to racial equity, social justice, health, resilience, and a just economy.

The CAP identifies actions to address inequities across sectors, including in housing and transportation. It supports communities that have been most impacted by climate change yet have not historically benefited from climate solutions. By centering racial equity and focusing on what matters most to San Francisco's diverse communities, implementing the CAP will create good jobs that are tied to meaningful work. The CAP also prioritizes sustainable economic recovery so that San Francisco can withstand crisis-level shocks while creating resilient, healthy, and equitable communities.

The CAP will shape San Francisco's response to the climate crisis for decades to come. Achieving this goal is not just up to scientists or the government; it will require active participation from everyone and therefore focuses on empowering communities to take action.

## CHALLENGES IN UNPRECEDENTED TIMES

San Francisco's commitment to climate solutions must create opportunities that achieve sustainable and broad-based economic growth. The pandemic's impact on the economy has been severe, particularly harming the city's service and hospitality sector, commercial real estate, and public transit. COVID-19 also exposed significant racial and economic inequities, compounding existing income disparities.

While the COVID-19 pandemic is not expected to have a long-term direct effect on emissions, indirect effects will linger for years. In the transportation sector, these impacts might include less air travel and commuting as businesses rely more on telework, but such changes can also lead to less use of public transportation. In the commercial building sector, there are increased vacancies for office space, shops, and restaurants. This may result in less tax revenue, which could hinder the level of investment cities are willing to commit to climate action. At the same time, this may provide an inflection point for reimagining how we use these spaces for residents, communities, and other businesses.

Change text to: "Throughout the pandemic, San Francisco has to protect public health and spur economic recovery by adapting quickly to the circumstances and implementing innovative new programs. For instance, many streets were transformed into pedestrian-friendly, car-free recreational areas for people to safely exercise while keeping their distance. Neighborhood restaurants and cafes were allowed to create outside dining areas, an accommodation that will extend beyond the pandemic with the Shared Spaces program. While presenting challenges, these unprecedented times have also required a new way of thinking and shown that we need collective action to create a healthier and more sustainable future.

Implementation of pandemic solutions occurred quickly because of the urgency at hand. Similar urgency can apply to climate action, and inclusive implementation planning is also needed. As the prevalence and severity of climate changes grows, so does the need for awareness, diversity and inclusion.

## CLIMATE ACTION: PAST, PRESENT, AND FUTURE

San Francisco is synonymous with environmental action. Its first Sustainability Plan in 1994 was prescient. That plan grappled with climate change and identified the need to assess the true costs of relying on fossil fuels. San Francisco was also one of the first cities to truly embrace the power of municipalities to effect change. In the face of decades of federal inaction on climate, it has bolstered its reputation as a leader in national and



international sustainability efforts such as the [Urban Sustainability Directors Network](#) and [C40](#), which bring cities from around the nation and the world together to share best practices and drive advancements in climate action.

In the more than two decades since its first environmental plan, the City has adopted progressively more ambitious policies to reduce emissions while simultaneously decoupling emissions from economic growth. Since 1990, San Francisco has reduced

emissions by 41%, while its population has grown by 22% and gross domestic product (GDP) has increased 199% (Figure 3), showing that environmental action can coincide with and even drive economic growth. While San Francisco's economy has grown, it has also seen some of the widest income disparities in the United States,<sup>3</sup> exacerbating race and class divides that are evident in both the pandemic and environmental injustices.

## 1990-2019 San Francisco trends

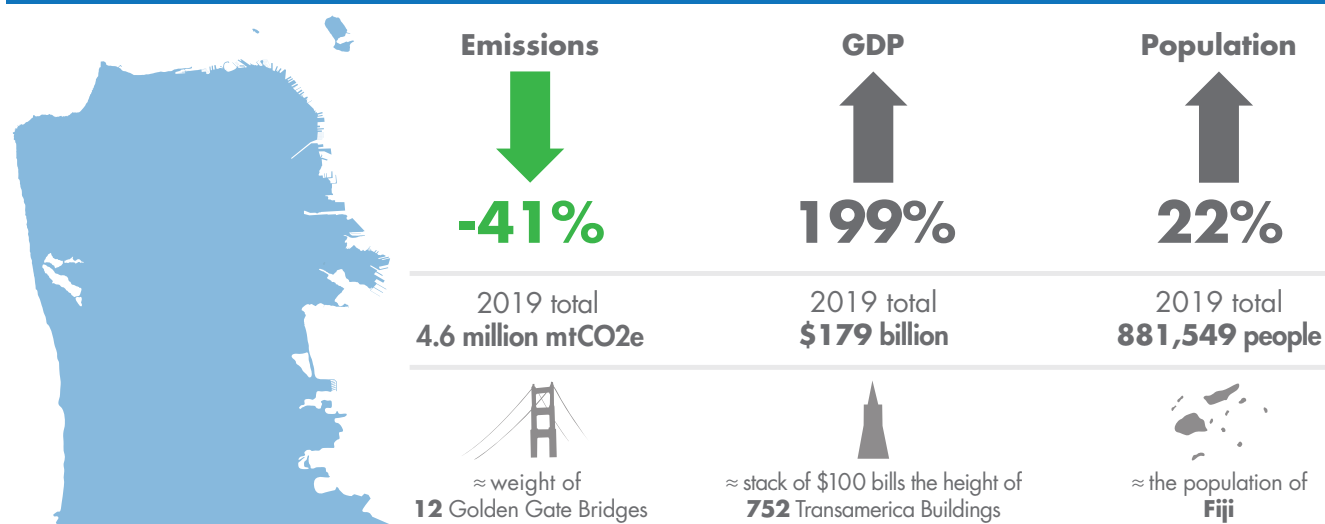


FIGURE 3: 1990-2019 SAN FRANCISCO GHG EMISSIONS AND GROWTH TRENDS

TABLE 2: SAN FRANCISCO'S KEY CLIMATE MILESTONES

YEAR	MILESTONE
2004	San Francisco's First Climate Action Plan
2013	San Francisco's updated Climate Action Plan
2015	0-50-100 Roots Climate Action Framework Launched
2016	Emissions Reduced by 30% Below 1990 Levels
2017	50% Low Carbon Trips Achieved –New Goals Set to 80%
2018	Mayor Breed Commits to Net-Zero Emissions by 2050
2019	San Francisco Board of Supervisors Declares a Climate Emergency
2019	100% Renewable Electricity Requirement for Large Commercial Buildings
2019	Emissions Reduced by 41% Below 1990 Levels (6 years ahead of schedule)
2020	Natural Gas Banned in New Construction
2021	Mayor Breed Advances Updates to Climate Action Goals in Chapter 9 of the Environment Code, Commits to Net-Zero Emissions by 2040, San Francisco Board of Supervisors Approves

Today, the country has a federal administration and Congress that are prioritizing climate action, but cities must continue to lead the way. For decades, San Francisco has created plans, implemented policies, and crafted engaging frameworks to address climate change and mitigate the impacts of air pollution and other environmental stressors. Table 2 shows some of key milestones that the City has assumed to meet its climate goals.

## MAJOR CLIMATE IMPACTS

Burning fossil fuels has caused global temperatures to rise and weather to become more extreme. Today, global climate change is directly affecting San Francisco, including higher temperatures, more extreme heat days, more extreme storms with heavier rainfall and flooding, sea level rise, severe droughts, and poorer air quality. These conditions have left California susceptible to catastrophic wildfires, directly threatening homes, businesses, and protected areas,

and blanketing the city, state, many other parts of the nation with hazardous smoke.





Climate change has both direct and indirect consequences. Direct consequences lead to health and economic challenges such as heat stroke, injuries from extreme storms, and respiratory illness from poor air quality. Indirect downstream consequences include food insecurity caused by poor agricultural output; income and property loss; housing and job insecurity due to drought, flooding and wildfires; and increased rates of anxiety and depression because of these disruptive consequences of climate change.

Table 3 summarizes historic and future direct climate impacts out to the late century.<sup>4</sup> It is difficult to predict the exact increase in future emissions and the climate's response to specific emissions levels. This table highlights projected climate impacts from three scenarios.

### Climate Impact Spotlight: Droughts

*Climate change projections indicate that droughts will intensify in many areas of the United States in the 21st century. Already, historic drought conditions in California are necessitating mandatory water restrictions for residents, businesses, and farms. Several consecutive years with little precipitation and low snowpack have left all of California's reservoirs significantly under capacity, and vegetation dry and highly combustible. Drought conditions such as low precipitation and high temperatures impact air quality by extending the blooming season for ragweed and other allergens, increasing exposure to ground-level ozone and fine particulates, and greatly increasing the likelihood of catastrophic wildfires that spread extremely unhealthy smoke to adjacent communities. These impacts exacerbate respiratory illness, allergies, and asthma and will be worse for children whose developing lungs and rapid breathing increases exposure to respiratory triggers. San Francisco must invest significant resources to prepare for the multiple threats posed by droughts and their harmful effects.*

TABLE 3: MAJOR CLIMATE IMPACTS

HAZARD	HISTORICAL PATTERN	LATE CENTURY (2070 - 2099)	
	Observed 30yr Average (1961-1990)	Medium Emissions Scenario (RCP4.5) <sup>5</sup>	Very High Emissions Scenario (RCP8.5) <sup>6</sup>
 <b>Extreme Heat<sup>7</sup> Days</b>	4 days	<b>30-year average:</b> 6 days / year <b>30-year range:</b> 4–11 days / year	<b>30-year average:</b> 12 days / year <b>30-year range:</b> 6–28 days / year
 <b>Maximum Length of Dry Spell<sup>8</sup></b>	111 days	<b>30-year average:</b> 118 days <b>30-year range:</b> 95–136 days	<b>30-year average:</b> 123 days <b>30-year range:</b> 96–153 days
 <b>Maximum 1-Day Precipitation</b>	1.695 inches	<b>30-year average:</b> 1.741 inches <b>30-year range:</b> 1.440–2.094 inches	<b>30-year average:</b> 1.814 inches <b>30-year range:</b> 1.408–2.335 inches
 <b>Sea Level Rise<sup>9</sup></b>	BASELINE YEAR	END OF CENTURY (2100)	
	2000	Low Emissions Scenario (RCP2.6) <sup>10</sup>	Very High Emissions Scenario (RCP8.5)
		66% probability sea-level rise is between 1.0–2.4 ft 5% probability sea-level rise meets or exceeds 3.2 ft	66% probability sea-level rise is between 1.6–3.4 ft 5% probability sea-level rise meets or exceeds 4.4 ft

## SAN FRANCISCO'S APPROACH

### Communicating About Climate Change

Climate change encompasses major sectors of the economy, draws heavily on scientific research and data, merges private and public interests, and has outsized equity implications. Effective communication will be key to achieving the City's climate action goals and ensuring that all San Franciscans can participate and benefit.

Climate action must therefore be multi-dimensional: it must be bold and science-based; it must be explicitly anti-racist and move society toward a more just and equitable world; it must embody shared values of mutual aid, support and protection; it must speak to diverse communities in languages that are their own, and amplify the voices of communities that have been historically disenfranchised; and it must lift up communities on the front lines of climate harm, many of which are among the least responsible for climate emissions and least resourced to respond.

Since its first CAP in 2004, San Francisco has been leading the way on local climate action, environmental justice, and developing and implementing innovative community-facing programs and outreach campaigns to engage with community stakeholders from all walks of life. Transparent [annual reporting](#) of community-wide emissions shows that the City has stayed ahead of targets set by the State of California and included in international climate protocols.

The 2013 CAP summarized the city's progress and shared examples of successful policies and programs and outlined an initial set of actions to be taken by citizens, businesses, and government to strive toward emission reductions. Several years later, San Francisco introduced the "0-80-100-Roots" climate action framework, where:

- 0 stands for zero waste to landfills and incineration, and zero toxics
- 80 stands for 80% of trips taken by low-carbon modes such as walking, biking, and transit
- 100 stands for 100% renewable energy and a complete phase out of fossil fuels, and
- Roots means using natural systems to sequester carbon from the atmosphere

As the dangerous consequences of climate change continue to harm people, it is important for San Francisco to deploy new communication tools and approaches that will increase community resilience in the face of challenges that lie ahead. An educated and committed public will be vital to participating directly in solutions as well as building and maintaining the political will to enact climate policies.



### CAP Development Process

Given the urgency of the climate crisis, any CAP must prioritize actions that will have the greatest potential to reduce emissions and a strong likelihood of realization. In April 2019, the Board of Supervisors passed the [Climate Emergency Resolution](#) which called on SF Environment to issue a technical feasibility analysis, the [Focus 2030 report](#), released three months later. Afterward, SF Environment outlined a process for updating the 2021 CAP. Early activities included: identifying partners, developing governance structures, identifying future technical tasks such as emissions impact analyses, conducting targeted stakeholder engagement, and preparing for general coordination for the many aspects of the CAP. This was initiated as the COVID-19 pandemic unfolded.

From there, the CAP update process followed the steps outlined below:

1. **Follow the Data** – The annual emissions inventory and supporting data serve as the foundation for identifying key focus areas for emissions reduction. Additionally, the city's Consumption-Based Emissions Inventory (CBEI), which expands the inventory process to address other sources of emissions, was also analyzed and used to inform the development of "Responsible Production and Consumption" strategies.

2. **Build on Experience** –With a history of administering credible and effective sustainability and climate programs over the past 20 years, San Francisco enjoys a high level of expertise for implementing climate strategies. Leveraging and growing from this experience will accelerate emissions reductions. However, given more ambitious goals driven by the unfolding climate emergency and the need to center equity in planning and implementation, new approaches will be needed and they must be responsive to today's challenges and opportunities.
3. **Center Equity** –In addition to eliminating emissions, equity is a co-equal priority for the CAP. To support transparency and rigor, SF Environment created the Racial and Social Equity Assessment Tool (R-SEAT) especially for the CAP, which is discussed in depth in **Section 4: Planning for People**, as well as in **Appendix D: R-SEAT Summary Findings**. SF Environment also launched the Community Climate Council, composed of leaders from key community organizations including the American Indian Cultural Center, Business Council on Climate Change, Chinatown Community Development Center, Community Youth Center, El Centro Bayview, Emerald Cities, Interfaith Power and Light, Livable City, PODER, Sutro Stewards, and SPUR. Members were convened and compensated to advise on the CAP and the best methods for reaching the city's diverse population. SF Environment also outlined various methods to ensure a range of voices could contribute to the CAP.
4. **Leverage Complementary Efforts** –The extent of the climate emergency means all complementary efforts must be leveraged to their fullest extent. The CAP leverages many other plans and policy initiatives. Examples include the growth of CleanPowerSF; building electrification codes; [ConnectSF](#), San Francisco's long range transportation plan and pricing studies; the [Electric Vehicle Roadmap](#); [Housing](#) and [Transportation](#) element updates of the General Plan; [urban forest](#) and [biodiversity plans](#); and ongoing [zero waste](#) efforts.



Anchor Partner Network Meeting on Equitable Decarbonization of Affordable Housing, Fall 2019

5. **Convene and Engage** –SF Environment convened Technical Working Groups (TWGs) composed of staff from key City departments who contributed significant time, creativity, and knowledge to the process. The department and partner agencies also implemented various forms of targeted stakeholder engagement. This engagement included the Transportation and Land Use sector focus groups, recurring updates to policy bodies such as the Urban Forest Council, and convening the Zero Emissions Buildings Task Force, which included the Anchor Partner Network, a focused process to identify equity priorities for residential building decarbonization.
6. **Draft Initial Strategies and Analyze Impacts** – TWGs and key stakeholders identified high-impact opportunities to reduce emissions, informed by a mix of existing department goals and opportunistic leverage points. Based on early drafts, preliminary emissions reductions for buildings and transportation, comprising approximately 90% of total emissions, were calculated. Throughout the process the R-SEAT was applied to surface and sharpen equity priorities. Other data, such as high-level costs, feasibility, and capacity to implement, were also documented.

Following this phase, a broad-based community engagement process was implemented.

# FREE ONLINE WORKSHOPS

WED, JAN 27

CLIMATE & ECONOMY

5:30-7:00 pm

with Alvaro Sanchez | The Greenlining Institute

TUE, FEB 2

CLIMATE & EQUITY

6:00-7:30 pm

with Jacqui Patterson | NAACP

TUE, FEB 9

CLIMATE & HEALTH

5:30-7:00 pm

with Linda Rudolph | Public Health Institute

THU, FEB 18

CLIMATE & RESILIENCE

5:30-7:00 pm

with Brian Strong | City and County of San Francisco

FEB 23 & 25

SAVE THE DATES

for Spanish and Chinese  
in-language workshops!



SAN FRANCISCO  
CLIMATE ACTION

0 80 100 ROOTS

SFEnvironment.org/climateplan

CAP Community Engagement Outreach Flier, January 2020

## Community Engagement

After developing draft strategies, the public engagement process was initiated to 1) inform residents about the proposed strategies, including how equity was incorporated; and 2) consult residents to identify missing elements and get ideas for implementation. Detailed information about the community engagement process can be found in **Appendix B**.

To ensure the CAP serves the needs, goals, and preferences of its constituents, SF Environment sought the participation of a diverse cross-section of the public, including communities of color, neighborhood and tenant groups, youth, workers, and seniors. Multilingual staff supported a specialized consultant team to engage with non-English-speaking residents. Further, the Department relied on members of the Community Climate Council to provide additional culturally competent outreach and engagement.

This process was conducted from mid-December 2020 to the end of March 2021, during the height of the pandemic. New approaches were needed, and innovative uses of digital technology were deployed to reach as many San Franciscans as possible, with

a strong commitment to connect with traditionally underrepresented populations and fostering an open and engaging atmosphere for all attendees. In February 2021, workshops started offering American Sign Language interpretation and specific outreach was conducted to the Mayor's Disability Council and The California Aging and Disability Alliance.

Overall, the engagement process reached 238,845 people, including those who saw social media posts or visited the website. Ultimately 5,777 people took at least one of the following actions: filled out the online survey, attended a virtual workshop or presentation, provided comments on the online open house platform, or interacted with social media content. Additionally, SF Environment hosted a kick-off webinar with Mayor Breed, followed with 11 public workshops (including one in Spanish and one in Chinese), and 11 community presentations. More than 1,400 comments were posted to the online open house platform, and nine emailed comment letters were received from stakeholder groups. City staff addressed major themes of the comments and feedback received and integrated the changes into the final CAP.



SAN FRANCISCO  
CLIMATE ACTION

0 80 100 ROOTS





A summary of major themes and community priorities captured from the engagement process include:

- **Evidence-based Efforts** –Provide rigorous, transparent, and consistent analyses to show potential effectiveness of actions, and ensure implementation does not inadvertently increase emissions or exacerbate inequities.
- **Cost Burdens** –Community members expressed concerns about the affordability of climate action and who will have to pay costs. Lack of affordable alternatives to a fossil fuel-based economy is a major potential barrier to success.
- **Balance of Agency** –There is desire for more education and outreach to empower communities. The onus for climate action should be on major institutions, including the government and corporations, not individuals.
- **Alignment** –The City should prioritize existing relevant projects or clarify how the CAP would interact with these policies and programs for a more holistic approach.
- **Workforce** –There is desire to see the City further supporting workforce development within local, low-income, and BIPOC communities.

The CAP must be viewed as a living document that will be revisited and updated regularly moving forward based on external factors, with a formal update every five years, all in acknowledgement of rapidly changing times. Progress on CAP strategies will be tracked through climate and equity metrics. Draft metrics are proposed in **Section 5: Solutions: A Path Forward.** Outreach and engagement will be imperative to success and will continue throughout implementation (see **Section 6: Next Steps for Implementing the CAP**, for more on this).

SECTION 3:

# **TOWARDS A NET-ZERO FUTURE**



The science is clear: the planet is warming, primarily due to burning fossil fuels and destroying tropical forests. Emissions inventories provide a quantifiable means for measuring progress toward reducing emissions over time. This section includes: **(1) Current emissions profiles** - San Francisco's current emissions inventory, baseline, and historical data; **(2) Emission reduction pathways** - a forecast business-as-usual (BAU) inventory and inventory projections; and **(3) Emission targets and climate goals** – specific targets and goals for emission reductions.

## CURRENT EMISSIONS PROFILE

The City of San Francisco's most recent sector-based emissions inventory is for the year 2019. The major sources of emissions are those generated by energy consumption from buildings, transportation, and water/wastewater management. Energy-related emissions are those generated by electricity use and burning natural gas. These emissions are primarily from consumption that occurs within residential and commercial buildings as well as municipal activities. Transportation emissions include burning gasoline or diesel fuel for vehicle travel and equipment use. Emissions from landfills come from decomposition of organic materials that produce methane, a powerful heat-trapping gas. Emissions from agriculture are allocated to the city proportionally from the Bay Area Air Quality Management District's regional inventory.

San Francisco's emissions are categorized into five sectors in the 2019 inventory (Figure 4): Transportation, Buildings (Residential and Commercial), Landfilled Organics, Municipal, and Agriculture and Wastewater. San Francisco's baseline inventory is set to 1990 levels and serves as a reference against which progress in reducing emissions over time may be measured. The 1990 level baseline inventory year is consistent with the State of California.

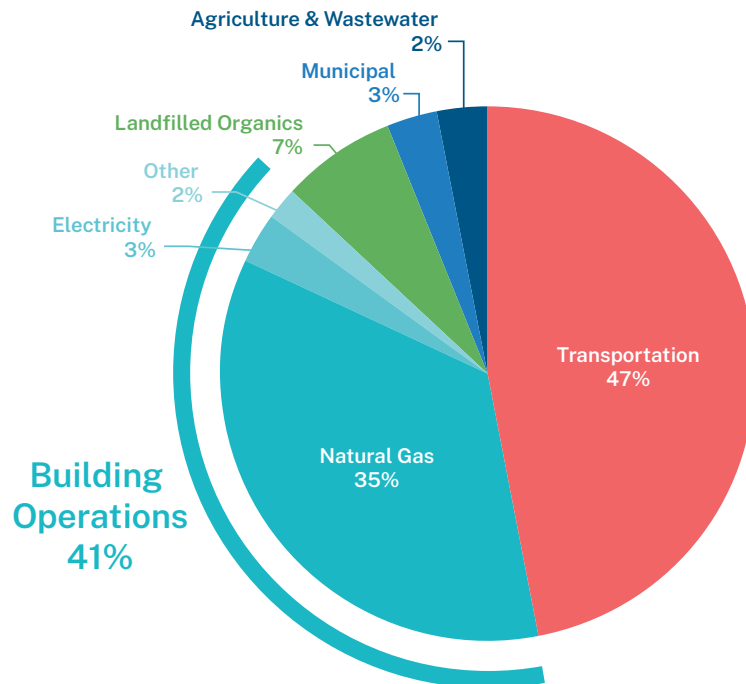


FIGURE 4: SAN FRANCISCO'S 2019 GHG INVENTORY

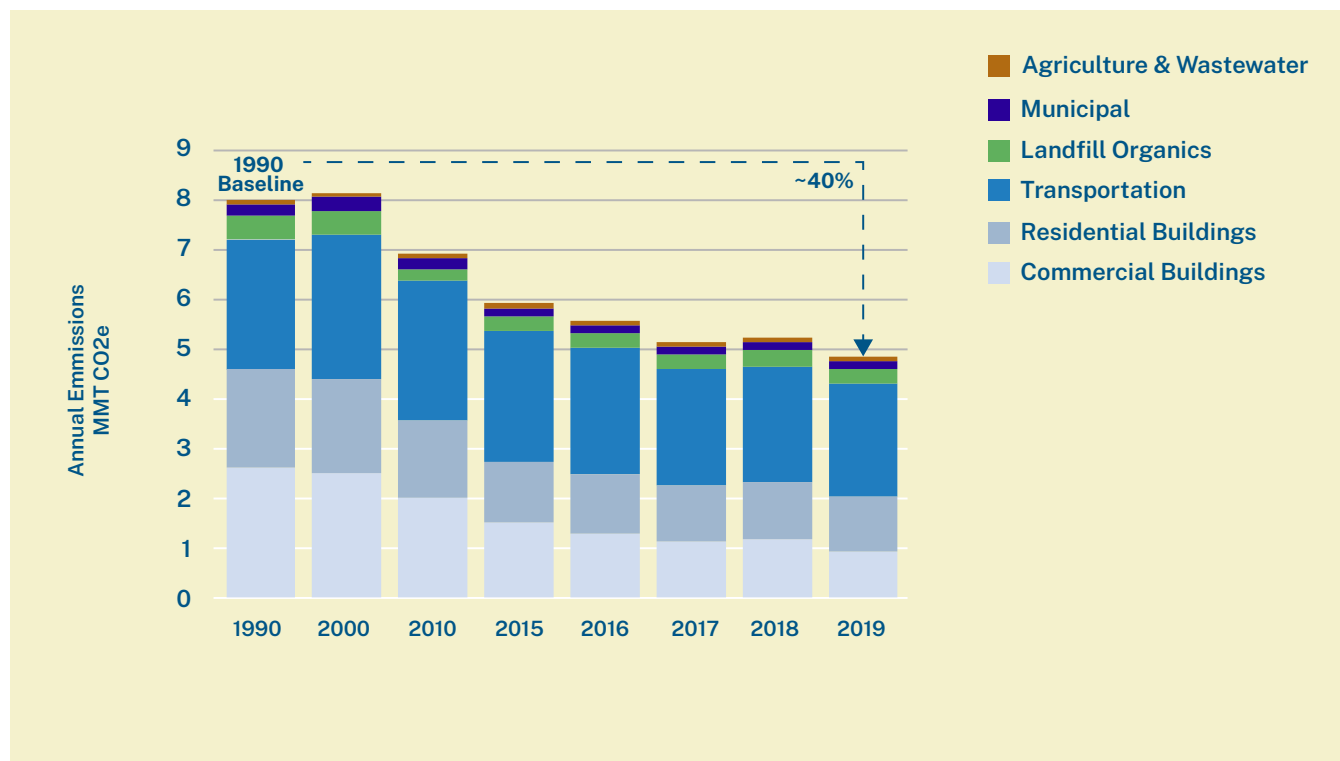


FIGURE 5: EMISSIONS: BASELINE (1990) TO CURRENT DAY (2019)



TABLE 4: 2019 EMISSIONS COMPARED TO 1990 LEVELS

SECTOR	PERCENT CHANGE FROM 1990
Residential Buildings	<b>47% decline</b>
Commercial Buildings	<b>67% decline</b>
Transportation	<b>16% decline</b>
Landfilled Organics	<b>35% decline</b>
Municipal	<b>32% decline</b>
Agriculture	<b>9% increase</b>
Wastewater	<b>26% increase</b>

San Francisco's emissions declined by 41% between 1990 and 2019, from 7.9 to 4.6 million metric tons of carbon dioxide (mtCO<sub>2</sub>e<sup>11</sup>) (Figure 5). San Francisco has consistently seen decreases in almost every sector (Table 4).

**Transportation:** In 2019, emissions in the Transportation sector totaled 2.20 million mtCO<sub>2</sub>e, accounting for 47% of San Francisco's emissions. Emissions from the Transportation sector have declined 16% below 1990 levels, mainly due to lower vehicle pollution and cleaner vehicle fuels mandated by the State of California. Emissions from public transportation, such as Muni and commuter ferries, have fallen as fossil-fuel diesel has been replaced by renewable diesel starting around 2016. Gasoline used by the Transportation sector was responsible for the largest share of emissions (72%), followed by diesel (21%), other fuels (6%), electricity (1%), and renewable diesel (<1%). Broken down by vehicle type, privately-owned passenger vehicles generated 72% of emissions, at 1.59 million mtCO<sub>2</sub>e. Maritime ships and boats accounted for 19% of emissions and off-road equipment produced 6% of emissions. The remaining 3% of sector emissions were from public transportation.

**Buildings:** In 2019, emissions from the Building sector totaled 2.02 million mtCO<sub>2</sub>e, accounting for 41% of San Francisco's emissions. Of these, emissions from Residential buildings totaled 1.05 million mtCO<sub>2</sub>e, comprising 23% of San Francisco's emissions.

Emissions from Residential buildings have declined 47% since 1990 — driven primarily by cleaner electricity supply, improved energy codes, and city-wide energy efficiency programs. Residential sector emissions are

generated from fossil fuels used to heat households, provide hot water, dry clothes, and cook. They result primarily from burning natural gas (96%), followed by electricity use (2%), and other fuel consumption (2%).

In 2019, emissions from the Commercial buildings sector totaled 831,000 mtCO<sub>2</sub>e, accounting for 18% of San Francisco's emissions. This includes commercial and industrial, direct access, district, and steam loop customers. Emissions from the Commercial sector have declined 67% since 1990. Like Residential buildings, this decrease was mainly due to a combination of cleaner electricity supply, improved energy codes, and city-wide energy efficiency programs. Commercial natural gas use was responsible for the largest share of emissions (85%), followed by steam (8%), and electricity (7%).

**Landfilled Organics:** In 2019, emissions from Landfilled Organics totaled 308,000 mtCO<sub>2</sub>e, accounting for 7% of San Francisco's emissions. Organic materials sent to landfills decompose and release methane emissions. Emissions from Landfilled Organics have declined 45% below 1990 levels due to improved resource recovery.

**Municipal:** In 2019, emissions from the Municipal sector totaled 156,000 mtCO<sub>2</sub>e, accounting for 3% of San Francisco's total emissions. In the Municipal sector, 86% of emissions were generated from City-owned buildings and 14% from the City's fleet of non-revenue vehicles. Municipal sector emissions declined 31% below 1990 levels. The steepest decline occurred between 2010 and 2012 when all City-owned buildings began to fully source 100% emission-free electricity generated by San Francisco Public Utilities Commission's Hetch Hetchy Power system.

**Agriculture:** In 2019, emissions from the Agriculture sector totaled 84,000 mtCO<sub>2</sub>e, accounting for 2% of San Francisco's emissions. These emissions have increased 9% from 1990 levels and are generated mostly from animal waste, with the remainder from managing urban soils.

**Wastewater:** In 2019, emissions in the Wastewater sector totaled 5,400 mtCO<sub>2</sub>e, accounting for just one tenth of a percent of San Francisco's emissions. Wastewater sector emissions have increased 26% from 1990 levels, mainly due to a 22% increase in population, which increases the volume of wastewater treated at

the City's water pollution control plants. Wastewater sector emissions occur mainly from fugitive emissions, or emissions that are released as effluent is discharged into a body of water.

## EMISSIONS REDUCTIONS PATHWAYS

### Global

In 2016, the IPCC estimated that to remain under a 1.5°C increase in average global temperature CO<sub>2</sub> emissions would need to fall by 45-75% from 2010 levels and cumulative global emissions after the end of 2017 must be less than 420 GtCO<sub>2</sub>. In 2018, scientists prepared a subsequent report to document progress towards long-term goals of the Paris Agreement and inform preparation of nationally determined contributions. The report found that limiting global temperature increase to 1.5° C would require rapid transitions in energy, transportation and land use, industry, and buildings. It notes that global net human-caused emissions must reach net-zero around 2050, which means remaining emissions will need to be balanced through carbon sequestration. Global organizations such as [C40](#) and One Planet City Challenge (OPCC) provided specific guidance for cities based on these IPCC reports, and recommended a 57%-68% reduction from baseline emissions inventories to meet a global 2030 target.

In August 2021, IPCC released its latest report, documenting the most up-to-date and comprehensive review on the science and expected impacts of climate change. The report states that humans are unequivocally responsible for global warming and that human-induced climate change is already affecting many weather and climate extremes in every region across the globe. Unless there are immediate, large-scale emissions reductions, it will be impossible to limit warming to close to 1.5°C. While the IPCC's synthesis of regional information will not be published until September 2022, it has released a [fact sheet](#) highlighting findings for urban areas. Cities, especially coastal cities, will be hotspots of global warming.

### State of California

In 2018, Governor Jerry Brown signed a non-binding executive order (B-55-18) which ordered, "A New Statewide Goal to be established to achieve carbon neutrality as soon as possible, and no later than 2045." At the same time, Senate Bill (SB)100 was signed into law requiring 100% of the state's electricity to be produced by zero-carbon resources by 2045. The law addresses the electricity portion of the State's emissions but does not address vehicle fuels and natural gas.

Currently, the California Global Warming Solutions Act of 2016: Emissions Limit, or SB 32, is a state law that codifies statewide emissions reduction targets to 40% below 1990 levels by 2030. SB 32 expanded upon Assembly Bill 32, which was passed in 2006 and established statewide goals to reduce emissions to 1990 levels by 2020.

The State of California has concurred that limiting global warming will require a 45% reduction in global emissions from 2010 levels by 2030 which is proportionate to the State's goal of a 40% reduction from 1990 levels by 2030 and reaching net-zero emissions by mid-century. The State is currently evaluating a pathway to achieve net-zero emissions by 2045.

In October of 2020, the California Air Resources Board (CARB) consulted with Energy + Environmental Economics to develop [Achieving Carbon Neutrality in California – PATHWAYS Scenarios Developed for the California Air Resources Board](#). This study evaluated three scenarios that could potentially achieve carbon neutrality in California by 2045 and was designed to align with California's Executive Order B-55-18. Analysts examined carbon neutrality differently in each scenario, ranging from 80-92% reduction in emissions by 2045, with remaining emissions being removed from the atmosphere using a combination of carbon sequestration strategies.





## San Francisco, CA

It is clear that San Francisco's response to the climate crisis must be swift and acknowledge the imperative of accelerating emissions reductions. In February 2019, San Francisco's Board of Supervisors approved a resolution declaring a climate emergency and directed SF Environment to issue a report detailing the steps San Francisco can take to reduce its carbon emissions. In July 2019, SF Environment released *Focus 2030: A Pathway to Net-Zero Emissions*, which was a foundational step in San Francisco's progress toward addressing the climate crisis. This technical report quantified potential emissions reductions consistent with reaching a net-zero goal.

Building upon the *Focus 2030* report to meet reduction targets, additional analysis was conducted to develop comprehensive understanding of the emissions reduction potential of various strategies and actions to achieve those targets.

A business-as-usual (BAU) baseline scenario was created to project the effect of emissions reduction strategies. The BAU assumptions, in which demographic and economic changes — namely population and job growth — serve as the primary drivers of changes in emissions, resulted in a scenario that showed emissions steadily increasing over time, rising 21% above 2017 levels. Continuing with business-as-usual is not an option if San Francisco is serious about meeting its climate commitments and avoiding the worst consequences of climate change.

From this baseline, a variety of emissions-reducing strategies and actions are applied to San Francisco's emissions forecast. These are described in **Section 5**. Details about the methods used for the Transportation and Land Use and Building Operations sectors are in **Appendix C**. Emissions reduction approaches vary in the targeted sectors. Local city data and applicable sector decarbonization rates were used to provide tailored analyses to understand emission reduction potential.



San Francisco's emissions reduction target:

### **Net-zero sector-based emissions by 2040**

Based on prior commitments, the CAP development process originally contemplated net-zero emissions by 2045 as the overall target. More recently, legislation sponsored by Mayor London Breed that updated Chapter 9 of the Environment Code accelerated the net-zero goal to 2040 and it also specifies net-zero as a 90% reduction below San Francisco's baseline year of 1990.

Current projections show that if all the strategies in the CAP were implemented based on the specified timelines, San Francisco would see an 80% reduction from 1990 levels by 2040, an 87% reduction by 2045, and a 94% reduction by 2050.

Peer review by external technical experts concluded the CAP puts forth an exhaustive set of strategies, and indicated that the main way to achieve the 2040 net-zero goal would be to accelerate implementation. Staff-led technical working groups concluded that the proposed strategies had considered aggressive implementation timelines, and any further acceleration would be possible only with significant assistance and support from external entities. Initial solutions to the projected 2040 shortfall include: receiving large amounts of heavily subsidized capital from non-city sources, aligned transformative policies from the state and federal government, and tapping into new science and tools to quantify the carbon sequestration effects of Healthy Ecosystems strategies, which are currently not accounted for within the emissions reduction projections. These are discussed in more detail in **Section 6: Next Steps for Implementing the CAP**.

If San Francisco successfully implemented all CAP strategies and actions, the City would achieve a 61% reduction in emissions by 2030 and an 87% reduction by 2045. More aggressive reductions by 2030 are challenged by the need for legislation and differing regulatory, financial, social, and equity considerations that must be developed in partnership with stakeholders. Major shifts are beginning to happen, as innovation and capital investment in climate technologies are on the rise, while securing new long-term funding and vigilantly prioritizing climate justice are also needed for success. Based on this data, analysis, and consideration of external factors, San Francisco has proposed the bold and aggressive goal of equitably reaching net-zero sector emissions by 2040, with a 61% reduction by 2030 (Figure 6).

To expand San Francisco's view of emissions, a Consumption-Based Emissions Inventory (CBEI) was conducted for the years spanning 1990–2015 by SF Environment in partnership with Lawrence Berkeley Lab's CoolClimate Network in April 2019. The results were released in October 2020. One recommendation from that study was that San Francisco should establish consumption-based emission reduction targets to accompany the existing sector-based emission-reduction targets for 2030 and 2050.

A CBEI measures emissions that occur throughout the supply chain. It includes goods, such as materials, consumer goods, and food as well as services, including healthcare, education, and entertainment (Figure 7). The methodology then ascribes the final emissions demand to consumers, defined as households and government in San Francisco. A CBEI differs from a sector-based inventory because it includes emissions generated outside city borders to produce goods and services for consumption by residents. Thus, a CBEI provides insights about where local consumption gives rise to emissions outside a city, leading to additional opportunities for reducing emissions and avoiding inequities associated with outsourcing high-emissions activities to other communities, locally, regionally, and internationally.

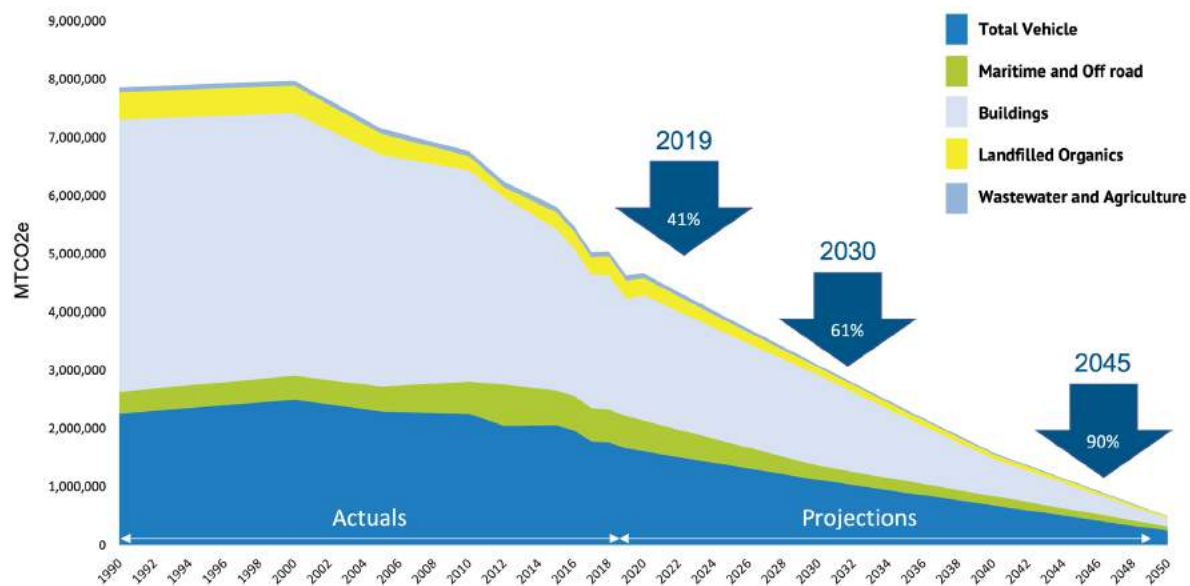


FIGURE 6: SECTOR-BASED GHG PROJECTIONS

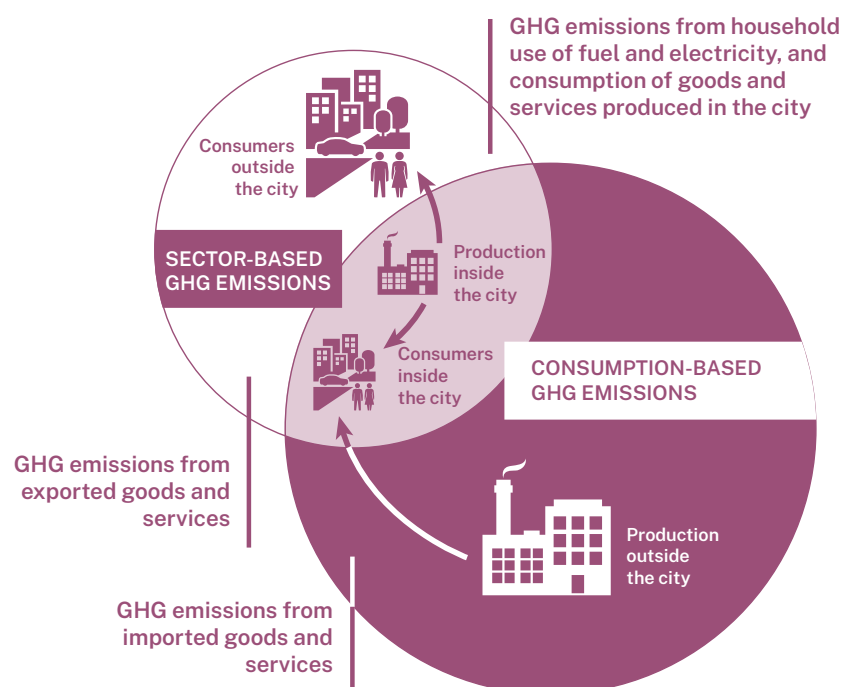


FIGURE 7: THE RELATIONSHIP BETWEEN SECTOR-BASED AND CONSUMPTION-BASED GHG INVENTORIES

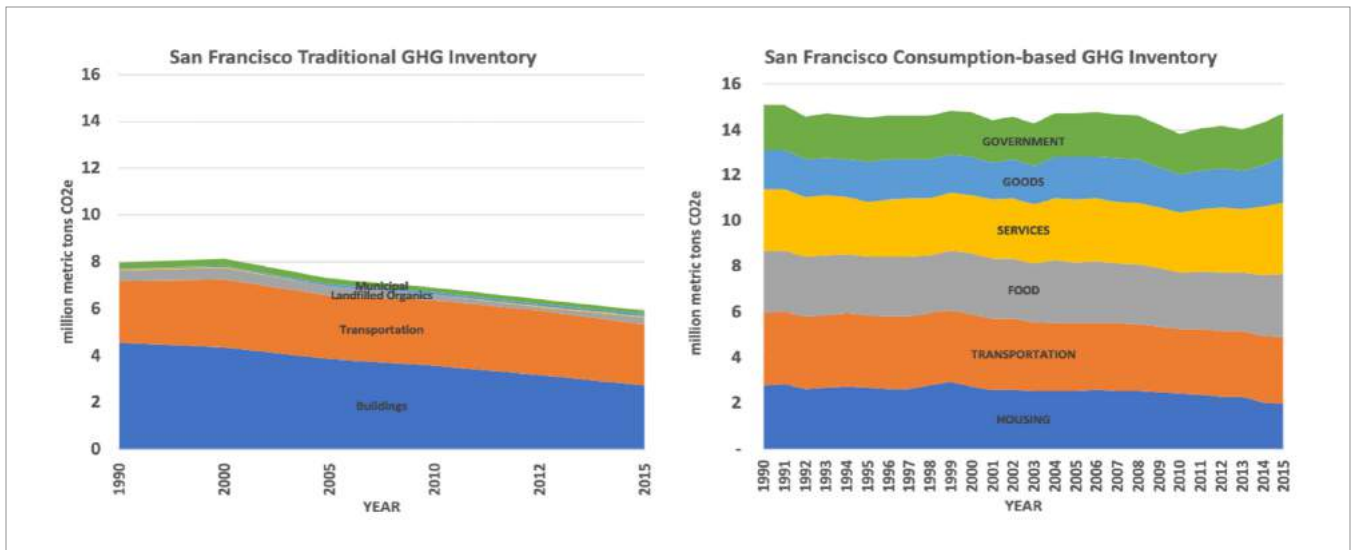


FIGURE 8: SAN FRANCISCO'S SECTOR-BASED AND CONSUMPTION-BASED GHG INVENTORY, 1990–2015

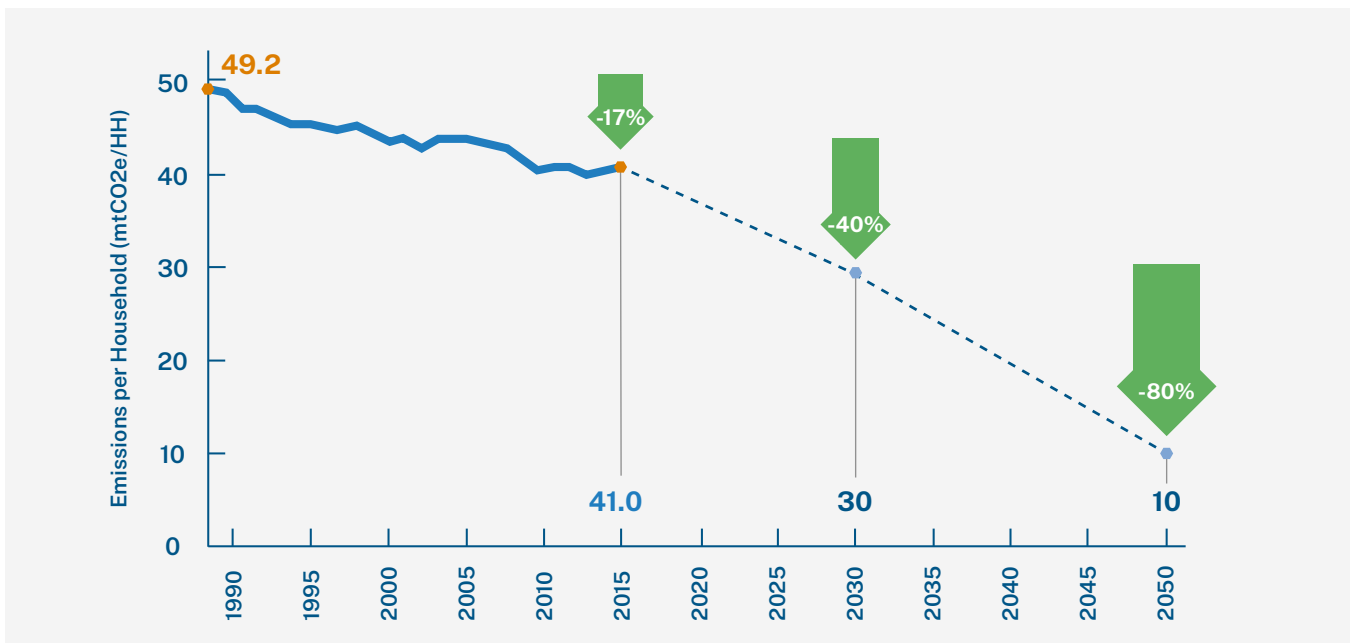


FIGURE 9: HISTORICAL (1990–2015) AND PROJECTED 2030 AND 2050 CONSUMPTION-BASED EMISSION REDUCTION TARGETS

According to the CBEI, San Francisco emitted 14.72 mtCO<sub>2</sub>e, which is 2.5 times higher than the 5.93 million metric tons in the sector-based emissions inventory (Figure 8). Total city-wide Consumption-Based Emissions (CBEs) decreased 2% between 1990 and 2015 even as the city's population increased.

Between 1990 and 2015 CBEs were reduced 17%, from 49.2 to 41.0 mtCO<sub>2</sub>e as measured on a per household basis (Figure 9). Policy-based CBE targets for San Francisco that align with SB 32 and recommendations from the CoolClimate Network suggest reducing emissions 40% below 1990 levels by 2030 and 80% below 1990 levels by 2050. These targets were adopted in by San Francisco in the updated version of Chapter 9 of the Environment Code. With aggressive state and local action between 2015 and 2030, San Francisco can reduce CBEs from 41 to 30 mtCO<sub>2</sub>e per household, an ambitious yet appropriate goal.



## EMISSIONS TARGETS AND CLIMATE GOALS

City staff, with community input, developed goals to reduce San Francisco's emissions to achieve its sector-based and consumption-based targets (Table 5). Goals (Table 6) are consistent with international protocols from science-based targets, statewide reductions required under SB 32, and regional and global emissions goals.

TABLE 5: 2021 CLIMATE ACTION TARGETS

SECTOR-BASED EMISSION REDUCTION TARGETS	CONSUMPTION-BASED EMISSION REDUCTION TARGETS
By 2030, reduce emissions by at least 61% compared to 1990 levels	By 2030, reduce consumption-based emissions to less than 30 mtCO <sub>2</sub> e per household, equivalent to a 40% reduction compared to 1990 levels
By 2040, achieve net-zero emissions by reducing emissions at least 90% compared to 1990 levels and sequester any residual emissions through nature-based solutions	By 2050, reduce consumption-based emissions to less than 10 mtCO <sub>2</sub> e per household, equivalent to an 80% reduction compared to 1990 levels

TABLE 6: 2021 CLIMATE ACTION GOALS

<b>ENERGY</b>	By 2025, supplying 100% renewable electricity, and by 2040, supplying 100% renewable energy (no more fossil fuels).
<b>BUILDINGS</b>	By 2021, requiring zero onsite fossil fuel emissions from all new buildings, and by 2035, requiring zero onsite fossil fuel emissions from all large existing commercial buildings.
<b>TRANSPORTATION</b>	By 2030, an increase in low-carbon trips to at least 80% of all trips measured and an increase in the level of electrification of vehicles to at least 25% of all private vehicles registered, and by 2040, an increase in the level of electrification of vehicles to 100% of all private vehicles registered.
<b>HOUSING</b>	Building at least 5,000 new housing units per year with maximum affordability, including not less than 30% affordable units, and with an emphasis on retaining and rehabilitating existing housing.
<b>ZERO WASTE</b>	By 2030, a reduction in the generation of solid waste of at least 15% below 2015 levels and a reduction in the amount of solid waste disposed of by incineration or deposited in landfill of at least 50% below 2015 levels.
<b>ROOTS</b>	Sequestering carbon through ecosystem restoration, including increased urban tree canopy, green infrastructure, and compost application.

SECTION 4:

# PLANNING FOR PEOPLE





Photo Credit: ShawnClover, Flickr

**In addition to reducing emissions to zero over the next 20 years, the CAP strives to ensure all San Franciscans have the skills, knowledge, and resources to meet interconnected challenges that lie ahead, including climate change. To do so, the proposed strategies leverage community strengths, advance racial and social equity, and provide critical benefits to the entire community.**

City climate action embodies the popular motto to “think globally but act locally.” By identifying and implementing policies, programs, and projects that will lead to meaningful reduction in emissions, San Francisco can help lead the international fight against climate change and pave the way for other jurisdictions to act on climate.

At the same time, reducing emissions offers a unique opportunity to advance other key City priorities: protecting public health; strengthening resilience to natural and industrial hazards and shocks; creating a more fair and inclusive economy; and importantly, directly addressing racial inequities and the marginalization of whole groups of people. Climate action is a vehicle to catalyze positive, transformative change across society that will protect all San Franciscans and support their ability to thrive.





Earth Day Volunteers 2012

## CENTERING RACIAL EQUITY

The rapidly unfolding climate emergency requires that strategies go beyond reducing emissions and include actions that advance racial and social equity. Black, Indigenous, and People of Color (BIPOC) and low-income residents are among the least responsible for causing climate change, yet the most vulnerable to its harms, including heat stress, flooding in low-lying neighborhoods, and housing and food insecurity. When data is analyzed by race, the results of discriminatory policies are evident across every social indicator, including unemployment, health, household income, education, housing, displacement, criminal justice, and police violence.<sup>12</sup> Climate change will only exacerbate these disparities, so strategies to reduce emissions must be intentionally designed for equity to mitigate and reverse these outcomes.

Concurrent to the CAP update, San Francisco is also developing an [Environmental Justice Framework](#) as part of its update to the General Plan. The Environmental Justice Communities Map (Figure 9) will be used as a primary tool for tracking progress on CAP equity goals.

Interventions to reduce disparities and advance equity vary in scope. They can take the form of targeted benefits, specialized programs and policies, or they may take on fundamental drivers of inequity. Equity can be advanced by ensuring inclusive access to benefits, for example by providing subsidies for green technologies such as solar panels, electric vehicles or energy-efficiency upgrades to those who cannot afford them. In this example, strategies deliver benefits to populations who may lack access to them while also promoting new technologies. Strategies can also address the root causes of the inequity. For example, expanding affordable housing options by building new housing stock and eliminating discrimination in home loan applications can help people with lower incomes reduce emissions associated with commuting and less energy efficient older housing.

The commitment to a CAP grounded in equity and justice requires that policymakers go beyond examining how the benefits of green technology can become available to those who cannot afford them. Instead, policymakers should also examine root causes; for example, why some people cannot afford green technologies in the first place, and how to address these underlying causes, such as disparities in income and wealth accumulation.

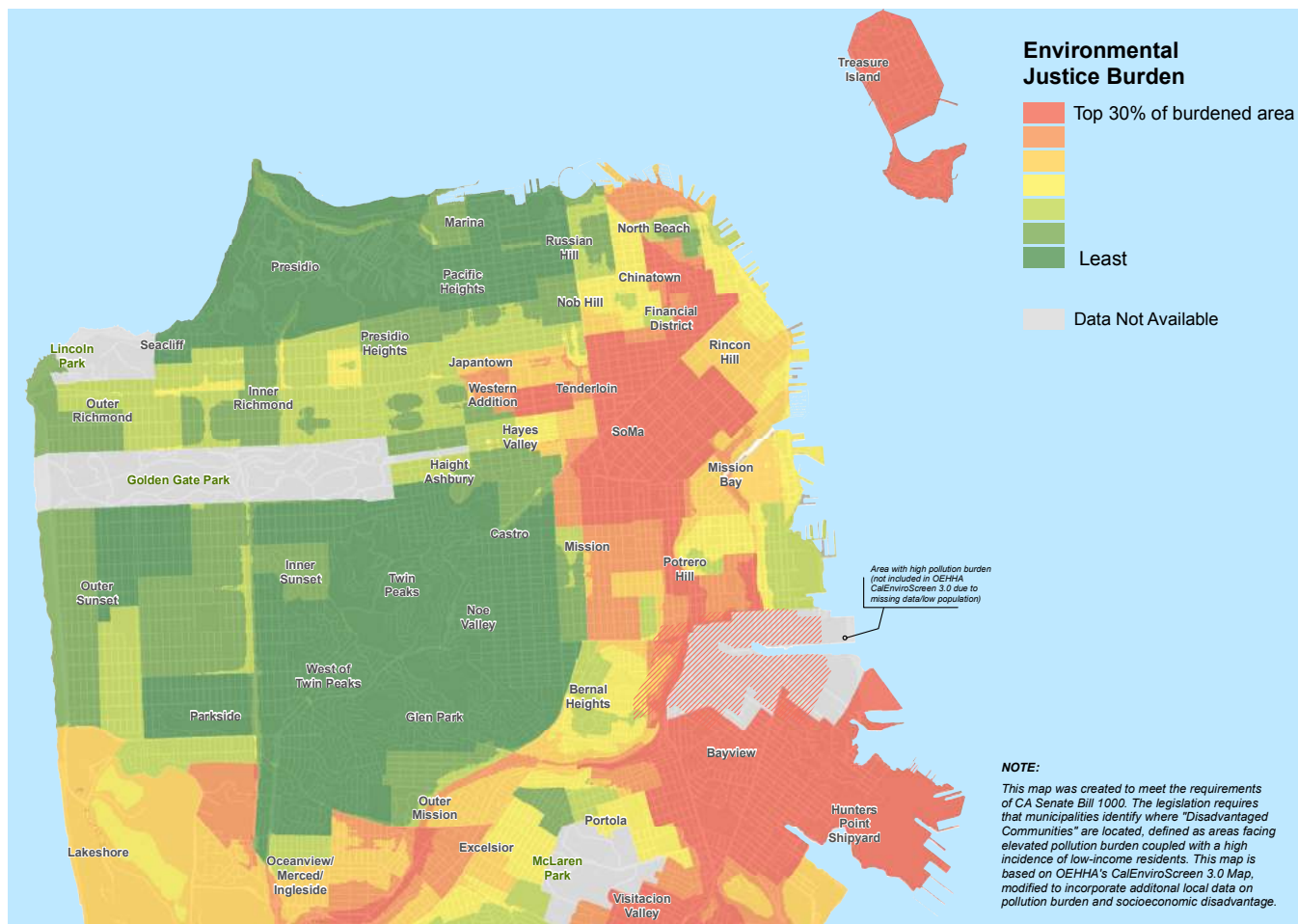


FIGURE 10: DRAFT ENVIRONMENTAL JUSTICE COMMUNITIES MAP<sup>13</sup>

## CLIMATE ACTION PLAN “LENSES”

San Francisco views climate action through four complementary focus areas, or “lenses”, which have identified critical issues and shaped proposed strategies for future implementation. These considerations must be advanced to the extent possible to maximize benefits for the entire community, and with a special eye toward reducing burdens on marginalized communities.

### Lens 1: Racial and Social Equity

Disparities by race and ethnicity in San Francisco and the Bay Area include median earnings (Figure 11), displacement (Figure 12) and home ownership and rent burden (described in **Section 5: Housing**).

Displacement, gentrification, and deep cultural losses have affected some of San Francisco’s most iconic neighborhoods, even as the city has experienced one of the longest periods of economic growth in its history. Poverty and racial and ethnic inequality have been identified as two foundational issues contributing to the disparities in San Francisco’s public health outcomes.<sup>14</sup> The stark inequality must be vigorously addressed. Climate solutions that fail to address racial inequity are less likely to be successful while those that advance multiple goals and provide sustainable solutions for many years. To advance equitable climate action, a Racial and Social Equity Assessment Tool (R-SEAT, **Appendix D**) was created to assess CAP strategies for their potential to address fundamental drivers of inequity. The R-SEAT leads with race because

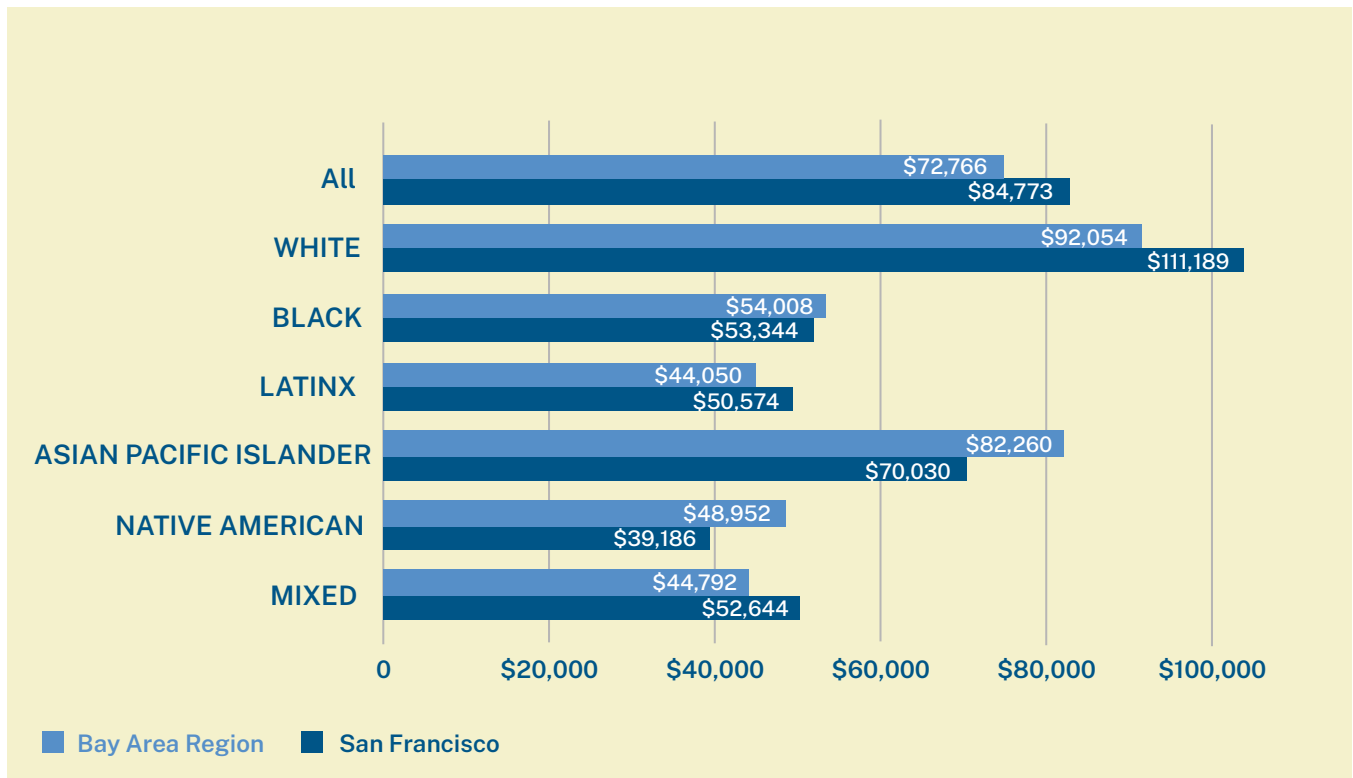


FIGURE 11: MEDIAN EARNINGS BY RACE AND ETHNICITY, 2019<sup>15</sup>

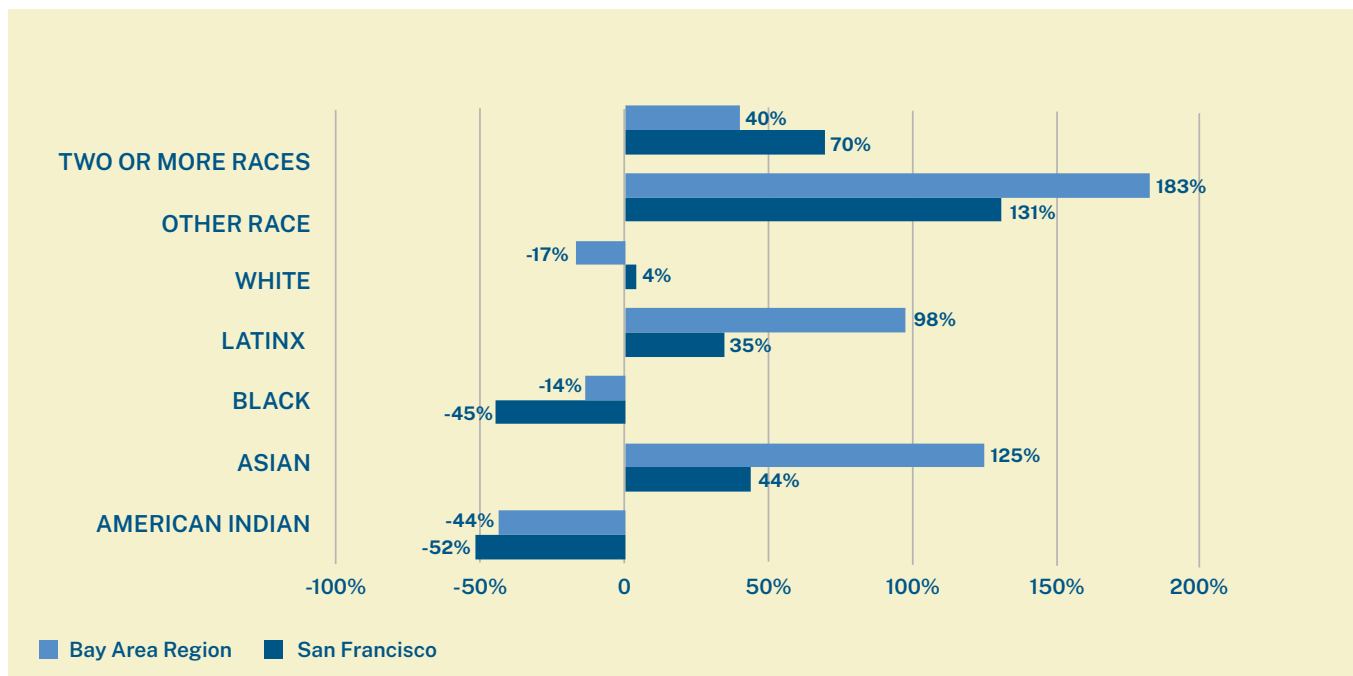


FIGURE 12: PERCENT CHANGE IN POPULATION BY RACE AND ETHNICITY, 1990 TO 2018<sup>16</sup>





racial discrimination intersects with other forms of marginalization. An intersectional approach accounts for how social categorizations such as race, class, gender, and sexual orientation create compounding discrimination or disadvantage.

## **Lens 2: Economic Recovery and Just Transition**

Through ambition and effort, San Francisco has demonstrated it can significantly reduce emissions while having a prosperous local economy. However, many residents and families have not benefited from the city's prosperity. There is a real possibility that whole communities could be left behind and penalized in the shift to decarbonization, unless policies are advanced to protect against that harm. A new imperative — referred to as a just transition — is integral to achieving local, national, and international climate goals. A just transition calls for a strategic, people-focused approach to phasing out polluting industries while creating employment pathways for workers in those industries, plus a new generation of workers, to transition to quality jobs that support economic and climate justice.

COVID-19 impacted many people and communities financially, but those most at risk were predominantly people of color and individuals with lower incomes: the communities that will also be harmed most by climate change. Economic recovery driven by climate action must provide opportunities to eliminate racial disparities and economic inequality.

For this CAP, and the policy initiatives that feed into it,

the City engaged labor leaders, frontline communities, environmental justice advocates, and other key stakeholders to ensure strategies support all workers, including those in fossil-fuel based industries that must decarbonize. Launching the CAP while recovering from COVID-19's economic disruptions provides opportunities to help impacted community members find meaningful work while building on community strengths and advancing common goals, including improving public health.

## **Lens 3: Protecting Public Health**

Climate change is one of the greatest public health threats of the 21st century. Both its causes — primarily burning fossil fuels and destroying tropical forests — and its effects have acute consequences for health. Climate-related events such as extreme temperatures, severe storms, and wildfires directly harm people and exacerbate pre-existing challenges such as poverty, food and housing insecurity, and displacement.

While everyone's health may be harmed by climate change, adverse health outcomes are not evenly distributed. Social Determinants of Health are defined as upstream conditions such as social and institutional inequities, as well as disparities in living conditions that impact people's health, including disease, injury, and mortality.

Social determinants are significant drivers of climate-related health inequities. Like other social determinants of health, climate change creates poor health outcomes, increased health care costs and disproportionately



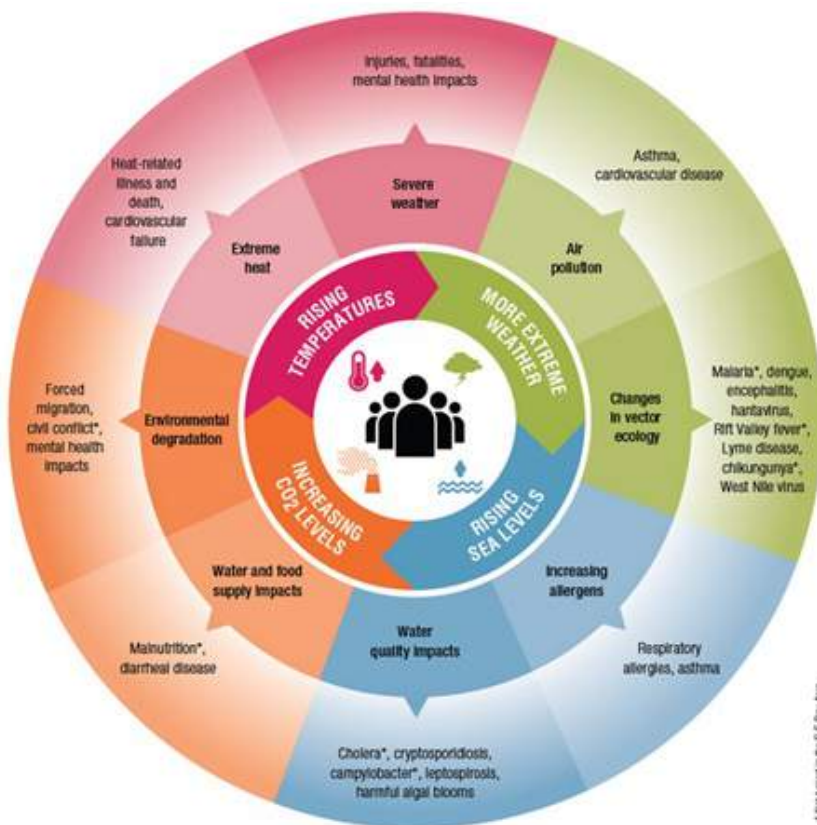


FIGURE 13: INTERCONNECTEDNESS OF CLIMATE CHANGE AND HEALTH

harms vulnerable populations such as seniors, children, people with disabilities, and people with pre-existing medical conditions. Research has concluded that the impacts from a changing climate are inextricably linked to poorer health.

Climate change impacts may be intensified by external factors such as location, proximity to infrastructure, and housing quality. For example, communities in flood plains and low-lying areas are more vulnerable to flooding from extreme storms, and families that live in homes without air conditioning or insulation are more vulnerable to extreme temperatures. Physiological characteristics may also make a person more vulnerable to climate stressors: those with pre-existing health conditions, such as asthma, are more vulnerable to dirty air from wildfire smoke; older adults are more vulnerable to extreme heat; and populations that rely on electronic medical equipment are more vulnerable to power shut-off's required for wildfire mitigation.

Climate change threatens human health in many ways, such as increases in rates of cardiovascular and respiratory diseases; increases in water and foodborne

illnesses; greater incidence of vector-borne diseases such as West Nile Virus; preventable injuries due to extreme weather events; increases in incidence of heat-related illnesses such as heat stroke, heat exhaustion, or even death. These stressors can also lead to impaired mental health. Figure 13 displays the most salient health impacts caused by climate change.

Addressing climate change can protect people's health. For example, walking and biking reduces traffic congestion and improves physical health, greenspaces and urban trees sequester emissions and improve air quality and mental health, and eliminating fossil fuels in buildings protects against chronic health conditions such as asthma.

## Lens 4: Resilience

San Francisco has a long-standing relationship with natural disasters and hazards, coping with multiple risks since the Great Earthquake of 1906. Planning to mitigate future earthquake risks has been underway for decades. More recently, the City and region have started to face specific climate change impacts such as

## A CLIMATE RESILIENT SAN FRANCISCO

Connecting People, Buildings, Infrastructure & Nature

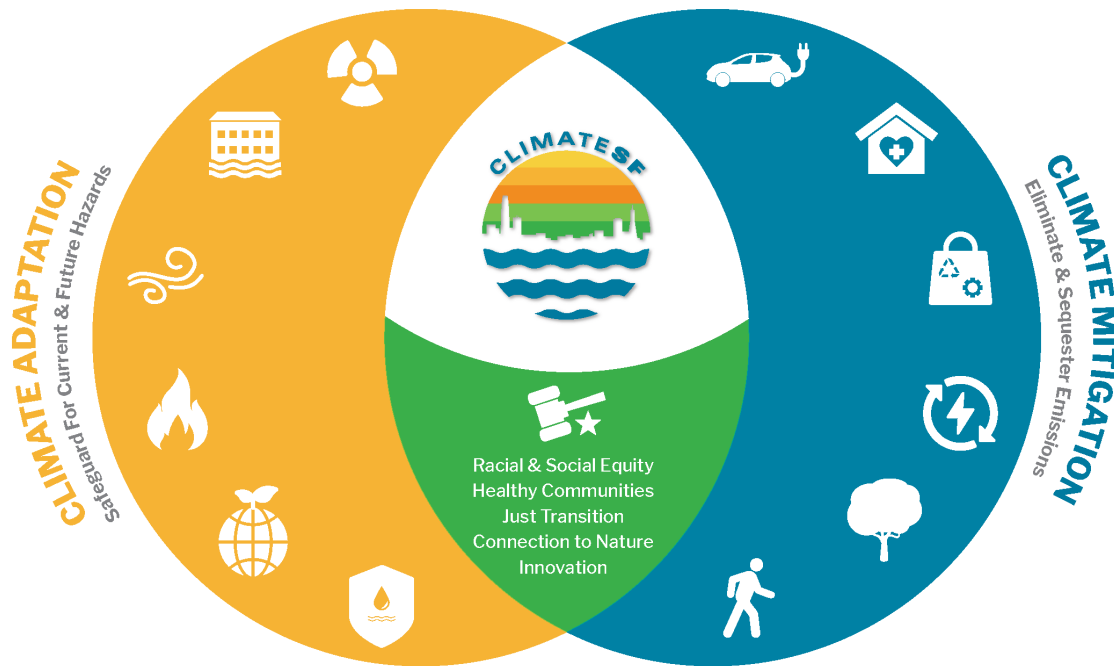


FIGURE 14: CLIMATE ADAPTATION AND MITIGATION CREATE RESILIENCE

extreme heat and poor air quality caused by wildfires. These hazards, as well as other threats such as coastal flooding and drought, are projected to increase in severity and frequency as emissions continue to build up in the atmosphere. Because of the overlap between climate resiliency and other preparedness efforts, such as pandemic and earthquake preparedness, fire safety, and other endeavors, the City can take a multi-hazard approach to addressing community resilience (Figure 14).

The [Hazards and Climate Resilience Plan \(HCR\)](#) developed by City agencies and adopted by the San Francisco Board of Supervisors in 2020, identifies hazards and their associated vulnerabilities and consequences and presents strategies to reduce risks and adapt to unavoidable climate impacts. This approved plan is required for San Francisco to receive federal pre-and post-disaster hazard mitigation funding. The HCR also meets State adaptation planning requirements and will be linked to the Safety and Resilience Element in San Francisco's General Plan.

As San Francisco contributes to ambitious efforts to keep global temperatures below 1.5°C, it must also prepare for unavoidable climate impacts and other hazards that will hit home. All CAP strategies and actions were assessed for their potential to increase resilience. Two specific impact areas were assessed:

- Community adaptation and resilience — the information and services available to prepare for, respond to, and recover from a hazard event
- Physical environment resilience — the changes to buildings and infrastructure, including nature-based infrastructure, which reduce risks from hazards and pollution.

The strategies and actions detailed later in this plan are meant to not only support mitigation, but also adaptation and resilience. The ability to anticipate, prepare for, and respond to hazards of all types will improve climate resilience and help San Francisco communities better cope with impacts.

A black and white photograph of a beach scene. In the background, several groups of people are walking along the shoreline. The foreground is dominated by the text 'SECTION 5: SOLUTIONS: A PATH FORWARD'.

SECTION 5:

# **SOLUTIONS: A PATH FORWARD**



ENERGY SUPPLY

BUILDING OPERATIONS

TRANSPORTATION AND LAND USE

HOUSING

RESPONSIBLE PRODUCTION AND CONSUMPTION

HEALTHY ECOSYSTEMS





# Energy Supply

**To become a zero emissions city, San Francisco must use only 100% renewable electricity for all energy needs and strategically phase out fossil fuels in all sectors.**

Over the past two decades, San Francisco has made significant progress in reducing emissions in its electricity supply. It must continue this trend to not only support building and transportation decarbonization efforts, but to ensure all San Franciscans have access to reliable and affordable clean energy.

## SECTOR GOALS:

**100% renewable electricity by 2025**

**100% renewable energy (no fossil fuels) by 2040**

## CONTEXT

Eliminating fossil fuels as a source of power generation is key to achieving the City's emission reduction goals, and San Francisco has made great progress in this area. As shown in Figure 15, in 2019, 83% of electricity supplied to San Franciscans came from greenhouse gas-free resources, with 69% from renewable sources that include wind, solar, and existing large hydropower.<sup>17</sup> Moving forward, San Francisco is well on its way to achieving 100% renewable electricity by 2025.<sup>18</sup>

Efforts to eliminate emissions from other key sectors such as Building Operations and Transportation & Land Use rely heavily on replacing dirty, fossil-fuel based energy sources such as natural gas, gasoline, and diesel with a plentiful and affordable stream of renewable electricity. The demand for electricity will increase as transportation electrification and building decarbonization efforts grow, and as the local population increases.

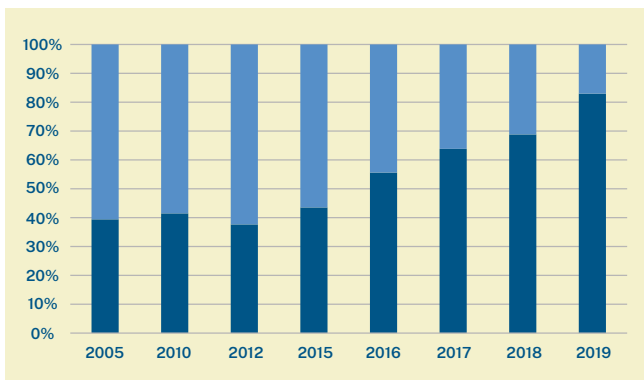
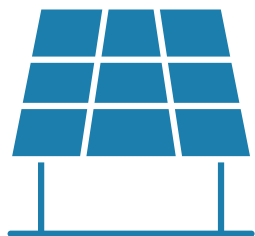


FIGURE 15: PERCENTAGE OF SAN FRANCISCO'S ELECTRICITY SUPPLIED BY RENEWABLE OR EMISSIONS-FREE SOURCES<sup>19</sup>



# Accomplishments



Constructed

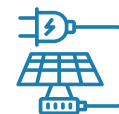
# 3

new solar installations  
on city property.

Announced major milestone of providing

# 100%

renewable energy to all CleanPowerSF  
customers by 2025.



Completed our first  
solar plus battery storage  
project in Diamond Heights.

Committed to **468 MW** of new and solar projects in California,  
enough to power over

# 430,000

San Francisco homes.

“Sourcing cleaner electricity is one of the most powerful local tools we have to combat the climate crisis. Through our Hetch Hetchy Power and CleanPowerSF programs, we’re now serving more than 70% of the electricity consumed in San Francisco with energy that is clean, affordable, and reliable.”

–Barbara Hale,  
Assistant General Manager, Power Enterprise,  
San Francisco Public Utilities Commission

## Clean Electricity and San Francisco’s Utility Landscape

The San Francisco Public Utilities Commission (SFPUC) provides more than 70% of the electricity consumed in San Francisco through two programs: Hetch Hetchy Power and CleanPowerSF. Hetch Hetchy Power is San Francisco’s publicly owned utility that has been generating hydroelectric power for more than a century. It energizes municipal services such as Muni, public schools, and the San Francisco International Airport, and an increasing number of residents and

businesses, including numerous affordable housing developments as well as tenants of Salesforce Transit Center. Launched in 2016, CleanPowerSF is the City’s Community Choice Aggregation (CCA)<sup>20</sup> program serving more than 380,000 customer accounts in San Francisco, providing renewable energy to residents and businesses at competitive rates.

As detailed in Figure 16, the remaining electricity customers are served by PG&E, an investor-owned utility, or Direct Access companies, independently contracted, for-profit energy service providers who work with large commercial and industrial customers.

Fully transitioning all San Franciscans to renewable electricity is challenging given this complex landscape. Hetch Hetchy Power already provides 100% renewable electricity, while CleanPowerSF will provide 100% renewable electricity to all its customers by 2025. However, PG&E and Direct Access providers are on track to meet the state’s goal of 100% renewable electricity by 2040. Accelerating this timeline will require customers to choose 100% renewable electricity programs offered by their utility or switch providers. San Francisco could also more expeditiously meet local clean energy goals by successfully acquiring PG&E grid assets located in the city.

# ⚡ Energy Supply

As climate change continues to impact San Francisco, it is critical that the electrical grid withstand the threats of extreme weather and continue to reliably provide power to City residents and businesses.

The SFPUC continues to ensure it can provide clean, safe, and affordable energy to its customers despite challenging external conditions through vegetation management, proactive maintenance, and safety and reliability checks. The SFPUC is also investing in local solar-plus-battery-storage projects and building out new, modern grid infrastructure.

In the past few years, the risk of wildfires has led PG&E to turn off power lines during high winds or dry conditions. Fortunately, San Francisco is less likely to suffer blackouts during these Public Safety Power Shutoff (PSPS) events due to the lower likelihood of wind-induced fire events within the city and its location on the transmission grid. However, San Francisco will continue to advocate for increased grid resiliency at the state level as appropriate.

## Equity and Grid Decarbonization

As the city strives to create a zero-emission future and a more equitable society, all San Franciscans should be able to participate in the clean energy economy. Electric

rates must be affordable and based on cost-of-service, while clean energy must be available to all.

Low-income residents can currently qualify for bill assistance programs that can reduce their electric bills by up to 35%. Moreover, the SFPUC continues to design and develop programs to ensure low-income residents and marginalized communities can help drive the transition to clean energy. The GoSolarSF Program provides incentives to install rooftop solar in low-income communities, and the Disadvantaged Communities Green Tariff and Community Solar Green Tariff programs are being developed to increase the adoption and development of affordable renewable energy within Disadvantaged Communities, as defined by the state through CalEnviroScreen.<sup>22</sup>

The City believes that access to information to make the best decisions about energy choices is key to advancing equity in the energy sector. To that end, the SFPUC creates culturally competent translations of program materials, and ensures that customers without access to the internet can receive program information by phone and through written materials.

Developing clean energy resources also presents an economic opportunity for San Franciscans. Building local distributed energy resources, such as solar and storage, can create jobs and increase capacity to meet growing electricity demand.

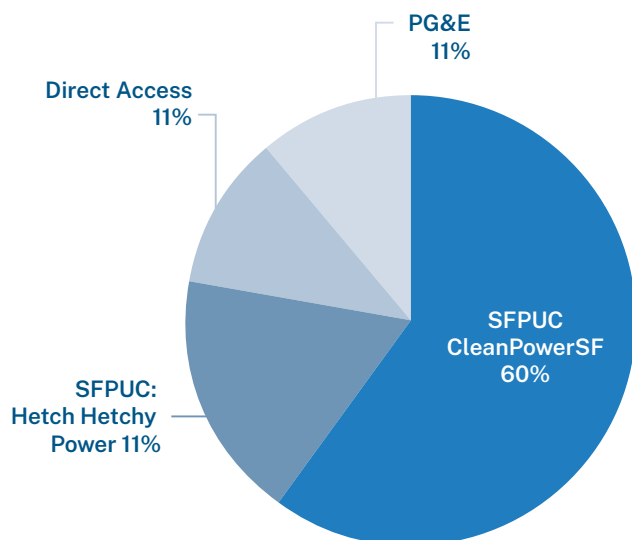


FIGURE 16: SAN FRANCISCO ELECTRICITY SUPPLY BY PROVIDER, 2020<sup>21</sup>

## Eliminating Natural Gas Infrastructure

Retail natural gas costs are largely determined by fixed costs to build and maintain utility distribution infrastructure, particularly gas piping. Failing to manage costs for maintaining and upgrading existing gas piping while demand and sales decline from decarbonization would lead to rate increases that will disproportionately impact low-income customers. Building electrification accompanied by strategic decommissioning of gas infrastructure will directly eliminate emissions from gas usage and reduce methane leakage from the distribution network.<sup>23</sup> This planning effort will help shield low-income ratepayers from unfair cost burdens while also reducing risks from pressurized gas piping, such as poisonous methane leaks, explosions, and fires.

In 2020, the California Public Utilities Commission (CPUC) initiated a process to plan for the long-term disposition of gas utilities in California. San Francisco can support these efforts by engaging with businesses, residents, state regulators and PG&E, to develop a

local approach for decommissioning gas infrastructure informed by constraints and opportunities for workers, families, and neighborhoods to ensure equitable outcomes.

## Strategies Overview

To eliminate GHG emissions in the energy sector, San Francisco must reach 100% renewable electricity and strategically phase out the use of fossil fuels, namely natural gas from buildings and gasoline and diesel from cars and trucks. The strategies listed below focus on an equitable transition to clean energy and require community input to ensure all San Franciscans have access to reliable and affordable clean energy.

### Top Climate Solution:

**Use 100% renewable electricity and phase-out all fossil fuels**



### Did you know?

**Co-Benefits of Climate Action:**<sup>24</sup> Installing solar PV and battery backup systems at critical facilities<sup>25</sup> can result in:

#### REDUCED EMERGENCY RESPONSE COSTS

**\$6.2 M**

Disaster services workers reduced by **37,000**, 2021–2050

#### HEALTH CARE SAVING

**\$452, 000**

Non-emergency injuries treated at shelters, over 7-day post disaster period

#### REDUCED UTILITY COSTS

**\$43 M**

Ongoing savings from on-site solar and battery backup, 2021–2050

All figures above in net present value



### Did you know?

**Job Potential of Climate Action:**<sup>26</sup> Continuing to develop 2-3 solar projects annually on municipal buildings through 2050 can provide:

**43,200 – 84,600 WORK HOURS**

For local construction workers, not including ongoing maintenance and manufacturing

# ES.1

## STRATEGY

Supply 100% greenhouse gas-free electricity to residents and businesses.



### WHAT WOULD SUCCESS LOOK LIKE?

100% of SF residents and businesses use affordable, renewable electricity by 2025



### GHG REDUCTION POTENTIAL BY 2030

Less than 100,000 mtCO2e



### ESTIMATED COST BY 2030

\$\$\$\$\$: 500 million+



### CLIMATE METRIC

% of renewable electricity used in SF



### EQUITY METRIC

% eligible SFPUC customers on low-income rates

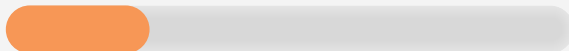
## Supporting Actions

- ES.1-1 Provide 100% renewable electricity at affordable rates.
- ES.1-2 Promote early adoption of 100% renewable electricity products to all San Franciscans, with a preference for City programs.
- ES.1-3 Ensure 100% renewable electricity is the only option for San Francisco residents and businesses by 2025, by supporting state or local regulatory requirements and/or acquiring PG&E's grid assets serving San Francisco.
- ES.1-4 Continue to expand programs and rates that provide low-income customers with renewable electricity and ensure community and stakeholder engagement in program development and rate-setting.

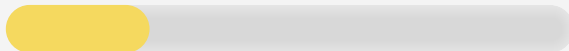
## COMMUNITY BENEFITS



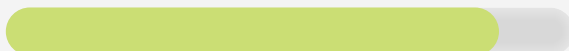
RACIAL AND SOCIAL EQUITY\*\*



JUST TRANSITION



HEALTH



RESILIENCE

# STRATEGY

Invest in local renewable energy and energy resilience projects.

## ES.2



### WHAT WOULD SUCCESS LOOK LIKE?

Local renewable electricity is developed where safe and affordable



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating (no direct reduction)



### ESTIMATED COST BY 2030

\$\$\$: 10-100 million



### CLIMATE METRIC

% of MW of local renewable energy (solar, storage, etc.) deployed



### EQUITY METRIC

# low-income customers enrolled in SFPUC customer programs

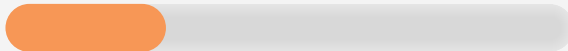
## Supporting Actions

- ES.2-1 Assist affordable housing developments with installing on-site solar and battery storage and meeting City energy efficiency and solar energy requirements.
- ES.2-2 Continue to develop onsite solar on City-owned buildings and reservoirs based on emerging opportunities and SFPUC feasibility analysis.
- ES.2-3 Explore developing grid-independent solar and storage at critical municipal facilities and other critical or vulnerable community sites.
- ES.2-4 Support the development of local renewable electricity production by scaling up programs such as net metering, community solar, feed-in tariffs, and battery storage.
- ES.2-5 Ensure SFPUC customer programs center equity in their design and metrics.
- ES.2-6 Continue to encourage private sector investment in local renewable energy solutions by engaging in public advocacy, educating consumers about their options (such as financing), and serving as a strategic partner.

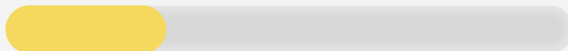
## COMMUNITY BENEFITS



RACIAL AND SOCIAL EQUITY



JUST TRANSITION



HEALTH



RESILIENCE



# ES.3

## STRATEGY

Design and develop the reliable and flexible grid of the future.



### WHAT WOULD SUCCESS LOOK LIKE?

100% of the growth in electricity demand is met with renewable electricity



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating  
(no direct reduction)



### ESTIMATED COST BY 2030

\$\$\$\$\$: 500 million+



### CLIMATE METRIC

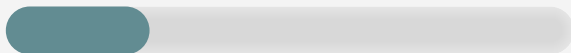
% of growth in electricity demand met with renewable electricity



### EQUITY METRIC

Electrical rates are affordable and reflect cost of service

## COMMUNITY BENEFITS



RACIAL AND SOCIAL EQUITY\*\*



JUST TRANSITION



HEALTH



RESILIENCE

## Supporting Actions

- ES.3-1 Plan for the change in electricity demand and usage due to electrification of transportation and buildings through efforts such as the SFPUC's Integrated Resource Plans and ensure community engagement in these efforts.
- ES.3-2 By 2023, evaluate the rate and program options to facilitate an affordable transition to all-electric buildings.
- ES.3-3 Invest in distribution infrastructure (including acquisition of PG&E assets) and smart-grid technologies, such as advanced metering infrastructure, demand response, and distribution automation.



# STRATEGY

Develop workforce capacity to deliver clean energy resources.

## ES.4



### WHAT WOULD SUCCESS LOOK LIKE?

Clean energy workforce reflects the diversity of our community



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating  
(no direct reduction)



### ESTIMATED COST BY 2030

\$\$: 1-10 million



### CLIMATE METRIC

N/A



### EQUITY METRIC

% of CleanPowerSF products and services procured from women, minority, disabled veteran, or LGBT-owned businesses.

## Supporting Actions

- ES.4-1 Continue to champion clean energy installers participating in City-funded incentive programs that engage in workforce development.
- ES.4-2 Utilize workforce development programs, such as Project Pull Internship and CityBuild, and education programs, such as Project Learning Grants and the Teacher Externship Program, to expose youth to clean energy related jobs and careers and diversify the workforce.
- ES.4-3 Include community benefits criteria for renewable energy and other contracts of \$5 million or more, giving preference to contracts that demonstrate a commitment to community benefits and environmental justice.
- ES.4-4 Engage in analysis to identify opportunities to meet diversity and workforce goals in the procurement of clean energy resources

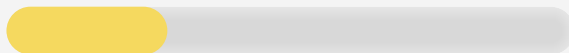
## COMMUNITY BENEFITS



RACIAL AND SOCIAL EQUITY\*\*



JUST TRANSITION



HEALTH



RESILIENCE

# ES.5

## STRATEGY

Plan for the equitable decommissioning of the city's natural gas system.



### WHAT WOULD SUCCESS LOOK LIKE?

Data collection, interagency collaboration, and community engagement informs an equitable plan and actionable steps.



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating  
(no direct reduction)



### ESTIMATED COST BY 2030

\$\$: 1-10 million



### CLIMATE METRIC

% of gas distribution piping located in neighborhoods with a plan for coordinated electrification.



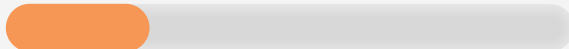
### EQUITY METRIC

% community-endorsed plans in neighborhoods and business districts in communities with environmental justice burden as identified in [EJ Communities Map](#)\*

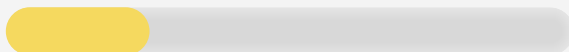
## COMMUNITY BENEFITS



**RACIAL AND SOCIAL EQUITY\*\***



**JUST TRANSITION**



**HEALTH**



**RESILIENCE**

## Supporting Actions

- ES.5-1 By 2023, assemble data to inform strategic and equitable planning for geographically focused electrification and gas decommissioning plans. Develop metrics to inform prioritization and implementation, including cost, equity, safety, climate and just transition.
- ES.5-2 By 2025, report annually on the status of gas decommissioning, including reduction of methane leakage in San Francisco attributable to decommissioning or removal of gas distribution, along with cost, equity, safety, and just transition.
- ES.5-3 By 2025, publish a Decarbonization Masterplan documenting the systematic approach to decommissioning natural gas distribution and transmission in San Francisco. Specify difficult-to-address loads/uses that are likely to remain “residual” in 2040. Provide neighborhood groups and business districts with interactive planning mechanisms to empower coordination of electrification, and to set localized goals and priorities.
- ES.5-4 By 2026, establish memorandum of understanding between the City, state regulators, and utilities stating mutual intent to de-commission natural gas transmission and distribution in San Francisco.
- ES.5-5 By 2030, transition the district system steam loop serving downtown and Civic Center to renewable energy.







# Building Operations

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**Transitioning buildings from natural gas to clean electricity is critical to reach the City's climate, health, and resiliency goals. Strategies must protect low-and-middle-income renters and owners, support affordable housing, ensure new jobs, and provide training for local workers.**

In 2019, buildings were responsible for 41% of citywide emissions, evenly split between residential and commercial buildings. Of that total, the overwhelming majority (87%) was from natural gas burned to operate heating systems, boilers, water heaters, clothes dryers, and cooking appliances while 13% was from electricity. While emissions from buildings have successfully been cut in half since 1990 – thanks to aggressive energy efficiency investments, stringent green building codes, and a cleaner electricity supply – achieving net-zero emissions by 2040 will require a strategic shift from natural gas to 100% renewable electricity. Implementation mechanisms, such as legislation, incentives, training, and public education must be designed with ongoing and open engagement with all stakeholders, and focus on creating opportunities and protections for BIPOC, low-and-moderate income residents, and other marginalized populations, while prioritizing a just transition for all workers.



# Accomplishments



## Effective June 2021

San Francisco adopted an ordinance that bans natural gas in all new construction

San Francisco's 2020 SF Energy Fair attracted

# 450+ participants

and featured 27 exhibitors and 20 speakers



Home to 9 all-electric 100% affordable housing projects avoiding indoor and outdoor air pollution in hundreds of units.

San Francisco's energy benchmarking law motivates

# 3,114

large commercial and multifamily buildings to improve energy efficiency performance; reducing commercial energy use **10%** from **2013 to 2017**.

## SECTOR GOALS:

**Zero emissions new construction by 2021**

**All large commercial buildings are zero emissions by 2035**

**All buildings are zero emissions by 2040**

## CONTEXT

Past successes and business-as-usual approaches will not be sufficient for buildings to achieve full decarbonization by 2040. The energy, policy, and technology landscape for buildings in 2021 is very different from what it was in 1990, 2000, or even 2010. Meaningful partnerships between all building stakeholders will be needed to chart a path to the healthy, equitable, and prosperous future.

### Harnessing the power of renewable electricity

Clean, reliable, and affordable electricity is the key to eliminating building emissions. Emissions from electricity supplied to San Francisco are declining and in the coming years will approach zero as all of the city's

electricity providers increase renewable electricity supply. As noted in section 5.1, Hetch Hetchy and CleanPowerSF supply more than 380,000 city residents and businesses with electricity and are on track to meet San Francisco's goal of supplying 100% renewable electricity citywide by 2025.

By contrast, emissions from fossil fuel used in buildings—primarily natural gas—are not declining and now account for almost 90% of building-sector emissions; this share will continue to grow over time as the electricity supply gets cleaner. At this time, options to provide gas from renewable sources are too limited to meet the task at hand, so achieving sector goals will require transitioning all buildings to renewable electricity.

### Efficient and all-electric buildings

In 2020, San Francisco passed legislation requiring all new building construction to be efficient and all-electric, meaning highly energy efficient and no new natural gas for buildings. This policy, which went into effect in June 2021, will all but eliminate operational emissions from new buildings—nearly 10 years ahead of the City's commitment—and prevents natural gas emissions that otherwise could have been locked in for decades to come.

## ZERO EMISSION BUILDINGS TASK FORCE

**For the scale of change required to meet goals for buildings, all stakeholders will need to be involved in developing and implementing fair and effective solutions. SF Environment partnered with PODER and Emerald Cities to form the Anchor Partner Network (APN) which designed and delivered targeted engagement with a diverse set of community stakeholders to identify equity priorities and approaches for residential building decarbonization. Mayor London Breed convened the “Zero Emissions Buildings Task Force” which met between 2018 and 2020 and brought together building sector leaders, advocacy, non-profit, community, and financing partners to identify equitable and effective pathways for building decarbonization. The APN was complemented by the “Existing Commercial Buildings” working group which focused on the largest properties with the largest carbon footprints; an “Existing Municipal Buildings” working group which addressed project selection and capital planning in city-owned facilities; and a “New Construction” working group which informed the All-Electric New Construction Ordinance in Dec. 2020.**

The transition for existing buildings will be much more challenging and will require inclusive engagement with a broad spectrum of stakeholders to co-create and deliver the necessary suite of policies, education, and funding support for an equitable transition. These solutions must consider the city’s diverse building stock, deferred maintenance, and substandard electrical connections, while also acknowledging that approximately two thirds of residents are renters who will need protections against rent increases, disruption, and displacement. Continuing to pursue and implement cost-effective energy efficiency is also crucial to realize important benefits while making electrification more affordable.

In retrofitting existing buildings, key barriers include the cost of new appliances, workforce readiness, and electrical panel upgrades and capacity. Yet, every existing building will experience advantageous moments for decarbonization over the coming years—and success will require foresight to act on opportunities as they arise. For instance, roughly 5%<sup>27</sup> of energy-using equipment is replaced each year as boilers, heaters and other equipment age. Key opportunities for upgrading to efficient and all-electric equipment include during renovation or seismic retrofit, when a property is sold, or replacing equipment at the end of its useful life. Decarbonizing at these moments will minimize costs and present natural inflection points for incentives and other policy interventions. These principles are at the center of Building Operations strategies and supporting actions, which as modeled, are projected to eliminate nearly all sector emissions by 2045 (Figure 17).

### An equitable transition

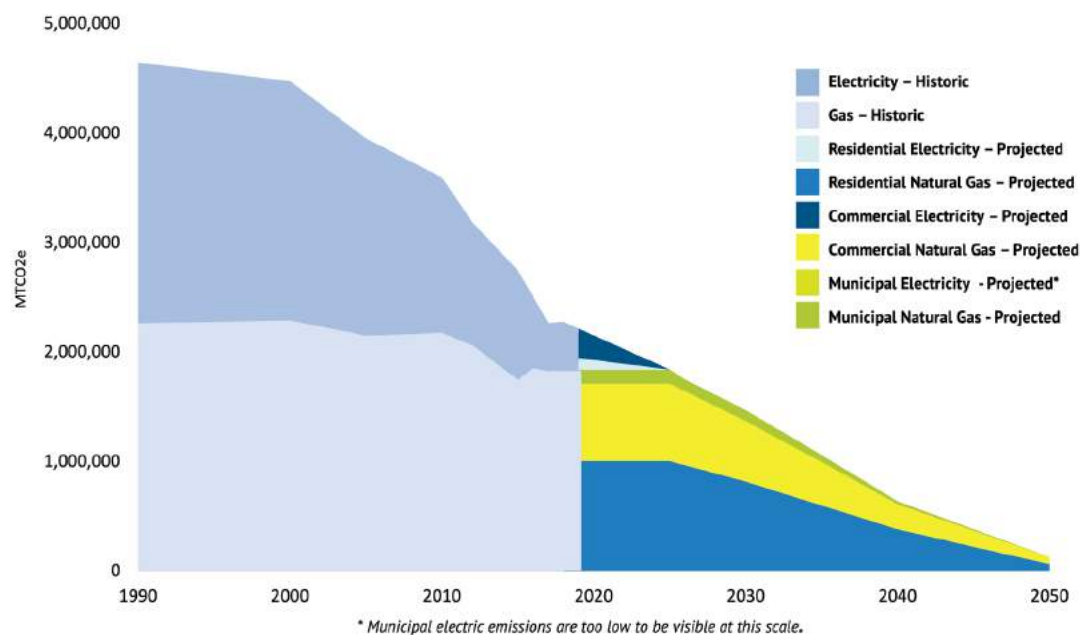
An equitable transition to efficient and all-electric buildings will deliver important benefits to the whole community. Electrification reduces exposure to pollutants from burning natural gas, which contribute to respiratory illnesses, including asthma. Heat pumps can provide both heating and cooling, which can protect residents from extreme temperatures, which is especially important for older adults and populations with pre-existing health conditions.

Robust tenant protection policies and leasing strategies must be in place to prevent displacement for residents and businesses. Funding support and financial incentives must grow rapidly to fuel increased demand for retrofits. New education resources will be critical to inform owners and tenants about the many benefits of zero-emission buildings.

Building decarbonization can create well-paid jobs for installers trained to build and maintain efficient and all-electric buildings. Just Transition principles, which prioritize opportunities for those leaving carbon-intensive industries and for disadvantaged workers seeking employment in the low-carbon economy, must guide workforce policies, programs, and investments.

Other necessary actions include: advocacy for accessible interfaces on electric home appliances

FIGURE 17: PROJECTED EMISSIONS FROM BUILDINGS



to ensure there are affordable options which can be used by someone who is blind or low-vision, maintaining affordable electricity rates that include low-income customer discounts, optimizing renewable electricity resources on the grid, and engaging with manufacturers to reduce costs and guarantee good performance.

## Beyond operational emissions

### Refrigerants

Air conditioners, refrigeration systems, and heat pumps all use chemicals called refrigerants to move heat and thus provide heating and cooling. Today's most common refrigerants are hydrofluorocarbons (HFCs), potent heat-trapping emissions that are many times more powerful than carbon dioxide produced when burning fossil fuels. These emission sources are not included in the standard sector-based inventory methodology, but are critical to address.

While heat pumps directly eliminate natural gas emissions, HFC leakage would reduce these gains. The California Air Resources Board's (CARB) regulations require transitioning to new refrigerants that trap

less heat; HFCs have been banned from large new refrigeration installations starting in 2022 and will begin requiring even lower-emissions alternatives by 2025. Local efforts will focus on ensuring building owners comply with CARB's regulations, supporting maintenance to reduce leakage, and advocating for stricter state and federal standards.

### Embodied Emissions

Globally, buildings account for 39% of emissions. While 28% of all emissions come from operations, such as electricity use and heating and cooling, 11% come from materials and construction services, a category called "embodied emissions."<sup>28</sup> Globally, embodied carbon is responsible for 11% of annual emissions and 28% of total building sector emissions.

As operational emissions decline, embodied emissions will account for a larger share of total emissions. Strategies for reducing emissions from materials and construction activities are addressed in the Responsible Production & Consumption sector under RPC Strategy 1: "Achieve total carbon balance across the buildings and infrastructure sectors."

# Strategies Overview

Today, nearly half (41%) of San Francisco’s emissions come from buildings. Fully transitioning buildings away from relying on natural gas to efficient technologies such as heat pumps that run on clean electricity will be critical to reaching the City’s climate goals. Strategies to get there will include protections for low-and-middle-income owners and renters, support for affordable housing developers, and ensure new job and training opportunities for local workers.

**Top Climate Solution:**  
Electrify existing buildings



**Did you know?**  
Co-Benefits of Climate Action:<sup>29</sup> Eliminating fossil fuel use in existing buildings can result in:

<b>REDUCED SOCIAL COSTS<sup>30</sup></b>  <b>\$38 M</b>  From reduced outdoor air pollutant quantity from decarbonization of multi-family and office buildings, 2026 – 2050	<b>REDUCED UTILITY COSTS</b>  <b>\$232 M</b>  For multi-family and office buildings improving efficiency and fuel switching, accruing until and including 2050	<b>JOB POTENTIAL<sup>31</sup></b>  <b>2,080 – 2,900 full time 30-yr careers</b>  Across a range of occupations, through 2050
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All figures in net present value



# STRATEGY

Eliminate fossil fuel use in new construction.



**Building  
Operations**

# BO.1



## WHAT WOULD SUCCESS LOOK LIKE?

All new buildings generate no emissions in their operation.



## GHG REDUCTION POTENTIAL BY 2030

\$\$: 1-10 million



## ESTIMATED COST BY 2030

Cost neutral, potential savings



## CLIMATE METRIC

TBD



## EQUITY METRIC

# new affordable housing developments which receive financial assistance for electrification

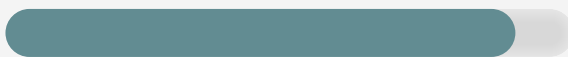
## Supporting Actions

BO.1-1 By 2021, require newly constructed buildings to be efficient and all-electric with no on-site carbon emissions.

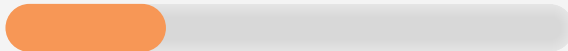


Casa Adelante (2060 Folsom): all-electric affordable housing with 127 affordable apartments, and 29 units for formerly homeless transitional-age youth. Developed by MEDA and Chinatown CDC. Photo credit: James E. Roberts-Obayashi Corp. (general contractor)

## COMMUNITY BENEFITS



RACIAL AND SOCIAL EQUITY\*\*



JUST TRANSITION



HEALTH



RESILIENCE



## Building Operations

# BO.2

## STRATEGY

Eliminate fossil fuel use in existing buildings by tailoring solutions to different building ownership, systems, and use types.



### WHAT WOULD SUCCESS LOOK LIKE?

New policies, financial incentives, and an expanded workforce align to make efficient, all-electric building upgrades the norm.



### GHG REDUCTION POTENTIAL BY 2030

100,000 - 250,000 mtCO<sub>2</sub>e



### ESTIMATED COST BY 2030

\$\$\$\$\$: 500 million+



### CLIMATE METRIC

Electrification rate (%/year of total)



### EQUITY METRIC

% electrification projects in communities with environmental justice burden as identified in [EJ Communities Map](#)\*

% financial assistance for electrification retrofits distributed in communities with environmental justice burden as identified in [EJ Communities Map](#)\*

## Supporting Actions

- BO.2-1 By 2023, develop a system to monitor the replacement rate of existing private sector natural gas-fueled equipment with all-electric. Annually report to BOS whether fossil-fuel using equipment is being switched at a rate sufficient to meet climate goals, including access to electrification by BIPOC and low-income communities.
- BO.2-2 By 2023, develop a time-of-replacement policy that phases in requirements that all newly installed residential and other small building equipment be efficient and all-electric. The policy should customize requirements for simple equipment replacements to full renovations.
- BO.2-3 By 2024, begin recording decarbonization status for each property at time of sale and permit review to ensure compliance with time of replacement policy.
- BO.2-4 By 2023, perform an inventory of natural gas-fueled equipment in municipal buildings.
- BO.2-5 By 2024, ensure the City's Capital Plan is updated to reflect the need to replace gas-fueled equipment, in alignment with the City's 2040 net-zero goal.
- BO.2-6 SFO will a) evaluate an efficient, all-electric Terminal Central Utility Plant that would reduce total direct (Scope 1) airport emissions by approximately 80% by 2030, and b) prioritize all-electric equipment replacements throughout campus buildings, including terminal and non-terminal spaces that are occupied by tenants and the Airport Commission.

## COMMUNITY BENEFITS



RACIAL AND SOCIAL EQUITY\*\*



JUST TRANSITION



HEALTH



RESILIENCE

BO.2-7 Adopt a building performance policy requiring large commercial buildings to:

- a) completely transition to efficient and all-electric equipment no later than 2035
- b) in 2025, begin regular disclosure of progress toward goal
- c) allow payment of annual fees in lieu of electrification, which must be invested into decarbonization of low-income and affordable housing.

BO.2-8 By 2023, develop and adopt tenant protection and anti-displacement policies for renters in buildings transitioning to efficient and all-electric systems.

BO.2-9 By 2023, begin offering targeted technical assistance for BIPOC and low-income owners and tenants including information about incentives, rebates, and public and private financing options.

BO.2-10 By 2024, pass a residential time-of-sale policy that requires an electrification plan, prioritizing water and space heating, indoor air quality, electric safety, how to access emergency response information, and recording of the presence or absence of gas service for each property.

BO.2-11 By 2024, develop and implement prescriptive criteria and permit & inspection processes for residential heat pump water heaters to be installed with a single integrated permit.

BO.2-12 Explore the creation of a revolving decarbonization fund by developing a virtual power plant (VPP) or other district scale solutions that monetizes the benefits derived from energy efficiency, demand response, and energy storage systems.







## Building Operations

# BO.3

## STRATEGY

Expand the building decarbonization workforce, with targeted support for disadvantaged workers.



### WHAT WOULD SUCCESS LOOK LIKE?

As demand for efficient and all-electric buildings increases, there is a racially diverse, well-trained and well-paid workforce to deliver building decarbonization services.



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating (no direct reduction)



### ESTIMATED COST BY 2030

\$\$: 1-10 million



### CLIMATE METRIC

N/A



### EQUITY METRIC

TBD

## Supporting Actions

- BO.3-1 Partner with workforce development entities, labor unions, and apprenticeship programs to align with and disseminate regional and statewide building electrification training, funding and project financing opportunities, prioritizing those transitioning from fossil-fuel dependent trades.
- BO.3-2 Partner with affordable housing providers, equipment vendors, subject matter experts, utilities and CleanPowerSF, CBO's and others to create a Clean Energy Buildings Hub to connect building owners and other customers with high-road service providers and installers, rebates and financing, and case studies.
- BO.3-3 By 2023, define goals and create policies for professional and workforce development building upon CityBuild Pro to ensure equitable access to building decarbonization jobs for BIPOC and low-income communities, from design to installation to business operations.
- BO.3-4 By 2025, create a Public-Private facilities managers and building operators roundtable to support peer-to-peer learning on fuel switching.

## COMMUNITY BENEFITS



RACIAL AND SOCIAL EQUITY\*\*



JUST TRANSITION



HEALTH



RESILIENCE



SAN FRANCISCO  
CLIMATE ACTION

80 100 ROOTS



# STRATEGY

Transition to low-global warming potential refrigerants.



## Building Operations

# BO.4



### WHAT WOULD SUCCESS LOOK LIKE?

State and federal requirements significantly decrease GWP of refrigerants while equipment manufacturers offer more affordable low-GWP equipment options.



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating (no direct reduction)



### ESTIMATED COST BY 2030

\$\$: 1-10 million



### CLIMATE METRIC

# of building owners who receive information and/or technical assistance to transition to low-GWP refrigerants.



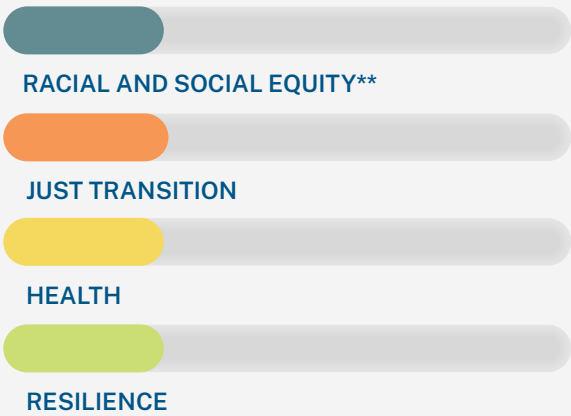
### EQUITY METRIC

% small businesses in communities with environmental justice burden as identified in [EJ Communities Map](#)\* which receive information and technical support.

## Supporting Actions

- BO.4-1 By 2023, publish guidelines for refrigerant management best practices for selection of lowest-GWP refrigerants in new and replacement equipment, and collection and recovery of refrigerants from existing equipment to enhance compliance with state regulations.
- BO.4-2 Support the adoption of more stringent state and federal regulations to reduce refrigerant GWP.
- BO.4-3 By 2023, support City departments’ transition away from high-GWP refrigerants, by providing guidelines and specifications for future purchases of products containing refrigerants.

### COMMUNITY BENEFITS





# Transportation and Land Use

**Addressing climate change means addressing San Francisco's transportation and land use issues head on. At nearly 50% of total city emissions, the transportation system must be transformed to reduce overall reliance on cars and equitably and efficiently connect people to where they want to go by transit, walking, and biking. All remaining vehicles must steadily transition to zero emissions.**

## SECTOR GOALS:

**By 2030, 80% of trips taken by low-carbon modes such as walking, biking, transit, and shared EVs.**

**By 2030, increase vehicle electrification to at least 25% of all registered private vehicles, and to 100% of all vehicles by 2040.**

## CONTEXT

Transportation and land use policies are an essential part of San Francisco's plan to reach net-zero emissions by 2040. Getting the city on a path to a healthier, cleaner and more equitable future will require significant investments in reducing emissions from transportation. Climate action through transportation and land use means reversing the deliberate failures of past policies that heavily prioritized automobiles over modes that are safer, healthier, less carbon intensive, and more efficient. Ensuring that these low-carbon modes are less costly and more convenient to use than higher-carbon modes is key to achieving our climate goals and creating a socially equitable and environmentally sustainable future.

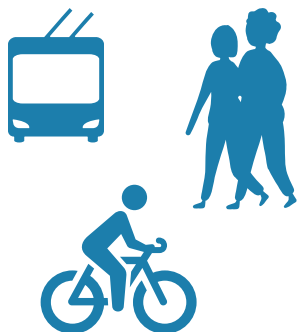
San Francisco has a goal that by 2030, 80% of trips are taken by low-carbon modes such as walking, biking, and transit.<sup>32</sup> Strategies to help people make more trips without a car and reduce emissions include: improving transit service, expanding bicycle lanes and safe places for people to walk, increasing housing production density and development that puts people closer to destinations, and implementing pricing policies and parking management programs that better align with climate goals. While these investments will create many quality-of-life benefits for the city, they will not be enough to adequately cut emissions, so shifting remaining cars to electric vehicles that run on renewable electricity, will be necessary to meet the City's climate goals. San Francisco has set a goal that by 2030, vehicle electrification will increase to at least 25% of all registered private vehicles, and to 100% of all by 2040. Expanding access to affordable and convenient charging options will be primary way the City supports these goals.

Eliminating emissions from transportation will require a fundamental change in how people move around and how transportation and land use efforts are prioritized, funded, and implemented. Major adjustments will be required at all levels: citywide, neighborhood, and

# Accomplishments

## Market Street

significantly reduced traffic to enable safer use of low-carbon modes by banning private vehicles in 2019



Completed

# 42 total miles

of protected bike lanes in 2019, with 49 targeted by 2022

# 50%

low-carbon mode share goal reached, new target set for **80% by 2030**

## Slow Streets

program dedicated more than

# 20 corridors

to active transportation, with four being made permanent so far

individual. Continuing down the same path of over-using single-occupancy private vehicles is the wrong direction, and will only exacerbate existing climate, health, equity, and transportation problems.

To meet San Francisco's climate action goals, policymakers and the public will need to evaluate significant trade-offs and then agree on and implement actions that go beyond the status quo. For example, acknowledging the total societal costs—on health, congestion, and climate—of planning cities around automobiles, and then taking strong action to prioritize people over cars. Such trade-offs may mean changing expectations about time devoted to commuting and running errands, adjusting subsidized parking and residential permits fees to create funding for new public spaces, more housing, and improved transit services.

## Transportation Impacts

San Francisco faces many transportation challenges: safely and efficiently moving people around the city and region; serving the mobility needs of individuals with disabilities; managing, repairing, and expanding aging infrastructure; and responding to new mobility technologies and related regulatory issues. At the same time, people of color and low-income communities

have been underserved by existing transportation infrastructure, which has prioritized costly private cars over lower emissions alternatives such as public transit.

The transportation sector currently creates 47% of San Francisco's emissions. That share is rising due to meaningful advancements in the building and energy sectors and a comparative lack of progress in confronting automobile dependency and fossil fuels used for transport. As San Francisco prepares for rapid changes to reach net-zero emissions, it must ensure that costs and other burdens do not disproportionately fall on low-income people, people of color, and other populations that have faced a history of marginalization.

The transportation policies of the 1950s-1980s negatively impacted the wealth of BIPOC families and individuals and isolated entire communities from opportunity. Highway and transit investments scored better for federal funding when they removed "blight," defined as areas with more BIPOC communities. Policies of the time then began to promote automobile dependency and petroleum consumption, resulting in streets that made walking, biking, and taking transit more difficult. Even though these overtly racist policies have been rescinded, lower-income and BIPOC populations continue to face disproportionate harm.

Examples of these inequitable outcomes include:

- Lower income households have been forced into long commutes from auto-dependent places, greatly increasing time spent commuting.<sup>33</sup>
- While Muni is the top carrier of low-income riders in the region and key to providing access to jobs and livelihoods for San Franciscans, bus speeds and reliability continue to be hindered by congestion from private vehicles.<sup>34</sup>
- Residents living in proximity to freeways suffer disproportionately higher rates of cancer and respiratory diseases with larger racial and ethnic disparities.<sup>35</sup>
- People of color are more likely to die of traffic-related crashes because streets in formerly redlined neighborhoods were built to accommodate faster car traffic, resulting in less safe conditions for non-motorists.

Past efforts to manage the City's limited street space and achieve better outcomes for travelers have led to stalemates, inaction, and the maintenance of the status-quo. Meanwhile, the costs of driving and car-dependence — including air pollution, traffic collisions, decreased mobility for low-income and communities of color, wasted time stuck in traffic — have gone unaddressed and in many instances have worsened. In most cases, these external costs are drastically underrepresented in the actual cost of owning a car, especially when compared to less harmful methods of transportation. For example, a monthly transit pass costs almost as much as what a residential parking permit costs for an entire year in San Francisco.

The City's efforts to decarbonize the transportation system must not repeat the mistakes of the past, but rather correct for past injustices and create a future that is safer, healthier, and more equitable. Transportation and land use investments that create the greatest benefits for historically marginalized people need to be prioritized, including:

- Reducing noise and air pollution in lower-income neighborhoods.
- Improving safety outcomes, especially for vulnerable populations, including travelers with disabilities.

- Expanding access to jobs, services, and education by increasing reliability of low-carbon transportation modes and reducing their financial and time cost.

The COVID-19 pandemic has exacerbated existing challenges with our transportation system and highlighted the major class and race divides in how we commute and work. It also forced agencies to quickly adapt. The City added new bike and pedestrian networks, modified transit service, added new transit-only lanes, and did more to meet the needs of essential workers and individuals who rely on transit. Many of these emergency efforts have been successful.

Even before the pandemic, San Francisco began to transform some of its streets. For instance, the downtown section of Market Street prohibits private vehicle use and speed limits were lowered in the Tenderloin to improve safety. Additionally, newly implemented transit-only lanes on Geary Boulevard, one of the busiest transit corridors in San Francisco, improved bus travel time with minimal traffic impacts to that corridor and surrounding streets.<sup>36</sup> As the City recovers from the pandemic, there is an opportunity to build on these successes to improve our non-driving travel options and enable transportation choices that address long-standing challenges, reduce emissions, and advance equity.

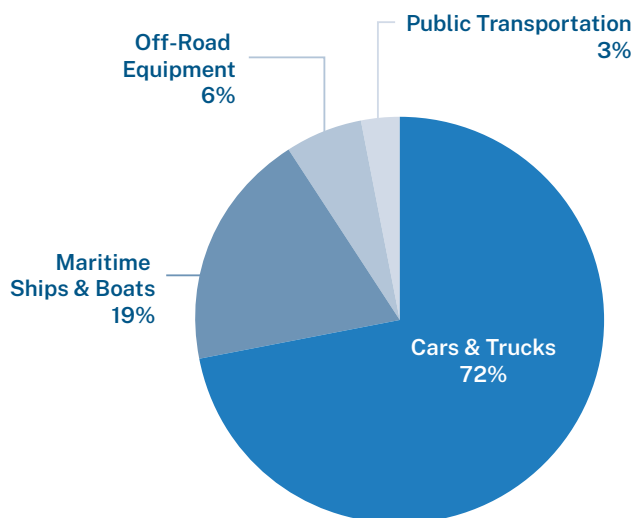


FIGURE 18: 2019 SAN FRANCISCO'S GHG INVENTORY - TRANSPORTATION SECTOR EMISSIONS<sup>38</sup>



## Increasing transit, biking, and walking

San Francisco has set a target of 80% of trips to, from, and within San Francisco to be made by low-carbon modes by 2030. In 2019, approximately 45% of all trips in, to and from San Francisco were made by driving.<sup>37</sup> Achieving San Francisco's climate goals for transportation will require a dramatic and sustained shift away from driving as the main travel choice. Of the 47% of total city emissions attributed to transportation in 2019, cars and trucks were responsible for the supermajority of emissions (72%), while local and regional public transportation contributed just 3% (Figure 18).

Often, people travel by car because it is their only practical option or is simply more predictable and time-efficient than the alternatives. Despite investments by the City, some transit routes can be slow and unreliable, and biking and walking are more dangerous on streets designed for motor vehicles. Successfully shifting trips to transit, walking, and biking means making these choices safe, convenient, reliable — and even fun. This can be done by redesigning streets to prioritize efficient movement of transit vehicles and reimagining streets as places for people of all ages and abilities. Examples of this include transit-only lanes, protected bikeways, HOV/carpool lanes, shared spaces, car-free roads in parks, and slow streets.

## Integrating Transportation and Land Use

Land use refers to the location and intensity of “uses” such as housing, retail, open space, and commerce. Land use decisions directly affect people's travel choices, since how people get around depends on where and how far they need to go, and the effectiveness of available travel options. Cities like San Francisco that were originally built before the popularization of the automobile often have denser development patterns that are well suited to travel by foot or transit. As automobiles gained prominence, streets and buildings were increasingly redesigned to serve cars over pedestrians. In recent years, San Francisco has reversed that trend by removing parking requirements and revising density controls to enable the denser housing more reflective of older San Francisco construction. Still, much more can be done in San Francisco to further coordinate transportation and land use.

Through comprehensive area plans, improved street designs, and enhanced transit service, San Francisco is starting to shift back towards people-centered neighborhoods, with recent examples found in the Mission, Hayes Valley, and South of Market districts. There are many opportunities to create more of these amenity-filled areas and to enhance existing ones in a manner that benefits current residents and welcomes new neighbors. Neighborhoods that are further from the city core with less transit access end up experiencing higher driving rates; it is critical that new housing in the outer neighborhoods has access to additional transit service to support the use of non-driving modes.

Neighborhoods built with a mix of housing, services, and amenities close together, especially those with reduced or priced parking, encourage and allow people to walk, bike or use other zero-emissions means of travel for everyday needs. On the other hand, car-dependent neighborhoods take space from people and give it to roads and parking spaces. Suburban-style land use is hard to serve by transit, which leads to an increase in driving and climate pollution. Therefore, regional collaboration, creating new housing, and investing in regional transit continue to be major strategies for the CAP and Plan Bay Area 2050.

Housing, and where it is located, also plays a critical role in determining transit choices. As discussed in Section 5.4: Housing, substantially increasing housing near services, jobs, and other activities helps with shifting people's decisions to walk, bike, or take transit, rather than to drive.

While the San Francisco has made progress in developing more affordable housing, the production of new affordable units is not equitably distributed across neighborhoods. Affordable units tend to be concentrated in areas of the city with higher levels of environmental pollution and greater rates of poverty. Land use policies that encourage more transit use could include engaging with communities to strategically rezone high-opportunity areas to accommodate new multi-family housing, specifically in places that currently have strong economic, environmental, and educational outcomes including more parks, better air quality, and higher performing schools.<sup>39 40</sup>

## PURSuing SHARED GOALS

San Francisco's Transit First policy, which was added to the city charter in 1973, prioritizes land uses and street space for transit, walking, and explicitly discourages inefficient cars and parking. A vigorous, renewed commitment to implementing the Transit First policy directly supports climate action.

Vision Zero (adopted in 2014) commits resources to eliminate traffic fatalities, the vast majority of which occur due to interactions between large motorized vehicles and pedestrians and cyclists. Reducing car travel and car speeds will greatly reduce injuries and deaths on our roads.

Transit, walking and biking improve local air quality for everyone, especially people who suffer from respiratory illnesses like asthma. Similarly, low-carbon modes increase physical activity which can reduce the likelihood of health problems like diabetes and depression.

Car ownership, including loan payments, insurance, and fuel costs, creates significant financial burdens. Allowing people to meet their daily needs without having to own a personal vehicle lessens this financial burden and can give time back to families by shortening commute times and reducing car congestion.

## Switching from Fossil Fuels to Renewable Electricity

Investing in transit system improvements and making land use changes will have long lead times before impacts are felt and measurable. Even with significant investments in transit and policies that encourage people to get out of their cars, reaching zero emissions by 2040 will also require an accelerated transition away from gasoline and diesel-fueled cars and trucks to zero-emission vehicles (ZEVs), primarily electric vehicles (EVs) that run on renewable electricity. By 2030, 25% of all registered private vehicles in San Francisco need to be zero emission, and by 2040, 100% of vehicles need to be zero emission.

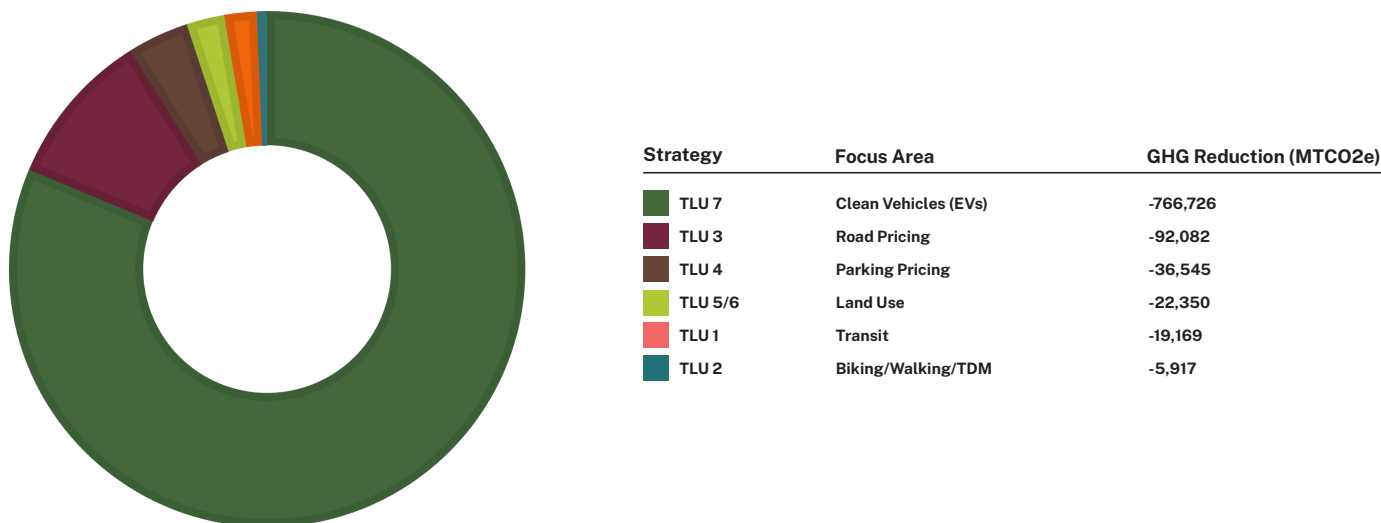
As is the case today, cars and trucks will still be needed in the future. With our current transportation infrastructure, private vehicles are often the best option for people with limited mobility such as youth or seniors, or people with disabilities. Support for transitioning to EVs should focus on these types of trips and drivers. As in any dense city, there are challenges to broad adoption of EVs in San Francisco. These include currently limited charging infrastructure, the unique challenges of multi-unit residential buildings such as limited parking, common garage meters, landlord-tenant "split incentives", as well as a general lack of off-street parking where charging is easier to install and access. These issues must be addressed for people to feel comfortable switching to EVs. San Francisco will continue to invest in expanding the network of public charging infrastructure, promote the adoption of zero emission vehicles, and make progress transitioning the City's non-revenue fleet to zero emission vehicles, among other policies.

While expanding vehicle electrification is essential to reducing emissions, there are uncertainties around the travel behavior associated with their use. For example, if EV adoption is led by those with higher incomes, it will worsen existing socio-economic disparities in the transportation sector. If not well managed and mitigated, these impacts could move San Francisco away from its long-range transportation and equity goals and result in increased congestion, unsafe roadways, and more inequity. Another specific challenge to address is that there are currently no wheelchair-accessible electric vans, which calls on San Francisco to develop solutions to this problem. Policies such as "Transit First" and principles such as "equitable access" in the "Electric Vehicle Roadmap for San Francisco" are aimed to safeguard against the potential unintended consequences of rapid electrification.

## GHG Pathways for Emission Reductions and Co-Benefits

The pathways for projected emissions reductions from ground transportation are shown in Figure 19. Major changes to emissions result from actions affecting vehicle miles travel (VMT), and from the further adoption of EVs. See **Appendix C-3** for a technical

FIGURE 19: 2050 GHG REDUCTION POTENTIAL PATHWAYS (MTCO2E) BY FOCUS AREA FOR THE TRANSPORTATION AND LAND USE SECTOR<sup>41</sup>



overview. Figure 19 shows the projected emissions impact of each individual TLU strategy compared to the 2050 baseline scenario. When all strategies are implemented simultaneously, each strategy's individual effectiveness is impacted by others, therefore the total reduction does not equal the exact sum of all strategies. Furthermore, the City will play a major role in integrating the shift to low-carbon modes with major transit improvements and land use strategies that can create significant regional emission reductions not included in the analysis.

With cars and trucks contributing such a large portion of sector emissions, electrifying private vehicles is projected to have a significant impact on emissions reductions. However, this focus does not reflect the full range of potential benefits that could come from transforming the transportation sector. To have a holistic approach to transportation policy, a co-benefit framework is critical to understand the synergies between current local impacts along with emissions reductions. This approach encourages decision making to account for multiple benefits and may assist with

funding efforts and garnering public support. Table 7 depicts six transportation co-benefits (emissions, congestion, equity, public health, safety, and economic vitality) and the alignment with each transportation action. This co-benefits framework acknowledges the multiple indirect climate change benefits that are clearly important as additional or primary motivations for adopting or implementing many of the transportation strategies and actions. It is essential to examine Figure 18 along with Table 7 to understand the total impact of each transportation action. For example, the actions in strategy TLU 2 that support walking, biking, and transportation demand management have lower emission reduction potential, but substantially align with important co-benefits and should still be considered an important climate mitigation strategy.

TABLE 7: CO-BENEFITS OF LOW CARBON TRANSPORTATION<sup>42</sup>

CO-BENEFIT	EMISSIONS	CONGESTION	EQUITY**	PUBLIC HEALTH	SAFETY	ECONOMIC VITALITY
STRATEGY ACTION	TLU 1: Build a fast and reliable transit system that will be everyone's preferred way to get around.					
TLU 1.1	*	*	*	*	*	*
TLU 1.2	*	*	*	*	*	*
TLU 1.3	*	*	*	*	*	*
TLU 1.4			*	*	*	
TLU 1.5	*		*	*	*	*
TLU 1.6	*	*	*	*	*	*
TLU 1.7			*			

CO-BENEFIT	EMISSIONS	CONGESTION	EQUITY**	PUBLIC HEALTH	SAFETY	ECONOMIC VITALITY
STRATEGY ACTION	TLU 2: Create a complete and connected active transportation network that shifts trips from automobiles to walking, biking, and other active transportation modes.					
TLU 2.1	*	*	*	*	*	*
TLU 2.2	*	*	*	*	*	*
TLU 2.3	*	*	*	*	*	*
TLU 2.4	*	*	*	*	*	*
TLU 2.5	*	*	*	*	*	*
TLU 2.6	*	*	*	*	*	*
TLU 2.7	*	*		*	*	

CO-BENEFIT	EMISSIONS	CONGESTION	EQUITY**	PUBLIC HEALTH	SAFETY	ECONOMIC VITALITY
STRATEGY ACTION	TLU 3: Develop pricing and financing of mobility that reflects the carbon cost and efficiency of different modes and projects and correct for inequities of past investments and priorities.					
TLU 3.1	*	*	*	*	*	*
TLU 3.2	*	*	*	*	*	*
TLU 3.3	*	*			*	*
TLU 3.4	*	*	*	*	*	*
TLU 3.5	*	*	*	*	*	*
TLU 3.6	*	*	*			
TLU 3.7	*	*	*	*	*	*
TLU 3.8	*	*		*	*	*
TLU 3.9	*	*	*	*	*	*

 = Alignment with co-benefit



CO-BENEFIT	EMISSIONS	CONGESTION	EQUITY**	PUBLIC HEALTH	SAFETY	ECONOMIC VITALITY
STRATEGY ACTION	TLU 4: Manage parking resources more efficiently.					
TLU 4.1	*	*	*	*	*	*
TLU 4.2	*	*	*	*	*	*
TLU 4.3	*	*	*	*	*	*
TLU 4.4	*	*	*	*	*	*
TLU 4.5	*	*	*	*	*	*

CO-BENEFIT	EMISSIONS	CONGESTION	EQUITY**	PUBLIC HEALTH	SAFETY	ECONOMIC VITALITY
STRATEGY ACTION	TLU 5: Promote job growth, housing, and other development along transit corridors.					
TLU 5.1	*	*	*	*	*	*
TLU 5.2	*	*	*	*	*	*
TLU 5.3	*	*	*	*	*	*

CO-BENEFIT	EMISSIONS	CONGESTION	EQUITY**	PUBLIC HEALTH	SAFETY	ECONOMIC VITALITY
STRATEGY ACTION	TLU 6: Strengthen and reconnect communities by increasing density, diversity of land uses, and location efficiency.					
TLU 6.1	*	*	*	*	*	*
TLU 6.2	*	*	*	*	*	*
TLU 6.3	*	*	*			*
TLU 6.4	*	*	*	*	*	*
TLU 6.5	*	*	*	*	*	*
TLU 6.6	*	*	*	*	*	*

CO-BENEFIT	EMISSIONS	CONGESTION	EQUITY**	PUBLIC HEALTH	SAFETY	ECONOMIC VITALITY
STRATEGY ACTION	TLU 7: Where motor vehicle uses or travel is necessary, accelerate the adoption of zero-emissions vehicles (ZEV's) and other electric mobility options.					
TLU 7.1	*		*			
TLU 7.2	*		*	*		*
TLU 7.3	*			*		*
TLU 7.4	*			*		
TLU 7.5	*	*		*	*	*
TLU 7.6	*			*		*

# Strategies Overview

The seven Transportation and Land Use strategies, and their supporting actions, must be implemented together to advance San Francisco's vision for a transformed, low carbon, healthy, and equitable city. Implementation will require public engagement and support, significant funding, and in the case of some policies, formal adoption. New concepts will require technical studies, planning, and extensive outreach.

To produce equitable outcomes, public engagement must include robust multilingual public outreach and education campaigns that help communities understand, contribute to, and navigate the transition to a low carbon system. Implementation of actions must consider and proactively strive to prevent displacement. Integral to building a robust, efficient, and safe transportation system means building one that is accessible and useful to everyone, including people with disabilities, low-income households, and marginalized communities.

## Top Climate Solutions:

- Invest in public and active transportation projects
- Increase density and mixed land use near transit
- Accelerate adoption of zero emission vehicles and expansion of public charging infrastructure
- Utilize pricing levers to reduce private vehicle use and minimize congestion
- Implement and reform parking management programs



## Did you know?

**Co-Benefits of Climate Action:**<sup>43</sup> Creating an active transportation network to shift trips from driving to walking, biking, and other low-carbon modes could result in:

### VALUE OF A LIFE YEAR (VOLY) FROM INCREASED ACTIVITY

**\$258 M**  
**2030 – 2050**

The mode shift toward active transport leads to significant positive health outcomes for new cyclists

### REDUCED SOCIAL COSTS DUE TO REDUCED EMISSIONS

**\$143,000**  
**2030 – 2050**

Fewer cars on the road means reduced air pollution and improved health outcomes.







## STRATEGY

Build a fast and reliable transit system that will be everyone's preferred way to get around.



### WHAT WOULD SUCCESS LOOK LIKE?

San Francisco has a transportation system that is reliable and affordable and makes it easy to choose public transit.



### GHG REDUCTION POTENTIAL BY 2030

100,000 - 250,000 mtCO<sub>2</sub>e



### ESTIMATED COST BY 2030

\$\$\$\$\$: 500 million+



### CLIMATE METRIC

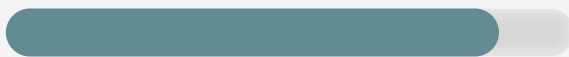
Increase in transit mode share



### EQUITY METRIC

TBD

## COMMUNITY BENEFITS



**RACIAL AND SOCIAL EQUITY\*\***



**JUST TRANSITION**



**HEALTH**



**RESILIENCE**

## Supporting Actions

TLU.1-1 Fund and implement the recommendations of the ConnectSF Transit Corridors Study and Muni Forward Plan, including taking steps to:

- a) Identify and implement key transit corridors for service every 5 minutes or better all day long.
- b) Ensure transit on frequent corridors is not delayed by recurring congestion by investing in transit-only lanes, signal management, queue-jump lanes and other transit priority treatments.
- c) Retime traffic lights to minimize signal delay for frequent lines.
- d) Optimize stop spacing on frequent lines to maximize transit ridership.
- e) Advance major transit capital projects, including a new Westside Subway along 19th Avenue and Geary, the Caltrain Downtown Extension, Central Subway extension, and the Link21 new transbay tube.

TLU.1-2 Improve transit reliability by bringing infrastructure into a state of good repair. Adequately fund State of Good Repair with at least \$300 million annually.

TLU.1-3 Greatly improve rider comfort, safety, and experience on transit across age, gender, race, and ability to encourage more people to ride transit. Example activities include data collection, reporting, sensitivity training of fare inspectors, and expanding the Muni Transit Assistance Program.





TLU.1-4 Implement Phase One of SFMTA's Racial Equity Action Plan to improve working conditions and initiate the development of Phase Two in 2021 and then implement Phase Two in 2022 to improve safety, access, and opportunities for the public.

TLU.1-5 While meeting transit ridership goals, prioritize services and reduce obstacles for more vulnerable populations, neighborhoods with fewest mobility options, and populations that have faced historic disinvestment.

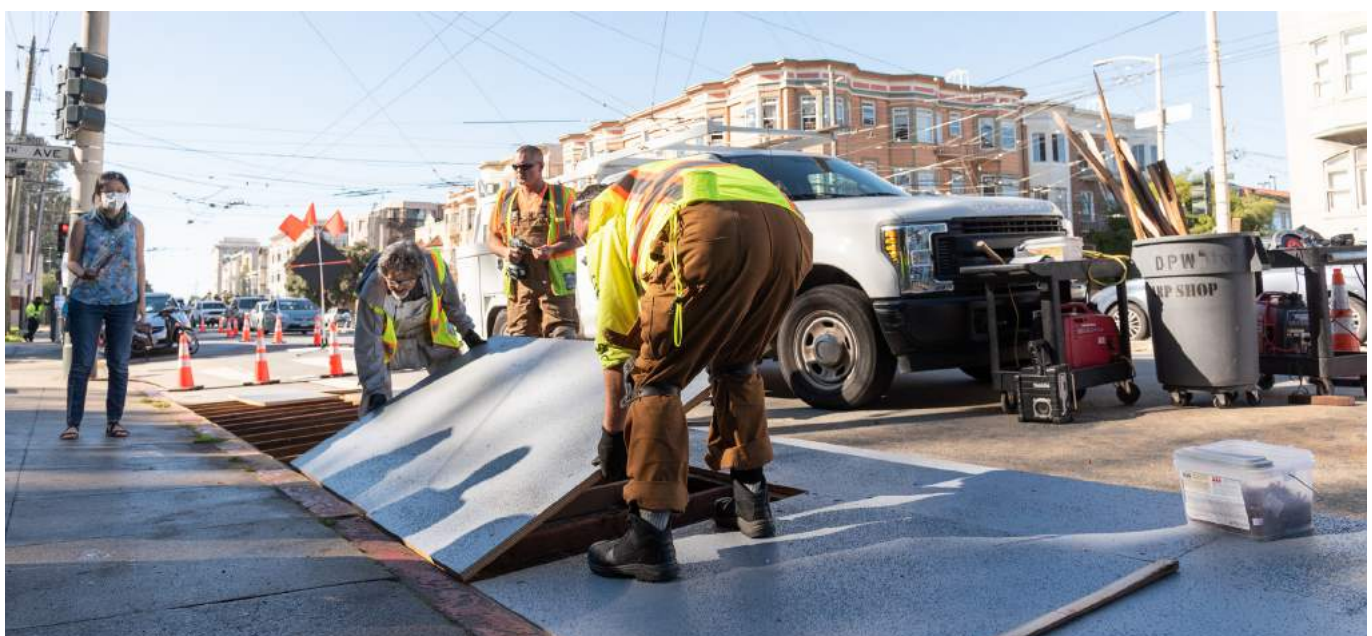
TLU.1-6 By 2025, implement 50 miles of Muni Forward transit priority improvements, including 30 miles of new transit-only lanes. to increase reliability, frequency and safety for riders.

TLU.1-7 By 2022, study the role of Muni fare programs on equity, climate, and mobility goals and adopt recommendations.

TLU.1-8 Improve connectivity between regional and local transit service by:

a) Funding targeted projects that improve physical connections and make transfers seamless between local and regional transit systems

b) Collaborating with regional partners to improve coordination between regional operators and secure funding for projects, including Caltrain Downtown Rail Extension, Caltrain Service Vision, Second Transbay Crossing, California's State Rail Plan, and ferry projects.



Fulton Bus Bulb installation. Photo Credit: SFMTA

## STRATEGY

Create a complete and connected active transportation network that shifts trips from automobiles to walking, biking, and other active transportation modes.



### WHAT WOULD SUCCESS LOOK LIKE?

San Francisco has a transportation system that is reliable and affordable and makes it easy to choose active modes like walking and biking.



### GHG REDUCTION POTENTIAL BY 2030

Less than 100,000 mtCO<sub>2</sub>e



### ESTIMATED COST BY 2030

\$\$\$; 10-100 million



### CLIMATE METRIC

Increase in walk and bike mode share



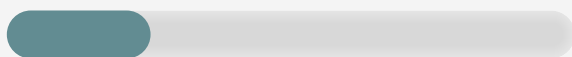
### EQUITY METRIC

TBD

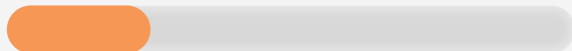
## Supporting Actions

- TLU.2-1 Continue to expand programs that provide corridors that are attractive to all demographics for walking, biking, and using scooters, wheelchairs, and other small mobility devices. Connect the Slow Streets network, car-free roads in parks, and the protected bikeway network to neighborhoods in San Francisco.
- TLU.2-2 Expand community programs and partnerships to make biking more accessible, via safety and maintenance classes, community parking, and subsidies for electric bikes for low-income residents.
- TLU.2-3 By 2022, establish a modal planning framework, placing transit and active modes at the forefront, that will guide decisions about design and utilization of the City's rights-of-way.
- TLU.2-4 Expand the protected bikeway network by at least 20 miles by 2025.
- TLU.2-5 Establish and utilize design guidelines to improve connectivity and access to active transportation options at major transit stops.
- TLU.2-6 Update San Francisco's Bike Plan by 2023 to improve and expand the active transportation network with robust community input.

## COMMUNITY BENEFITS



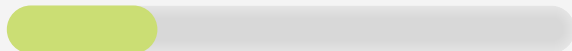
**RACIAL AND SOCIAL EQUITY\*\***



**JUST TRANSITION**



**HEALTH**



**RESILIENCE**





- TLU.2-7 Encourage employers to further reduce auto commutes through incentives such as transit benefits and universal passes, e-bike incentives, active transportation support, telework policies, and carpool programs.
- a) Continue promoting Transit First initiatives and incentives for all City employees
  - b) Integrate existing SFO Employee and Airline Employee BART Discount Programs



Photo Credit: SFMTA

## STRATEGY

Develop pricing and financing of mobility that reflect the carbon cost and efficiency of different modes and projects and correct for inequities of past investments and priorities.



### WHAT WOULD SUCCESS LOOK LIKE?

Less congested streets and a more equitable transportation system through targeted re-investment of fees, discounts, and/or incentives to help disadvantaged travelers and advance the use of low carbon modes.



### GHG REDUCTION POTENTIAL BY 2030

Greater than 400,000 mtCO<sub>2</sub>e



### ESTIMATED COST BY 2030

\$: 0-1 million



### CLIMATE METRIC

Reduce vehicle miles traveled (VMT) and greenhouse gases (GHG)



### EQUITY METRIC

TBD

## COMMUNITY BENEFITS

**RACIAL AND SOCIAL EQUITY\*\***

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**HEALTH**

**RESILIENCE**

## Supporting Actions

- TLU.3-1 By 2022, develop recommendations for programs and policies that will advance equity (e.g., provide discounts and exemptions for low-income individuals), reduce vehicle traffic, and increase transit service to downtown. For example, complete the Downtown San Francisco Congestion Pricing Study recommendations, and by 2026, study and implement the appropriate pricing policies.
- TLU.3-2 Advance local, regional, state, and federal opportunities to transition away from fossil fuels by increasing fees to drive.
  - a) By 2022, identify and consider pricing mechanisms that can be implemented locally (e.g. vehicle license fee).
  - b) By 2022, establish priorities to advocate for regional, state and federal legislation (e.g. increase gas tax, application of road user charges).
- TLU.3-3 By 2023, introduce new tools to manage short-term curb uses, such as flexible regulations and pricing.
- TLU.3-4 Develop and take all necessary steps to implement an integrated system of tolling for bridges and freeways and on Treasure Island to prioritize transit and higher occupancy vehicles.
- TLU.3-5 Implement the Treasure Island Mobility Management Program including new ferry service, East Bay bus service, and island tolling.
- TLU.3-6 Apply policy tools to reduce impacts on low-income and historically marginalized communities and ensure that money generated from pricing programs is invested in transportation improvements, especially for those communities.







## STRATEGY

Manage parking resources more efficiently.



### WHAT WOULD SUCCESS LOOK LIKE?

Parking resources in San Francisco are managed in a more efficient way that better reflects our climate and transit-first priorities.



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating  
(no direct reduction)



### ESTIMATED COST BY 2030

\$: 0-1 million



### CLIMATE METRIC

# of parking spaces and amount of curbside that is actively managed  
# of vehicles registered in San Francisco



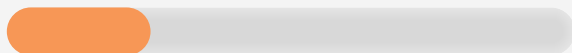
### EQUITY METRIC

TBD

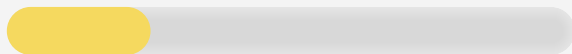
## COMMUNITY BENEFITS



**RACIAL AND SOCIAL EQUITY\*\***



**JUST TRANSITION**



**HEALTH**



**RESILIENCE**

## Supporting Actions

- TLU.4-1 Prioritize enforcement of parking and curb regulations that impact street safety and efficiency
- TLU.4-2 Expand paid parking citywide, where appropriate Set prices at a level that reduces demand for parking so that drivers can always find a parking space near their destination.
  - a) Reinvent and expand the Residential Parking Permit program.
  - b) Expand paid hourly parking to Sundays and evenings, where appropriate.
  - c) Expand demand-responsive parking meter and garage pricing.
- TLU.4-3 Steadily reduce the City's overall parking supply in keeping with traffic reduction and emissions reduction goals, and convert underutilized public and private parking lots, parking spaces, and garages to more productive uses, such as housing and car-free roads in parks.
- TLU.4-4 Reinvent and expand the parking tax on private parking to reduce congestion, air pollution and emissions.
- TLU.4-5 While using pricing to balance parking supply and demand, develop programs to reduce impact on low-income, auto-dependent people and ensure net benefit to low-income individuals.
- TLU.4-6 Implement a program to prioritize access and parking for people-with-disability parking placards.

# STRATEGY

Promote job growth, housing, and other development along transit corridors.



## Transportation & Land-Use

# TLU.5



### WHAT WOULD SUCCESS LOOK LIKE?

San Franciscans have access to good jobs, housing, services within a transit-accessible corridor.



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating  
(no direct reduction)



### ESTIMATED COST BY 2030

\$\$: 1-10 million



### CLIMATE METRIC

Reduce vehicle miles traveled (VMT)



### EQUITY METRIC

TBD

## Supporting Actions

- TLU.5-1 Expand housing capacity (for example, by increasing heights and removing restrictions on density) in areas where existing or new high-capacity transit is planned.
- TLU.5-2 Locate jobs close to existing or new high-capacity transit corridors.
- TLU.5-3 Use streamlined approval processes, such as Housing Sustainability Districts, in the 1/4-mile areas around major transit stations to build housing and mixed-use developments more quickly.

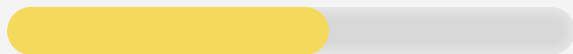
## COMMUNITY BENEFITS



RACIAL AND SOCIAL EQUITY\*\*



JUST TRANSITION



HEALTH



RESILIENCE

## STRATEGY

Strengthen and reconnect communities by increasing density, diversity of land uses, and location efficiency.



### WHAT WOULD SUCCESS LOOK LIKE?

San Francisco neighborhoods are compact and have a variety of uses (stores, services, amenities) that residents can easily access



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating  
(no direct reduction)



### ESTIMATED COST BY 2030

\$\$: 1-10 million



### CLIMATE METRIC

Reduce vehicles miles traveled (VMT)



### EQUITY METRIC

TBD

## Supporting Actions

- TLU.6-1 Facilitate the development of neighborhoods where people live within an easy walk or roll of their daily needs. Create a working group of City agencies and residents to plan and design for such neighborhoods.
- TLU.6-2 Examine rezoning to allow for multi-family housing throughout San Francisco.
- TLU.6-3 By 2023, increase the types of home-based businesses allowed in residential districts.
- TLU.6-4 Identify and reimagine under-utilized publicly owned land and roadways that could be transformed or repurposed.
- TLU.6-5 Design public space and the transportation system (including roadways) to advance racial and social equity by co-developing plans and projects with BIPOC community members and understanding their needs before designing the space.
- TLU.6-6 Update the Transportation Element of the City's General Plan.
- TLU.6-7 Design public space and the transportation system to advance disability justice by co-developing plans and projects with diverse elements of the disability community and understanding their needs before designs are complete.

## COMMUNITY BENEFITS



**RACIAL AND SOCIAL EQUITY\*\***



**JUST TRANSITION**



**HEALTH**



**RESILIENCE**







## STRATEGY

Where motor vehicle use or travel is necessary, accelerate the adoption of zero-emissions vehicles (ZEVs) and other electric mobility options.



### WHAT WOULD SUCCESS LOOK LIKE?

100% car sales by 2030 are EV's without increasing number of vehicles in SF



### GHG REDUCTION POTENTIAL BY 2030

Greater than 400,000 mtCO2e



### ESTIMATED COST BY 2030

\$\$: 1-10 million



### CLIMATE METRIC

% of electric vehicles in new vehicle sales



### EQUITY METRIC

# community-endorsed charging infrastructure projects in communities with environmental justice burden as identified in [EJ Communities Map](#)\*

## COMMUNITY BENEFITS

**RACIAL AND SOCIAL EQUITY\*\***

**JUST TRANSITION**

**HEALTH**

**RESILIENCE**

## Supporting Actions

- TLU.7-1 By 2023, launch a public awareness campaign, including messaging tailored to specific communities, with the goal of educating residents about the health, economic, and environmental benefits of transit, active transportation, and electric vehicles.
- TLU.7-2 Expand publicly available EV charging across the city that is financially and geographically accessible to low-income households and renters.
- a) By 2022, complete an evaluation framework to develop curbside charging pilots
  - b) By 2023, expand charging to 10% of spaces in municipally owned parking lots
  - c) By 2023, expand charging to 10% of spaces within privately owned large commercial garages
  - d) By 2023, create three “fast-charging hubs” with one serving a disadvantaged community within San Francisco.
  - e) By 2025, install charging to 10% of SFO-owned parking stalls supported by load management software.
- TLU.7-3 By 2024, develop a plan to help the City’s non-revenue fleet and small and locally owned businesses build infrastructure that allows for zero emission delivery, drayage, and longer haul trucks.
- TLU.7-4 By 2023, establish a pathway to incentivize ZEVs for passenger service vehicles operating at the airport.



TLU.7-5 By 2024, launch a pilot to advance the use of ZEVs, e-bikes, and other low-carbon modes for door-to-door goods and meal delivery services.

TLU.7-6 By 2030, create incentives for the use of renewable diesel and emerging zero-emission technologies to reduce emissions from construction equipment at least 50% from 2020 levels.

TLU.7-7 Design by 2023 and launch by 2024 a pilot project to test the use of accessible bicycles, e-bicycles and e-scooters for commuting, as well as recreation.



Photo Credit: SFMTA



# Housing

**One of the most effective ways to reduce emissions is to ensure San Francisco has the quantity and types of affordable, accessible housing that support its diverse residents.**

Dense urban environments like San Francisco offer many housing-related opportunities to reduce emissions. Providing housing to people of all incomes near services, jobs, and activities helps replace private vehicle trips with low-carbon modes such as walking, biking, and transit. Providing more housing in San Francisco makes it easier for people to live close to where they work, instead of commuting long distances by car.

## SECTOR GOAL:

**Build at least 5,000 new housing units per year with maximum affordability, including not less than 30% affordable units, and with an emphasis on retaining and rehabilitating existing housing.**

To successfully reduce emissions while supporting a prosperous, inclusive, and resilient city for everyone, San Francisco must substantially increase the amount of housing available and prioritize affordability and housing options for those most at risk: BIPOC communities, people with disabilities and other vulnerable populations, as well as working-class families who have faced gentrification and economic dislocation. The CAP is coordinated with the Housing Element in the City's General Plan and other housing policy and implementation efforts developed by City agencies, in collaboration with elected officials and community members. Together, they support San Francisco's goal to build at least 5,000 housing units per year, with at least 30% of those units being affordable.<sup>44</sup> These goals underpin Housing strategies to implement appropriate zoning changes, streamline

approvals, lower construction costs, and expand and sustain funding to build and preserve affordable housing.

Housing is foundational to the physical, social, and emotional health of individuals and their communities. As the world faces increasing climate, health, and economic threats, healthy and stable housing is essential for our communities to recover from shocks, build resiliency, and thrive.

## CONTEXT

San Francisco's diverse job opportunities and quality-of-life amenities have attracted people and businesses for decades. Cycles of robust economic growth have created wealth and helped fund public improvements but also exacerbated inequality by putting extraordinary pressure on the city's housing stock and existing residents and communities. From 2010 to 2019, San Francisco added eight new jobs for every new home built. This disparity is due to regulatory barriers, high land and construction costs, labor shortages, and neighborhood opposition, which have constrained the financial feasibility and development of both subsidized affordable and market-rate housing.



# Accomplishments



The city sheltered over  
**3,800 people**  
in Shelter in Place (SIP)  
hotels or trailers during  
COVID-19.

The city increased the number of new  
affordable units to

**908 per year**

up nearly **50%** from the prior **10** years.



The city funded 52 small  
and large site buildings to  
preserve affordability and  
support local businesses

**From 2015 to 2019,**  
the city increased the number of units for construction to

**4,563 per year**

up **61%** from the previous **10** years

“**The most important thing we can do is recognize that density isn’t a dirty word. We know that people who live in cities have a significantly lower carbon footprint than people who do not.**”

—Mayor London Breed, San Francisco

Mayor Breed has set an ambitious goal to build 5,000 new units of housing per year to make up for years of underbuilding. In the last 40 years, the City produced 5,000 units in a year just once. The last five years have seen an average of 4,200 new housing units built annually and the 30 prior years each produced fewer than 1,900 units annually. Housing availability, affordability, and accessibility disproportionately affects low- and moderate-income San Franciscans who experience higher than average housing cost burdens, over-crowding, and housing instability. Many have been displaced or forced to find cheaper housing outside the city, which can lead to long, costly, high-emissions commutes and community isolation. As with health and climate stressors, housing challenges disproportionately impact BIPOC communities, including rent burden (Figure 20). BIPOC communities

also grapple with income and housing discrimination and face resulting disparities.<sup>45</sup>

Although many cities have seen population decline from COVID-19, including San Francisco, this may be a temporary decline. The State-mandated Regional Housing Needs Allocation is expected to increase San Francisco’s 8-year housing production target from nearly 29,000 units currently to 82,000 for the years 2023 through 2031 to address current unmet needs as well as future growth. To meet housing production targets in a manner that also supports equity and climate goals, it is also critical that new housing includes types, locations, accessibility, and affordability levels to meet the diverse needs of different households including families with children, couples, roommates, seniors, people with disabilities, and people seeking individual and group housing.<sup>46</sup>

Thoughtfully crafted housing policies can protect existing residents, rehabilitate, and preserve existing housing, maintain affordability, increase housing production, and produce new affordable and accessible housing options for low-to-moderate income residents. Adopting such policies is essential to meeting San Francisco’s housing goals and advancing racial and social equity.

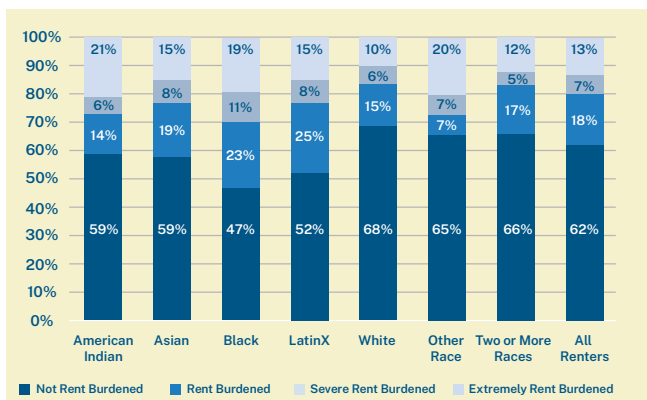


FIGURE 20: RENT BURDEN BY RACE AND ETHNICITY, 2018<sup>47</sup>

## Vulnerable and Underserved Populations

Strategies to increase housing production and affordability must prioritize and support the needs of at-risk residents, along with low-income and communities of color. In San Francisco, vulnerable populations include seniors, people with disabilities and chronic physical or mental health conditions, formerly incarcerated individuals, young adults exiting foster care or other transitional situations, people experiencing domestic violence, and people experiencing homelessness. Areas with high concentrations of people in these groups are being considered in the 2022 Housing Element currently under development. Often, these same communities are harmed by environmental injustices that exacerbate health problems, such as exposure to polluted air and water from industrial, solid waste, and congested roadways as well as insufficient access to healthy food, health services, and nature.

Furthermore, vulnerable and underserved people often experience disproportionate impacts from climate and other hazards. As the COVID-19 pandemic has shown, it is essential to connect these residents not only with services and resources, but also adequate and safe housing to ensure a resilient city. Investments in building new housing and retrofitting existing housing should be focused on underserved communities and vulnerable residents in every neighborhood.

Repairing historic injustices and improving outcomes for communities of color and low- and middle-income residents requires investing in neighborhoods with lower average incomes, including preserving

and building affordable and accessible housing, strengthening local businesses and organizations, ensuring supportive infrastructure, and creating affordable housing in higher-resource neighborhoods throughout San Francisco.

## Housing Production and Affordability

To meet increased housing targets, requirements of State law,<sup>48</sup> and local needs and equity concerns, the City's Housing Element Update seeks to increase affordable housing in higher opportunity neighborhoods<sup>49</sup> to help expand choices that can enhance resident health and financial outcomes (Figure 21). Two significant challenges include securing public funding and finding available sites. Although the City has recently increased annual housing funding by hundreds of millions of dollars, local funding is variable in nature, development costs remain high, and additional State and federal affordable housing dollars are needed.<sup>50</sup> To increase the number of sites for housing, it is critical for the City to engage in community strategies to strategically rezone higher-resource areas of San Francisco to accommodate new multi-family housing that can serve low- and middle-income individuals and families.

Investing in existing housing, which is often more economical and can be done with lower emissions than new construction, is an important tool to complement building new housing. Importantly, retrofits also support affordable housing preservation and community stabilization for people with limited incomes. As the majority of San Francisco housing was built before 1950, structural and weatherization upgrades such as windows and insulation also help protect people from earthquakes and climate hazards such as heat waves and wildfire smoke. Retrofits also create a predictable inflection point for switching out natural gas appliances for electric ones and integrating more efficient, lower-emissions systems into existing housing stock. In addition to cutting emissions, upgrades can also improve indoor air quality to support resident health and comfort.

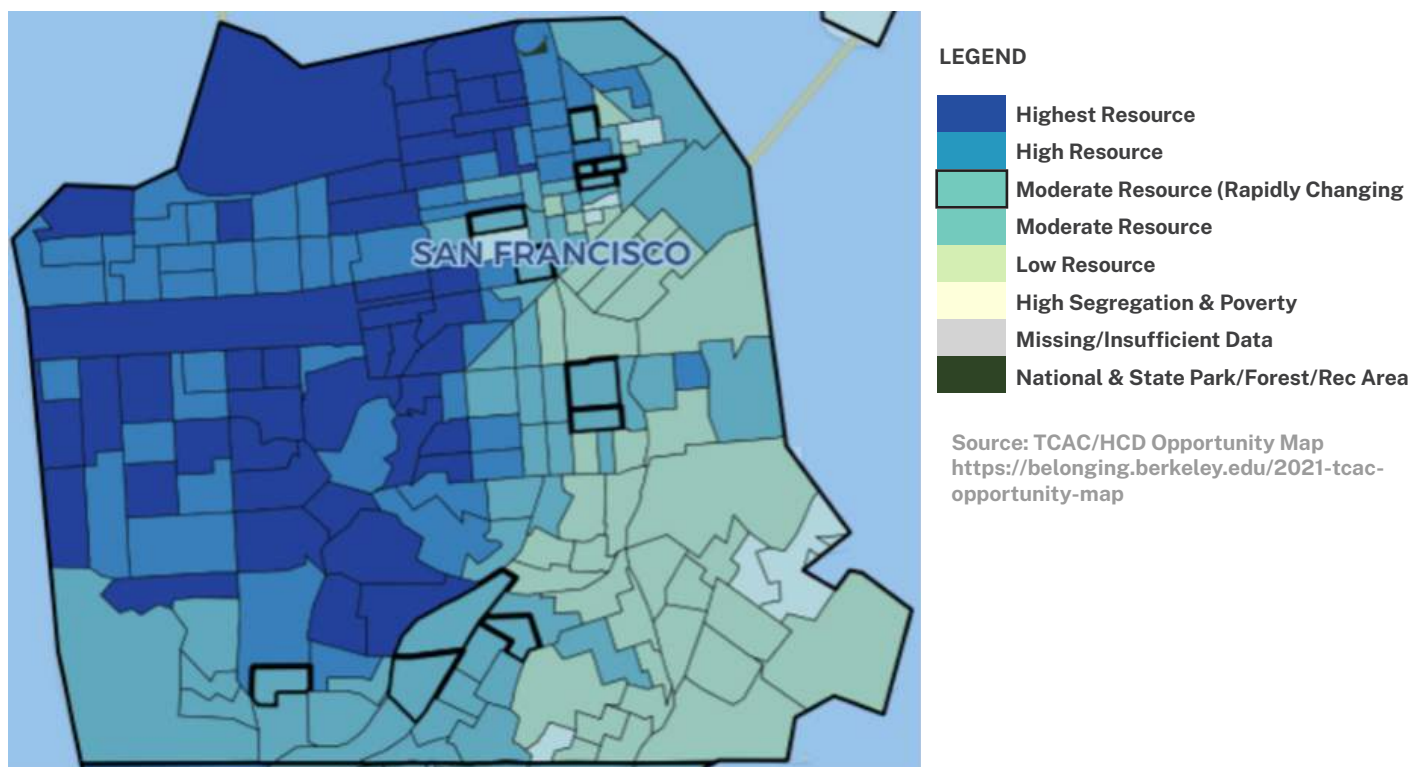


FIGURE 21: STATE OPPORTUNITY MAP BY CENSUS TRACT

## Strategies Overview

The housing strategies and actions included in the Climate Action Plan are aligned with the Housing Element of the City's General Plan, and numerous other housing policy and implementation efforts. These plans support the needed retention of existing affordable housing to ensure community stability and increase in new housing production in San Francisco, particularly affordable and accessible housing, across all neighborhoods. The City's commitment to advancing racial and social equity, and prioritizing its vulnerable residents, is also inextricably linked to its housing policies and implementation. By both focusing resources and services in historically underserved areas and opening up affordable housing opportunities in higher-resource neighborhoods, San Francisco can leverage housing investments to build a more equitable and climate-resilient city.

### Top Climate Solution:

**Increase affordable compact infill housing production near transit.**

# H.1

## STRATEGY

Anchor BIPOC families and advance their return to San Francisco through robust housing and stabilization programs.



### WHAT WOULD SUCCESS LOOK LIKE?

Communities are stabilized throughout the city to the maximum extent possible, especially BIPOC and other low-and-moderate income households who have been disproportionately displaced in recent years.



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating  
(no direct reduction)



### ESTIMATED COST BY 2030

\$\$\$: 10-100 million



### CLIMATE METRIC

# of incoming residents and # of displaced residents, annually



### EQUITY METRIC

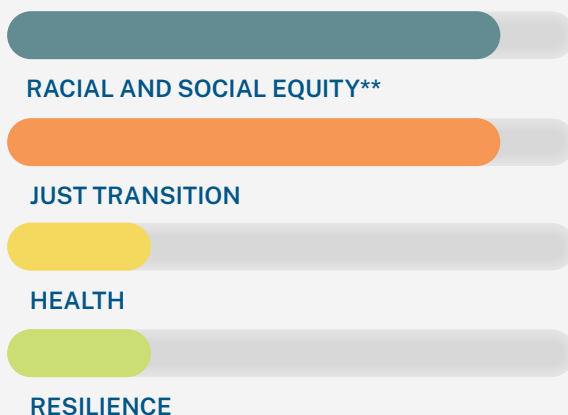
% BIPOC residents living in San Francisco  
% of annual incoming residents that are BIPOC

% of displaced residents that are BIPOC annually

## Supporting Actions

- H.1-1 Leverage every housing action and investment to help reverse historic dispossession based on race, ethnicity, disability, or socio-economic status, and enable housing security for affected communities.
- H.1-2 Prioritize affordable housing in cultural districts and areas with historically marginalized racial or ethnic communities to encourage their stabilization and return.
- H.1-3 Expand tenant services including education, outreach, counseling, and legal and rent assistance to keep local residents and workers housed in San Francisco.
- H.1-4 Initiate steps to increase housing production, particularly affordable and accessible housing, in higher opportunity neighborhoods that historically have been racially and economically exclusive.

## COMMUNITY BENEFITS





# STRATEGY

Support vulnerable populations and underserved communities through both the preservation and rehabilitation of existing housing and new housing development that serves their needs.

## H.2



### WHAT WOULD SUCCESS LOOK LIKE?

New housing development is built in high resource areas, and existing affordable and rent-controlled housing is rehabilitated without causing displacement. Vulnerable and underserved populations have access to both types of housing.



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating  
(no direct reduction)



### ESTIMATED COST BY 2030

\$\$\$\$: 100 million-500 million



### CLIMATE METRIC

# of existing residential units retrofit annually



### EQUITY METRIC

% and # of new residential units serving vulnerable and underserved populations,  
% and # of existing residential units rehabilitated for vulnerable and underserved populations

## Supporting Actions

- H.2-1 Provide funding and resources to help people who are unhoused or without stable housing become and stay safely housed.
- H.2-2 Subsidize and develop incentives for building housing targeted towards vulnerable populations in high resource areas, especially along transit-rich, commercial, and social service corridors.
- H.2-3 Initiate steps to fund the acquisition and preservation of existing, affordable, multi-family housing, with a goal of at least 400 units annually.
- H.2-4 Secure federal, state, and local resources for accessibility, energy efficiency, decarbonization, and resilience upgrades in existing and new housing.

### COMMUNITY BENEFITS



**RACIAL AND SOCIAL EQUITY\*\***



**JUST TRANSITION**



**HEALTH**



**RESILIENCE**

# H.3

## STRATEGY

Advance zoning and implementation improvements that support new housing production sufficient to meet goals, especially sustainable, small, mid-sized, family and workforce housing in lower density neighborhoods.



### WHAT WOULD SUCCESS LOOK LIKE?

Increased percentage of San Francisco's housing production overall and affordable housing production specifically is in higher opportunity neighborhoods.



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating  
(no direct reduction)



### ESTIMATED COST BY 2030

\$: 0-1 million



### CLIMATE METRIC

# of new housing units built proximate to transit each year, # of multi-unit projects approved in formerly R-1 and R-2 zoning



### EQUITY METRIC

% BIPOC, low-, and moderate-income in higher resource neighborhoods

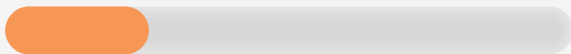
## Supporting Actions

- H.3-1 Study changes to increase multi-family housing in higher-resource neighborhoods and near transit, jobs, services, parks, high quality schools, and other amenities.
- H.3-2 Develop additional approval and permit streamlining for new housing that exceeds inclusionary and sustainability requirements.
- H.3-3 Address financial and educational barriers for lower income small property owners to add housing (such as Accessory Dwelling Units) and rehabilitate existing units that are healthy and resource efficient.
- H.3-4 By 2025 establish codes and regulations that facilitate use of new materials (e.g. cross-laminated-timber) and new technology (e.g. modular housing) to lower costs and increase resource efficiency of construction.
- H.3-5 Expand green construction training and apprenticeship programs to grow the local pool of skilled labor and reduce construction costs.

## COMMUNITY BENEFITS



**RACIAL AND SOCIAL EQUITY\*\***



**JUST TRANSITION**



**HEALTH**



**RESILIENCE**

# STRATEGY

Expand subsidized housing production and availability for low-, moderate-, and middle-income households.

## H.4



### WHAT WOULD SUCCESS LOOK LIKE?

The number of affordable housing units produced and preserved annually is increased compared to recent and historic averages and San Francisco achieves a higher share of its RHNA affordable housing targets than in the past.



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating  
(no direct reduction)



### ESTIMATED COST BY 2030

\$\$\$\$: 100 million-500 million



### CLIMATE METRIC

# of new affordable housing units built proximate to transit each year, # of affordable multi-unit projects approved in formerly R-1 and R-2 zoning



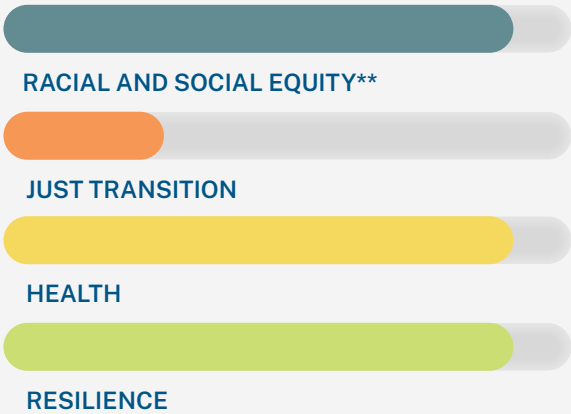
### EQUITY METRIC

% new affordable housing units occupied by BIPOC

## Supporting Actions

- H.4-1 Meet Regional Housing Needs Allocation (RHNA) targets and requirements to affirmatively further fair housing by increasing production of affordable housing, especially for families with children, in both higher resource neighborhoods and Priority Geographies that have historically been home to lower income communities of color.
- H.4-2 By 2025 renew and increase public and private funding for affordable housing as one-time bond funds and ERAF allocations are depleted.
- H.4-3 Advocate for increased regional, state, and federal funding for affordable and green housing.
- H.4-4 Identify cost cutting measures to make affordable housing developments in San Francisco more competitive for regional, state, and federal funding.
- H.4-5 Continue to prioritize surplus City, enterprise agency, and other public land for affordable housing based on timing and financial feasibility.

### COMMUNITY BENEFITS





# Responsible Production & Consumption

**Climate change is driven by the global production of the goods and services that people and organizations consume. Responsible production calls for companies to rethink how they produce goods, to cut down on waste and toxics, and support consumers in making purchasing decisions that reduce emissions.**

San Francisco is a leader in pursuing zero waste and reducing exposure to harmful chemicals. While continuing to advance waste reduction, reuse, recycling, composting and community health, the City must also begin to address the lifecycle impacts of the products – including both goods and services – that flow in and out of San Francisco. Purchases made in San Francisco have global ramifications, including the production and release of harmful chemicals and pollutants that impacts communities.

## SECTOR GOAL:

**Reduce solid waste generation 15% by 2030**

**Reduce disposal to landfill by 50% compared to 2015 levels**

Historically, San Francisco has used a sector-based inventory to track citywide emissions. Included in this inventory are emissions from fossil fuels used in the building and transportation sectors, and methane emitted from landfills. Sector-based inventories account for downstream emissions that take place in a

given geographic area, but not the emissions generated by the creation and distribution of consumer products that go into that area. Known as upstream emissions, these can also be thought of as emissions that San Francisco outsources to other communities. In keeping with its commitment to equity and consideration of those who will be impacted the most by climate change, this plan integrates actions to reduce emissions from production and consumption, recognizing the effect local and regional purchasing decisions have all over the world. A Consumption Based Emissions Inventory (CBEI) provides San Francisco with an expanded framework to assess and act to cut emissions, while aligning other activities with climate actions goals.



# Accomplishments



## Mandatory Recycling and Composting Ordinance

has resulted in 99% of all properties now being compliant for recycling and composting service

The city has kept more than **2.5 million tons** of food scraps and other organics out of the landfill for over 25 years



The city has kept more

**3 million tons**

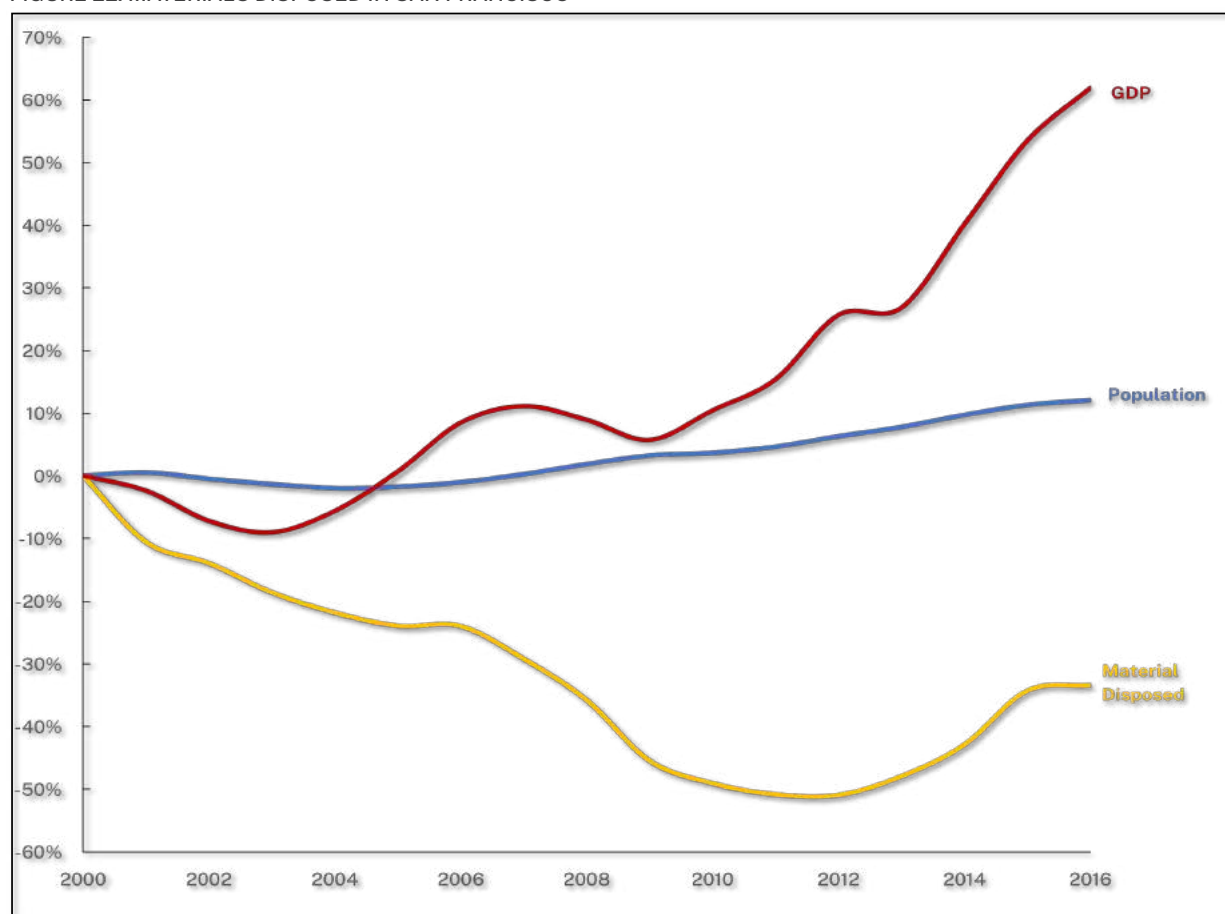
of recyclables out of the landfill reducing virgin resource extraction and emissions



The city keeps more than **1 million tons**

per year of construction and demolition debris out of landfills recycled into products that reduces virgin resource extraction and emissions.

FIGURE 22: MATERIALS DISPOSED IN SAN FRANCISCO



## Climate and the Material Lifecycle

San Francisco's ambitious zero waste goal of sending nothing to landfill or incineration has led to an increase of reuse, recycling, and composting of discarded materials. While this has decreased emissions in the waste sector, it has missed accounting for emissions from consumption, specifically the purchase of new goods and services.

While San Francisco cut the amount of disposed materials in half after 2000, a growing population, changing consumption patterns, and a building boom began to reverse that trend in 2013, when the amount of disposed materials began to increase, substantially increasing upstream emissions. Setting Responsible Production and Consumption goals can decrease these upstream emissions and negative effects on the communities impacted by them, while transforming how goods and services are produced, delivered, and used, as well as how they are then reused, recycled, composted, and disposed.

### The Roles of Producers and Consumers

Reframing San Francisco's zero waste success within a climate context requires holding producers responsible for the emissions of their goods and services. In this framework, producers can be incentivized to redesign their operations to reduce emissions across their supply chain. Further, they can help consumers prioritize lower-emissions decisions. Local, state, and federal policies, along with market forces, will continue to push producers to increase efficiency and innovate sustainable materials that have lower emissions.

This framework also helps consumers — including government and households — exercise agency in their purchasing decisions and behaviors. For instance, the City can reduce consumption impacts through its own procurement policies, and can create policies, programs, and educational initiatives to support consumers. Additionally, individual households can contribute by shifting their consumption patterns and expressing demand for better, local, and low-carbon goods and services that do not outsource emissions to other communities.



**Fix-It and Repair Opportunities Can Catalyze a Materials Reuse and Repair Economy**

### A New Call to Action

Moving forward, the City will work on reducing climate impacts of the top goods and services categories identified through the CBEI. San Francisco has long promoted climate action through behavior change: zero waste policies, programs, and educational efforts have reduced the amount of materials generated, including recyclables, compostable, as well as products that go to landfills (Figure 22). It is possible to meet these commitments and tackle a broader scope of global emissions through the production and consumption framework.

### Supporting Equity and Expanding Access

Implementing responsible production and consumption strategies reduces lifecycle emissions while providing direct community benefits to San Franciscans and people from across the region and world who produce and ship goods to the city. For example, the recovery, reuse, and repurposing of resources that might go to waste, including food, used furniture, construction materials, and clothing, can be redistributed to communities in need. Further, industries that create materials and reuse and repair existing materials provide opportunities to create meaningful local jobs.

Strategies that support sourcing local and regional foods and goods can reduce emissions and air pollution related to transport. Local production also strengthens resilience. Due to the COVID-19 pandemic, some goods have become scarce as global supply chains continue to be strained. Local production can improve San Francisco's ability to adapt and respond to future pandemics and natural disasters.

## Strategies Overview

Responsible Production and Consumption strategies address key product categories identified by the CBEI and seek to engage the wider community on implementation:

### Building materials and construction activities

- Many building products use virgin material, which have tremendous climate impacts from extraction, production and shipping.
- Strategies aim to reduce the climate impacts of construction products and materials by promoting reusing and extending the useful life of existing buildings and their components. This also reduces waste.

### Food

- Producing, shipping and wasting food generates significant global emissions.
- Strategies aim to shrink the climate impacts of the food system by reducing waste, promoting climate friendly diets, and getting excess food to those in need.

### Everyday goods and consumer products

- Clothing, textiles, electronics, foodware, paper, and plastic can all drain resources and generate huge amounts of waste. They are also relatively energy intensive and therefore generate significant emissions.
- Strategies focus on promoting the reduction, reuse, repair, and recovery of a range of goods and materials.

### Air travel

- Aviation and associated emissions are not included in the traditional sector-based emissions inventory. SFO International Airport plans to implement policies and programs to reduce emissions from airport fuels and operations.

### Top Climate Solution:

**Reduce food waste and embrace plant-rich diets.**



#### Did you know?

**Co-Benefits of Climate Action:** Reducing the carbon footprint of the food system by reducing waste, promoting climate-friendly diets, and getting excess food to communities in need could result in:

**REDUCED HEALTH COSTS**

**\$1.87M**

Due to reduced food waste-related transportation emissions



# Responsible Productions & Consumption

## RPC.1

## STRATEGY

Achieve total carbon balance across the buildings and infrastructure sectors.



### WHAT WOULD SUCCESS LOOK LIKE?

By 2030 buildings constructed will have a 40% reduction in embodied carbon.



### GHG REDUCTION POTENTIAL BY 2030

Not Available



### ESTIMATED COST BY 2030

Not Available



### CLIMATE METRIC

TBD



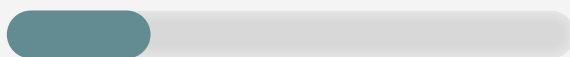
### EQUITY METRIC

Tons of rescued building materials received by non-profits and small businesses in communities with environmental justice burden as identified in [EJ Communities Map](#)\*

## Supporting Actions

- RPC.1-1 Between 2024-2026, phase in policies to reduce embodied carbon more than 10% per project by addressing at least three product categories or building assembly types.
- RPC.1-2 By 2025, develop a suite of incentives, policies, and/or guidelines for adaptive reuse of existing buildings, as well as the design and procurement of low-carbon structural materials for new construction.
- RPC.1-3 By 2025, establish a maximum allowance for embodied carbon of buildings, to be adjusted at regular intervals.
- RPC.1-4 By 2025, amend existing policies to require deconstruction of buildings and increase the source separation of specific materials.
- RPC.1-5 By 2025, engage with designers, landlords, and lessees to develop guidelines for tenant improvement projects that reduce excess material purchases and support reuse distribution channels.
- RPC.1-6 By 2025, create a policy framework to expand and cultivate regional building material reuse markets that support workforce development, small business enterprises, and entrepreneurial innovation.
- RPC.1-7 By 2030, advance best practices for “Design for Disassembly” and “Buildings As Material Banks” by creating implementation resources in partnership with global cities, and pilot at least one municipal project to maximize the value of carbon already invested in buildings.

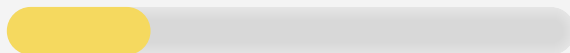
## COMMUNITY BENEFITS



RACIAL AND SOCIAL EQUITY\*\*



JUST TRANSITION



HEALTH



RESILIENCE





RETHINKING HOW WE USE COMMON BUILDING MATERIALS AND CONSTRUCTION ASSEMBLIES PRESENTS MANY OPPORTUNITIES TO REDUCE EMBODIED EMISSIONS







# Responsible Productions & Consumption

## RPC.2

## STRATEGY

Reduce the carbon footprint of the food system by reducing waste, promoting climate friendly diets, and getting excess food to communities in need.



### WHAT WOULD SUCCESS LOOK LIKE?

Amount of food waste is cut in half by 2030, sending as much as possible to communities in need.



### GHG REDUCTION POTENTIAL BY 2030

Not Available



### ESTIMATED COST BY 2030

\$\$: 1-10 million



### CLIMATE METRIC

Tons of excess food or food scraps generated and tons of food disposed to landfill and incineration.



### EQUITY METRIC

Tons of recovered food donated to San Francisco CBOs in communities with environmental justice burden as identified in [EJ Communities Map](#)\*

## Supporting Actions

- RPC.2-1 By 2030, reduce food waste by 50% in alignment with the City's voluntary commitment to the Pacific Coast Collaborative initiative by implementing food waste reduction guidelines and recommendations in partnership with food retail, distributors, and manufacturers.
- RPC.2-2 By 2022, continue implementing and scale the Kitchen Zero SF pilot program, which reduces food waste by tracking over-purchasing by food generators, and redirects otherwise wasted food to communities in need, including providing recovered fresh produce to communities with limited access.
- RPC.2-3 By 2024, adopt a Food Waste Prevention and Edible Food Recovery policy and develop a program and incentives structure for compliance and monitoring in alignment with California's State Bill 1383 food recovery regulations.
- RPC.2-4 By 2023, form strategic partnerships between SF Environment's Green Business Program, City agencies, and hospitality and food industry organizations to reduce over-purchasing of food and encourage lower-carbon intense menu choices.

## COMMUNITY BENEFITS



RACIAL AND SOCIAL EQUITY\*\*



JUST TRANSITION



HEALTH



RESILIENCE



RPC.2-5 By 2024, develop guidance in partnership with other municipal agencies to implement city procurement of food in alignment with the five core values put forth by the Good Food Purchasing Program (GFPP): developing local economies, improving health, valuing the workforce, considering animal welfare, and environmental sustainability, including regenerative agriculture.

RPC.2-6 By 2025, San Francisco Department of Public Health will ensure the Zuckerberg San Francisco General and Laguna Honda Hospitals meet a 20% reduction in carbon and water footprints by implementing sustainable food purchasing standards that ensure food procurement aligns with the core values of the GFPP.

RPC.2-7 By 2030, San Francisco Unified School District will continue to build upon its adopted resolution to participate in the GFPP, aiming to procure food locally and from minority owned businesses and farms, switch entrees to lower-emissions alternatives, reduce over-purchasing of food, and donate meals to communities in need.



San Francisco-based nonprofit Farming Hope manages a garden-to-table job training program for formerly incarcerated or homeless citizens. Through the KitchenZeroSF program (RPS.2-2), they are able to receive donated surplus produce from Imperfect Produce/Imperfect Foods for their operations.



# Responsible Productions & Consumption

## RPC.3

## STRATEGY

Promote reduction, reuse, repair, and recovery of goods and materials.



### WHAT WOULD SUCCESS LOOK LIKE?

By 2030, through a combination of policy, education and outreach, and new infrastructure solutions, San Francisco cuts its generation of discards by 15%, and the disposal of discards to landfill and incineration by 50%.



### GHG REDUCTION POTENTIAL BY 2030

Not Available



### ESTIMATED COST BY 2030

\$\$: 1-10 million



### CLIMATE METRIC

Tons of excess non-food and non-building materials generated and tons disposed to landfill and incineration.



### EQUITY METRIC

# of affordable housing and small business sites that have removed or reduced contamination charges

## COMMUNITY BENEFITS



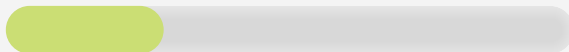
RACIAL AND SOCIAL EQUITY\*\*



JUST TRANSITION



HEALTH



RESILIENCE

## Supporting Actions

- RPC.3-1 By 2023, reduce use of non-reusable foodware by requiring, incentivizing, supporting and/or promoting reusables for on and off-site dining (to-go or delivery).
- RPC.3-2 By 2023, reduce, reuse, and repair, by requiring take-back and resale of used clothing, and promoting donation and longevity of used apparel and textiles.
- RPC.3-3 By 2024, encourage or facilitate inclusive and networked neighborhood-scale projects such as lending libraries, repair clinics, and reuse exchanges for tools, equipment, electronics, furniture and other goods that reduce production and consumption of goods.
- RPC.3-4 By 2024, expand outreach, education, and incentives for paper and plastic use reduction by supporting businesses and institutions in their transition to more reusable and plastic-free packaging and digital forms of communication; support policies to extend producer responsibility to reduce and recover packaging.
- RPC.3-5 Increase compliance with mandatory construction and demolition debris recovery (newly amended Environment Code Chapter 14) and mandatory recycling and composting (Environment Code Chapter 19) to increase recovery and reduce disposal while providing economic and social benefits such as local jobs and reduced illegal dumping.
- RPC.3-6 By 2025, advance opportunities, programs and policies within the city, neighborhoods, industrial and corporate campuses, and SFO airport to maximize material recovery.



# STRATEGY

Lead the aviation sector by reducing emissions across the airline passenger journey.



## Responsible Productions & Consumption

# RPC.4



### WHAT WOULD SUCCESS LOOK LIKE?

GHG emissions associated with all SFO ground fleet operations and landing/takeoff of aircraft have been reduced and aircraft fuels procured by air carriers are sustainable aviation fuels.



### GHG REDUCTION POTENTIAL BY 2030

Not Available



### ESTIMATED COST BY 2030

Not Available



### CLIMATE METRIC

Gallons of Sustainable Aviation Fuels procured.



### EQUITY METRIC

TBD

## Supporting Actions

- RPC.4-1 SFO will encourage and incentivize, where viable, switching aviation sector fuel to low carbon sources for both air and ground fleets.
- RPC.4-2 SFO will continue its leadership and partnership with airlines to work to replace up to 50% of its fuel supply with Sustainable Aviation Fuels by 2050.
- RPC.4-3 SFO will explore how to expand its Scope 1 and 2 carbon mitigation and offset program, to also consider qualified soil carbon sequestration as well as other sequestration projects where viable and as an accepted best practice.

## COMMUNITY BENEFITS



RACIAL AND SOCIAL EQUITY\*\*



JUST TRANSITION



HEALTH



RESILIENCE



# Healthy Ecosystems

**Healthy ecosystems provide nature-based solutions to climate change by sequestering carbon from the atmosphere and storing it in plants, trees, and soil. Stewardship of the city's natural resources helps restore biodiversity and provides a healthy environment that benefits all San Franciscans.**

Healthy Ecosystems deploy nature-based solutions, including ecological management, restoration, urban forestry, and regenerative agriculture to sequester emissions that cannot be eliminated by actions in other sectors. Globally, nature-based climate solutions can provide 37% of the mitigation needed by 2030 to limit temperature rise.<sup>51</sup> Urban ecosystems and nature-based solutions can offer important pathways for sequestering carbon while protecting and restoring healthy, biodiverse ecosystems, natural areas, and urban forests to ensure a nature-rich city that can be enjoyed by everyone.

## SECTOR GOAL:

**Continual use of nature-based solutions to sequester emissions and support biodiversity.**

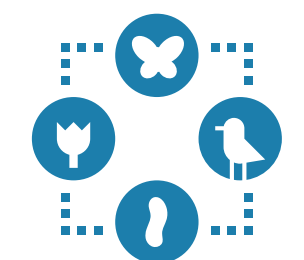
## CONTEXT

The Ramaytush Ohlone, the original peoples of the San Francisco Peninsula, have lived in harmony with nature for millennia. Embracing Indigenous Traditional Ecological Knowledge into how the city's lands, waters, and its population are cared for advances sustainability and climate goals. San Francisco has adopted plans and programs that lay actionable steps for greening the

city, restoring biodiversity, and improving community resilience.<sup>52</sup> Key examples include the 2018 Biodiversity Resolution, the Significant Natural Resource Areas Management Plan, and decades of work by the San Francisco Urban Forestry Council. These plans and policies aim to increase public access to nature, protect biodiversity, and support green infrastructure and other vital ecosystem services. Healthy Ecosystems strategies and supporting actions leverage these efforts to create crucial carbon sequestration tools that will help the City meet climate goals and create other community benefits.

Beyond the 49 square miles of the city boundaries, San Francisco owns land in surrounding counties, including watershed lands that protect water supplies,

# Accomplishments



Completed the pilot block installation of the

## Sunset Blvd Biodiversity Master Plan

supporting SF native plants and pollinators



# 12 miles

of trails created through parks to enjoy nature, vistas, and views

# 98%

of green waste have been repurposed into landscape materials and returned to our parks



# 20,000

native and climate resilient plants were planted in parks in 2020

and support many rare and endangered species. Continued resource management best practices, such as grassland restoration, rare species conservation, and invasive plant management ensure these natural lands will continue to store carbon on a much larger scale than the City itself could.

## Using nature-based systems to sequester carbon

Implementing ecologically regenerative agricultural practices — commonly referred to as “carbon farming” — on working lands located outside the city can serve as critical tools to mitigate climate change.<sup>53</sup> Examples of best management practices include riparian or other woody vegetation restoration to sequester carbon and help offset emissions along with fuels management to reduce the risk of high intensity wildfires to ensure that these lands continue to sequester carbon. Our scientific understanding of carbon storage capacity from natural ecosystems has become more robust and these solutions will be increasingly important to offset the emissions the City cannot eliminate completely to meet its 2040 net-zero emissions goal. However, climate change is a stressor on ecosystems and can potentially reduce their ability to sequester carbon.

For years, organic discards collected through the City’s zero waste program (“green bins”) have been used to create nutrient-rich compost which has traditionally been sold to regional agricultural operations, creating a circular flow of materials, and reducing emissions by keeping organics out of landfills where they emit methane. While still an emerging practice, studies show that applying high-quality compost to farmlands and pasturelands can significantly increase the soil’s ability to sequester carbon from the atmosphere, offering another opportunity to leverage zero waste

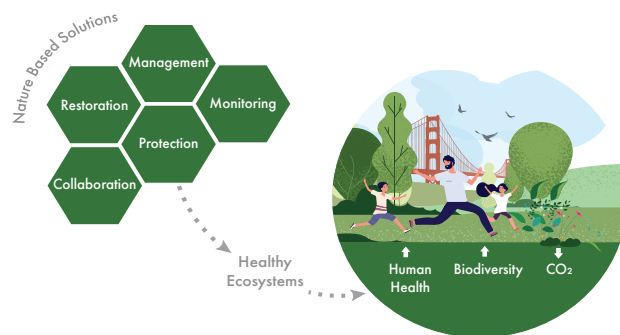


FIGURE 23: RELATIONSHIP BETWEEN HEALTHY ECOSYSTEMS, HEALTH, BIODIVERSITY, AND CLIMATE

efforts to support climate action. The City is working with external partners to study and improve compost application practices.

## Climate action and biodiversity

As climate change continues to threaten all aspects of society, the Earth's biodiversity is also in crisis.<sup>55,54</sup> Species are being lost at a rate 1,000 times greater than at any other time in recorded human history.<sup>56</sup> According to a recent report issued by the IPCC and Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), San Francisco is a global biodiversity hotspot, defined both by great biological diversity, and by the ongoing threat of human-caused impacts, such as expanding population and development patterns.<sup>57</sup> Dedicating lands and green space for carbon sequestration can restore and protect the region's undeveloped natural lands, allowing biodiversity to thrive. San Francisco's commitments to marrying biodiversity protection with climate action aligns with global efforts. State and federal governments, as well as C40, the global network of megacities, have set goals to conserve 30% of lands and coastal waters by 2030, both for robust biodiversity and to cut emissions.<sup>58,59</sup>

**“Biodiversity loss and climate change are both driven by human economic activities and mutually reinforce each other. Biodiversity loss and climate change are both driven by human economic activities and mutually reinforce each other. Neither will be successfully resolved unless both are tackled together.”**

-Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services & Intergovernmental Panel on Climate Change

## Generating community health benefits

As San Francisco works to meet its climate goals, it can also meet the need for residents to connect to nature and enjoy safe, green places to walk, meet and build community. For instance, planting street trees sequesters carbon and can support local biodiversity, while urban forestry has many other benefits, such as clean air, cooling, stormwater management, enhancing neighborhood beauty and improving quality of life. Planting street trees also produces benefits that support other sectors; for example, by making streets

more pleasant for walking, and by providing shading for buildings, which reduces the energy and associated emissions required to keep them cool.

Many studies have shown that natural environments enhance health and encourage healthy behaviors and there is a growing body of literature on the mental and physical benefits of spending time outdoors.<sup>60</sup> For instance, children who go to school in areas with green space tend to do better in school.<sup>61</sup> During the pandemic, when San Franciscans were unable to gather indoors, access to greenspace was critical for community health and resilience. Healthy Ecosystems not only mitigate climate change, but also help ecosystems and communities adapt. Additionally, protecting and restoring healthy, biodiverse ecosystems, and promoting smart and equitable urban forestry ensures environmental benefits are justly distributed to all San Franciscans.

## Equity and governance

To be successful, proposed healthy ecosystem strategies and activities will require extensive engagement and partnership with stakeholders, including but not limited to: BIPOC, agencies representing different jurisdictional boundaries, and private entities. Ongoing and future efforts must demonstrate a strong commitment to inclusive processes to ensure equitable outcomes.

While carbon sequestration and ecosystem conservation are mutually beneficial, in some situations there may be a conflict between the two goals. If, for example, a highly biodiverse California native grassland were planted with fast-growing eucalyptus trees to support sequestration goals, this would destroy the site's indigenous biodiversity and long-term ecological resilience; it could also make the landscape more susceptible to fires, which would release stored carbon. Conversely, in some cases non-native trees may be preferable for the urban landscape, as years of experience have identified species that are able to thrive in the harsh conditions of sidewalk tree planting.

Acknowledging these tensions, Healthy Ecosystems strategies and supporting actions leverage established best practices of urban greening and ecosystem restoration to clarify trade-offs and identify synergies to achieve shared goals.



## Strategy Overview

San Francisco already has ambitious plans to grow its urban forest and protect its biodiversity. Healthy Ecosystems climate strategies leverage these efforts for carbon sequestration. These strategies work together by strengthening collaborations and partnerships, increasing community participation in nature-based solutions, and maximizing nature-based resources to sequester carbon.

Increasing collaboration includes strengthening relationships with American Indian organizations, federal and state governing entities and deepening ties among the City agencies engaged in this work. Healthy Ecosystem collaborators will pilot projects to gain better understanding of the carbon storage potential of San Francisco's agriculture lands.

Identifying funding streams will be crucial to the success of each interwoven strategy. Additional funding will ensure that all community members benefit from this work, especially those areas of the city that have fewer trees and less green and open space than other San Francisco neighborhoods.

### Top Climate Solution:

**Enhance and maintain San Francisco's urban forest and open space**



### Did you know?

**Co-Benefits of Climate Action:** Maximizing trees and other urban greening throughout the public realm can result in:

#### INCREASED PROPERTY VALUES

**\$92M**  
(2021-2050)

#### REDUCED HEALTH CARE COST

**\$422,000**  
(2021-2050)

# HE.1

## STRATEGY

Advance citywide collaboration to continually refine nature-based climate solutions that sequester carbon, restore ecosystems and conserve biodiversity.



### WHAT WOULD SUCCESS LOOK LIKE?

All relevant agencies are engaged in a properly resourced collaboration that makes substantial and measureable annual progress on soil carbon sequestration and biodiversity projects.



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating  
(no direct reduction)



### ESTIMATED COST BY 2030

\$: 0-1 million



### CLIMATE METRIC

# of City sequestration and biodiversity projects implemented



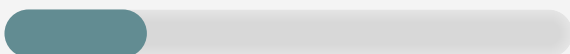
### EQUITY METRIC

# policies and plans evaluated and improved using racial equity tools

## Supporting Actions

- HE.1-1 By 2022, complete the Alameda watershed carbon case study and quantify the value of carbon storage provided by protecting this natural area.
- HE.1-2 By 2022, launch the municipal soil calculator and initiate an assessment of the potential for all City owned lands to sequester carbon while maximizing indigenous biodiversity.
- HE.1-3 By 2023, City departments should develop their own policies and procedures to assess carbon sequestration opportunities for capital projects, prioritize biodiversity and green infrastructure, and maximize local native plants. Departments should work together in the Biodiversity Interagency Working Group to create shared policies and procedures where possible.
- HE.1-4 By 2025, develop best practice guidelines for improving or maintaining carbon sequestration and retention in soils, plants and natural habitats, while preserving biodiversity and ecosystem services.
- HE.1-5 By 2025, incorporate carbon sequestration and biodiversity conservation findings into a Carbon Sequestration and Ecosystem Restoration Strategy for City land and watershed management, consistent with agencies' existing plans and policies.

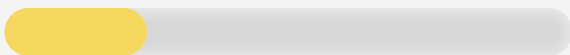
## COMMUNITY BENEFITS



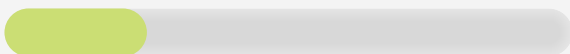
**RACIAL AND SOCIAL EQUITY\*\***



**JUST TRANSITION**



**HEALTH**



**RESILIENCE**

# STRATEGY

Increase equitable community participation and perspectives in nature-based climate solutions, including meaningful efforts to prioritize Indigenous science and Traditional Ecological Knowledge.

## HE.2



### WHAT WOULD SUCCESS LOOK LIKE?

The City will continue to provide and expand access to nature-based climate solution training, education and opportunities for all San Franciscans especially BIPOC communities.



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating (no direct reduction)



### ESTIMATED COST BY 2030

\$\$: 1-10 million



### CLIMATE METRIC

# of people engaged during trainings and outreach campaigns



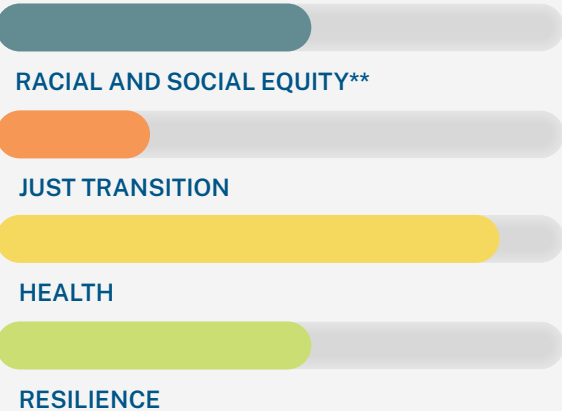
### EQUITY METRIC

# of acres dedicated for American Indian stewardship

## Supporting Actions

- HE.2-1 The City will engage American Indian tribes, cultural bearers, neighborhood organizations, local businesses, the San Francisco Unified School District, and non-profit organizations during the planning and implementation of greening projects, including for the purpose of local hiring and workforce development.
- HE.2-2 By 2022, establish an inter-jurisdictional working group of American Indian representation, federal and state parks agencies, cultural districts, local non-profits, and educational and research institutions, dedicated to nature-based solutions, focused on resilience and biodiversity conservation.
- HE.2-3 The City will honor Indigenous knowledge from the original stewards of these lands (Yelamu) and create strong partnerships through meaningful engagement with the Ramaytush Ohlone and the American Indian community to participate in stewardship of lands managed by San Francisco.

### COMMUNITY BENEFITS



## STRATEGY

Restore and enhance parks, natural lands and large open spaces.



### WHAT WOULD SUCCESS LOOK LIKE?

Natural lands management is fully resourced, so that existing lands can be continually improved and new lands added on an ongoing basis that are also sufficiently resourced for management and restoration.



### GHG REDUCTION POTENTIAL BY 2030

Less than 100,000 mtCO<sub>2</sub>e



### ESTIMATED COST BY 2030

\$\$\$: 10-100 million



### CLIMATE METRIC

# of acreage improved AND restored for carbon sequestration and biodiversity.



### EQUITY METRIC

% natural areas added or restored through community-endorsed processes in communities with environmental justice burden as identified in [EJ Communities Map](#)\*

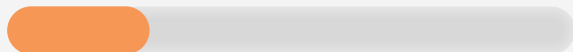
## Supporting Actions

- HE.3-1 By 2030, explore expansion of the City's natural areas preservation system through land transfers and acquisitions of undeveloped/unprotected private and public lands.
- HE.3-2 By 2030, continue improving management of existing salt marshes and explore expanding restoration acreage of degraded Bayshore properties owned by the Port and Recreation and Parks at India Basin and at Candlestick State Recreation Area.
- HE.3-3 By 2025, create a 3-acre horizontal levee at Heron's Head Park.
- HE.3-4 By 2030, restore and create 173 acres of natural ecological parkland on Yerba Buena and Treasure Islands, including implementing the Yerba Buena Island Habitat Management Plan.
- HE.3-5 By 2030, restore 100+ acres of upland and wetland habitats at the San Bruno Jail and SFO West of Bayshore Properties.

## COMMUNITY BENEFITS



RACIAL AND SOCIAL EQUITY\*\*



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HEALTH



RESILIENCE



# STRATEGY

Optimize management of the city’s entire urban forest system.

## Healthy Ecosystems

# HE.4



### WHAT WOULD SUCCESS LOOK LIKE?

Typology-based goals and targets are fully developed and balanced with land management objectives and being carried out across the entire city.



### GHG REDUCTION POTENTIAL BY 2030

Enabling/Accelerating  
(no direct reduction)



### ESTIMATED COST BY 2030

\$\$\$: 10-100 million



### CLIMATE METRIC

Plans, policies and annual monitoring are fully funded and being implemented.



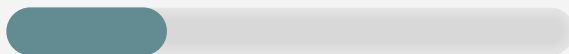
### EQUITY METRIC

# of organizations representing BIPOC communities in plan development

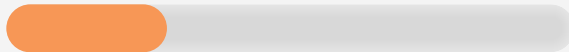
## Supporting Actions

- HE.4-1 By 2023, encourage City agencies to develop guidelines for tree species selection and management procedures that incorporate community resilience, carbon sequestration, and ecosystem services and biodiversity, consistent with City agencies’ strategic plans and goals.
- HE.4-2 By 2023, pending availability of resources, standardize urban forestry and greening data collection (including street tree census and canopy coverage), and complete the Urban Forest Master Plan Phases 2 (Parks and Open Space) and Phase 3 (Private Lands and Backyards).
- HE.4-3 By 2023, continue and, if applicable, expand urban wood waste diversion to maximize carbon sequestration and conserve landfill space.

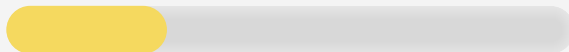
## COMMUNITY BENEFITS



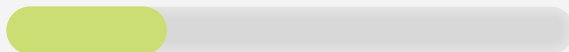
RACIAL AND SOCIAL EQUITY



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HEALTH



RESILIENCE

## STRATEGY

Maximize trees throughout the public realm.



### WHAT WOULD SUCCESS LOOK LIKE?

The public realm is fully “built-out” in terms of urban forestry and community greening, so that everyone has immediate access to nearby nature.



### GHG REDUCTION POTENTIAL BY 2030

Less than 100,000 mtCO<sub>2</sub>e



### ESTIMATED COST BY 2030

\$\$\$: 10-100 million



### CLIMATE METRIC

Count of trees planted and area (sq ft) of public realm installed with native, climate appropriate greening.



### EQUITY METRIC

% trees planted in communities with environmental justice burden as identified in [EJ Communities Map](#)\*

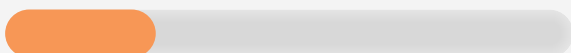
## Supporting Actions

- HE.5-1 By 2040, plant 30,000 street trees in the sidewalk tree wells, approximately a 25% increase, to complete the street tree network.,
- HE.5-2 By 2030, maximize, where woody vegetation is appropriate, planting coast live oak and other native trees and arborescent shrubs throughout the entire public realm.
- HE.5-3 By 2023, create a City-managed and -dedicated street tree nursery.
- HE.5-4 By 2023, create a policy to require preservation of mature trees during development or infrastructure modifications and for planting of basal area equivalent of mature trees whose removal is unavoidable.

## COMMUNITY BENEFITS



RACIAL AND SOCIAL EQUITY\*\*



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HEALTH



RESILIENCE

# STRATEGY

Maximize greening and integration of local biodiversity into the built environment.

## Healthy Ecosystems

# HE.6



### WHAT WOULD SUCCESS LOOK LIKE?

City and community greening in the built environment with local native plants has become routine



### GHG REDUCTION POTENTIAL BY 2030

Less than 100,000 mtCO2e



### ESTIMATED COST BY 2030

\$\$\$: 10-100 million



### CLIMATE METRIC

Count of acreage improved AND restored for carbon sequestration and biodiversity.



### EQUITY METRIC

% incentives distributed to communities with environmental justice burden as identified in [EJ Communities Map](#)\*

## Supporting Actions

- HE.6-1 By 2023, establish a measurable and geographically specific target for daylighting San Francisco creeks.
- HE.6-2 By 2023, create permanent code and financial incentives for nurseries to sell local natives and for private property owners to preserve green space, protect existing mature trees and shrubs, plant local natives, and install living roofs and walls.
- HE.6-3 By 2026, maximize revegetation of degraded City and State major expressway, highway and rail corridors with hardy, low-maintenance trees and shrubs.
- HE.6-4 By 2025, create a City-owned and managed local native plant nursery that supplies plants annually to City agencies that do not currently have access to local native plants.
- HE.6-5 By 2030, maximize replacing concrete to create more biodiverse green space on public land.
- HE.6-6 By 2030, build 10 pollinator habitat landscapes at public housing sites.
- HE.6-7 By 2030, fully implement the Sunset Boulevard Biodiversity Master Plan by planting native grasses, trees and shrubs for habitat and climate resilience.
- HE.6-8 By 2030, develop and implement science-based recommendations for creating ecological corridors where feasible.

## COMMUNITY BENEFITS



RACIAL AND SOCIAL EQUITY\*\*



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HEALTH



RESILIENCE

## STRATEGY

Conduct carbon sequestration farming pilot projects and research.



### WHAT WOULD SUCCESS LOOK LIKE?

Appropriate carbon sequestration projects have been piloted and have become best practice on city, private and other public owned land.



### GHG REDUCTION POTENTIAL BY 2030

Less than 100,000 mtCO<sub>2</sub>e



### ESTIMATED COST BY 2030

\$\$\$: 10-100 million



### CLIMATE METRIC

Appropriate carbon sequestration projects have been piloted and have become best practice on City, private and other publicly-owned land.



### EQUITY METRIC

# of projects which include Indigenous science and/or Traditional Ecological Knowledge

## Supporting Actions

- HE.7-1 By 2024, apply approximately 500 wet tons of biosolids per year as a soil amendment and to sequester carbon on newly identified sites such as mine reclamation projects in Northern California.
- HE.7-2 Improve compliance with Mandatory Composting (Environment Code Chapter 19 and SB 1383) and optimize organics processing to increase the quantity and quality of compost produced to support soil carbon sequestration activities.
- HE.7-3 By 2030, pilot appropriate carbon sequestration techniques as part of ongoing ecological restoration of degraded habitats within SFPUC lands.
- HE.7-4 By 2025, SFO will expand its carbon mitigation and offset program to include soil carbon sequestration projects, where viable.

## COMMUNITY BENEFITS



RACIAL AND SOCIAL EQUITY\*\*



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HEALTH



RESILIENCE







SECTION 6:

# **NEXT STEPS FOR IMPLEMENTING THE CAP**



**The CAP is a roadmap for meeting the City’s emissions reduction goals while advancing equity and other critical priorities. Successful implementation will call for government, the private sector and engaged communities to work together to address the climate emergency. Recommended actions must be carried out swiftly, efficiently, and democratically.**

Meeting the challenges of climate change and implementing the CAP will call for courage and sustained commitment from political leaders, businesses, community organizations, and residents. Desired outcomes can be accelerated by strategically leveraging planned investments in energy, buildings, transit, housing, and greening efforts. Sufficient funding and expanded stakeholder engagement will be necessary to move from vision to reality.

Ongoing and transparent reporting on key performance indicators, which is to occur annually, will be critical to measure progress against goals and allow for adjustments based on changing conditions. Future CAP updates will occur once every five years and will capture new and ongoing gaps and concerns.



Community supporters gather after the Board of Supervisors vote to pass the 2019 climate emergency resolution.

## LEVERAGING OTHER INVESTMENTS

The 2021 Climate Action Plan builds on decades of experience and the momentum created by complementary efforts to reduce emissions and advance equity. It reflects other plans and policy priorities, and identifies technical and financial opportunities, as well as challenges, for accelerated decarbonization.

The adoption of the CAP does not, by itself, fund or authorize implementation of any specific projects or policies, but rather provides a roadmap to achieve equitable climate goals. Although they may be included or referenced in other City plans, many of the CAP's proposed actions will require legislative approvals. Further, any new actions will be required to undertake all appropriate legal, environmental, and technical analysis.

For example, Building Operations actions such as “BO 2-2: electrification at time of replacement,” will require extensive stakeholder engagement, legal analysis and environmental review to create new legislation. Similarly, some Transportation and Land Use actions, such as “TLU 1-1: Fund and implement the recommendations of the ConnectSF Transit Corridors Study” are sourced from distinct planning efforts, so must ultimately follow their own timelines, decision making, and approval processes in accordance with

the plans and recommendations from which they are drawn. Importantly, for any proposed action to become reality, capital and operational funding options must be vigorously explored, identified, and expanded.

## FUNDING THE CAP

After CAP adoption, the City will continue working on actions that already have political authorization, fiscal support and environmental clearance; however, identifying adequate funding sources and undertaking any required technical, legal, and environmental review will be crucial for implementing other strategies. Particularly for actions where costs are borne by citizens and businesses or where federal support is lacking, efforts will be made to structure and phase in actions to control costs for private entities. However, to achieve CAP goals, investment levels must be strategically increased far beyond leveraging existing sources of funding.

These initiatives frequently rely on a multitude of funding streams made of local, regional, state, and federal sources. Securing these funds is highly competitive and often lacking, which means they may not be a dependable source to meet the City's needs. In many cases, cities and states cannot afford to address climate change and cut emissions on their own. External support, from state and federal governments, is needed more than ever. Other challenges include the fact that



many climate actions do not have a traditional return on investment that can attract private capital. Additionally, there will always be many competing demands on limited public sector funding.

The recent commitment of City funds will be used to assess the costs of implementing specific actions, investigate various funding and financing mechanisms, and make specific recommendations for moving forward. City departments and other key stakeholders, including business and labor voices, financial advisors, and legal and policy experts will collaborate to research and analyze reliable financing models and identify the most promising options.

This process will rely on preliminary work done to outline potential funding sources and will grow to include quantifying potential funding from each source and clarifying how much implementing each strategy will cost (See **Appendix G** for full technical summary). Overall, recommended next steps include:

1. Create an interdepartmental climate finance working group to assess the economic, social, political, and administrative viability of securing new funding sources.
2. Develop a detailed cost estimate for implementing CAP actions (beyond high-level estimates in the CAP).
3. Identify all opportunities to fund CAP strategies from existing funding sources and approved measures.
4. Assess which CAP strategies are not funded or partially funded to identify funding gaps.
5. Investigate a new tax (carbon tax, food tax) and/or increase existing taxes (sales tax, property tax) as a major contributor to reducing funding gaps.
6. Seek out and apply for relevant federal, state, and local grant opportunities which can serve as important seed funding for implementing CAP strategies or other supporting activities such as community engagement or technical analysis.

## MONITORING, EVALUATION, AND REPORTING (MER)

Upon completion of the CAP, the City will create and share a robust monitoring, evaluation, and reporting (MER) system that enables stakeholders to track key metrics and understand progress toward targets and goals.

SF Environment will work with key City agencies to establish a governance process, accompanied by a public facing dashboard to report on progress toward implementing the CAP. The dashboard will track climate and equity metrics, which were proposed in Section 5. The metrics are drafts and subject to change, based on multiple factors including: availability of data; introduction of better or higher quality data to quantify impacts; further engagement and discussion with additional stakeholders; and other external changing conditions. Some metrics were still being determined at the time of publication.

The MER system will follow requirements outlined in the updated Chapter 9 of the Environment Code, which calls for the City to measure and monitor sector-based emissions, including municipal emissions, as well as consumption-based emissions.

It will build on existing City data capabilities such as SFE's interactive climate storyboard, DataSF, and municipal and public sector building energy benchmarking. The system will use best practices to ensure accountability and transparency, provide relevant information to a wide range of stakeholders, and adapt as necessary. MER efforts will also serve to report on climate action progress to local, state, national, and global partners.

In addition to transparent reporting, the City government will need to show significant leadership to implement the CAP, including appropriating a budget commensurate with the need to accelerate climate investments. It will also need to speed up the delivery of projects, from planning and environmental review to procurement and construction. The City will also need to further embed climate priorities and values within policies, including education and training programs, and other governance-related activities within City government.

## COST OF INACTION VS. BEING PROACTIVE

While the costs of implementing the CAP may seem daunting, there is ample research showing that the costs of not acting are several orders of magnitude greater. Communities around the country are already being financially devastated by unfolding climate disasters.

Fortunately, San Francisco continues to exhibit the political will and leadership to create financing structures that can serve as models for future action, including:

**Bonds:** San Francisco's Green Bonds Program was launched by the SFPUC in 2015, to fund renewable energy investments. Since that time, the City has issued almost \$2 billion in Green Bonds.

**Fees:** San Francisco legislated the SF Carbon Fund, which requires that 13% of the cost of airfare for municipal travel be invested in local projects that mitigate and sequester emissions. While the program is a fraction of the city's overall budget, it has been a powerful funding source for neighborhood projects.

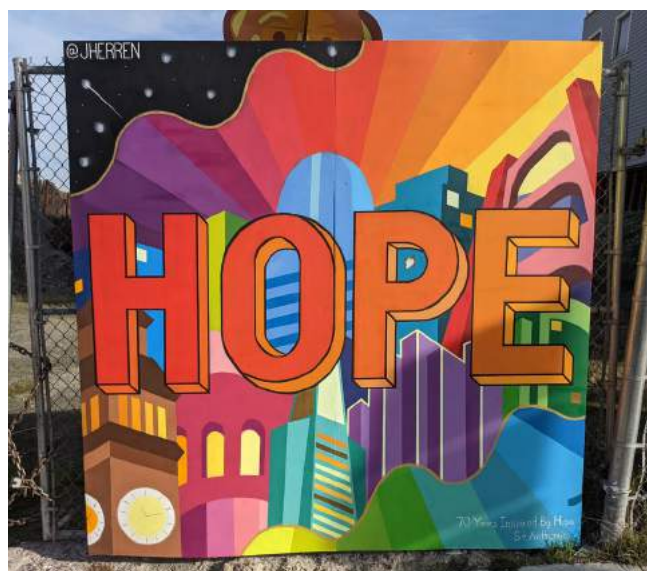
**Taxes:** In 2016, San Francisco voters passed the Soda Tax, which levies a small tax on distributors of sugary drinks. Revenues go toward food security, health education, and outdoor activities, all of which intersect with the city's climate mitigation and resiliency efforts.

**Grants:** San Francisco has secured a range of competitive grants. For example In 2019, it was awarded \$40 million from the State's Affordable Housing and Sustainable Communities Program to provide affordable housing developments designed to support public transit. And over the last decade, the City has received multiple grants from the California Energy Commission to accelerate the adoption of EVs.

Increased public awareness and participation informed by the MER system will be necessary to create active democratic participation in the CAP and will help to ensure that the city achieves the mandated emission reduction goals articulated in Chapter 9.

## ADDITIONAL TOOLS FOR REACHING NET ZERO

Chapter 9 of the Environment Code defines net-zero emissions as a 90% reduction in direct GHG emissions, to be reached by 2040, with the remaining 10% removed from the atmosphere using nature-based sequestration strategies. The City is working on parallel paths to pull carbon out of the atmosphere, even as it maintains momentum to reduce its emissions. Ultimately, San Francisco could sequester many more tons of carbon than the 10% called for in the Environment Code. While City agencies do not currently quantify the carbon sequestration potential of its Healthy Ecosystems strategies, new tools are being developed that can more accurately assess each strategy and provide data to inform how to best deploy them in urban environments and on City-owned land. Areas to explore include sequestration potential of applying organic material to soils, additional tree planting, other urban greening, as well as research into new technological solutions for sequestering carbon.



One example that could serve as a model is the SF Carbon Fund, which places a surcharge on the cost of City employees' work-related air travel and invests it in local projects that mitigate and sequester emissions. Launched more than 12 years ago, the SF Carbon Fund uses widely accepted protocols to estimate emissions savings. It has created \$1.5M for city-wide community greening projects that not only sequester carbon but provide a range of other benefits such as healthy food and community gathering space.

Similar revenue-producing models could be modified and expanded to fund projects that increase carbon sequestration, soil health, and nutrient recycling. Additionally, the City's wastewater treatment facility could be designed to capture excess methane gas and convert it low-emissions biofuel for uses that maximize climate benefits. Accounting for natural systems carbon sequestration and other strategies can help bridge the gap from the current projections to the 2040 net-zero target.

## ISSUES FOR FUTURE CONSIDERATION

CAP strategies must ensure that all community members, especially the most vulnerable and marginalized, have access to the health, economic, and resilience benefits of climate action. While this CAP is specifically focused on actions that reduce emissions and equitably distribute benefits, future iterations may consider action on other environmental issues to improve the delivery of critical infrastructure and maximize community health and resilience benefits of climate investments.

### Addition of a disability justice lens

Climate change has been demonstrated to have both a direct and indirect impact on the effective enjoyment of a wide range of human rights, including the rights of persons with disabilities. Persons with disabilities are often among those most adversely affected in an emergency, sustaining disproportionately higher rates of morbidity and mortality, and at the same time being among those least able to have access to emergency support.<sup>63</sup>

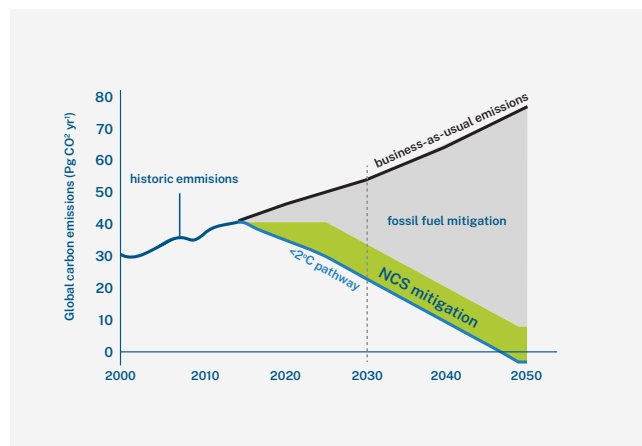


FIGURE 24: NATURE CLIMATE SOLUTIONS (NCS) CONTRIBUTION OF CARBON SEQUESTRATION TOWARDS REACHING NET ZERO EMISSIONS<sup>62</sup>

## Land contamination in the Southeast

During the community engagement process for developing the CAP, community members voiced strong concerns about hazardous waste and land remediation issues, particularly in the city's Bayview Hunters Point neighborhood. While not directly related to emissions reduction, these issues are important to both the city and communities in San Francisco's southeast sector, where new development on former Navy lands is growing. A number of City departments have jurisdiction over hazardous waste and land remediation issues and are rigorously working with the community to achieve long-term solutions. Future work streams have been identified to strengthen the connection between climate action, community resilience, and contamination issues. City departments will continue coordinating to:

- Secure funding to engage marginalized communities in identifying climate and environmental issues of greatest concerns to their community.
- Update the City's Hazards and Climate Resilience Plan, which identifies active and potential contaminated lands and calls out the risk of greater spills and the potential for storage infrastructure to be compromised by flooding.

- Identify funding that supports the Sea Level Rise Working Group in researching how current and former industrial uses of waterfront areas can lead to issues around soil contamination and hazardous materials that may be exacerbated by sea level rise.

## Water supply, conservation, and reuse

The City must ensure an adequate and sustainable long-term water supply for the citizens of San Francisco. Over the next year, a new section will be added to the CAP that will include a Water chapter that sets goals, strategies and actions around water consumption, residential and commercial water use, and diversifying water resources, including recycled water, water reuse, purification and storage.

The Water chapter will also address wastewater issues. The process of wastewater treatment generates emissions based on the amount of organic matter, predominantly protein, that is converted into nitrous oxide and released with effluent from the City's wastewater treatment plants. Methane, a powerful warming gas and biogas, is also released during the decay process in the City's anaerobic digesters. Capturing this biogas can reduce the carbon intensity of wastewater treatment processes. The Water chapter will look to align the use of biogas produced from the wastewater treatment plants with the City's Climate Action goals and develop strategies to reduce wastewater and its processing.

In developing this chapter, the SFPUC, SF Environment, and relevant stakeholders will also apply the Racial and Social Equity Assessment Tool (R-SEAT) to ensure an equity-centered approach to its development and recommendations.

## BOLD, COLLECTIVE ACTION

San Francisco is proud of its decades of local climate leadership, but much more action is needed. In 2021, after passionate advocacy from local stakeholders inspired to act by the unfolding climate emergency, the City allocated dedicated funding to develop a detailed analysis of the cost of CAP implementation and identify reliable funding models that would be most successful in San Francisco. It will also take steps to create a new

Climate Equity Hub to ensure San Francisco's diverse communities are engaged in the ongoing efforts to reduce emissions and transition to a more sustainable future. While the expected initial cost of the CAP will be large, the cost and consequences of inaction would be far larger and much more harmful over time.

The CAP sets ambitious goals for San Francisco. Implementing the CAP will require deliberate policy choices from City leaders, including creating new ordinances, swiftly undertaking necessary environmental review of CAP actions, authorizing meaningful budget and investment allocations, petitioning State and Federal leaders for adequate resources, and making difficult trade-offs with other goals and priorities.

Every resident and institution in San Francisco has a role to play when it comes to building resilience and eliminating emissions. Increasing engagement and participation from more people will be crucial to making progress, particularly with BIPOC stakeholders to deliver on commitments to center equity in CAP implementation. Outreach and communications must highlight the connections between climate action and the four lenses of racial equity, health, economic justice, and community resilience. Public and private support for decarbonization policy is high, but putting it into action will require deliberate decision-making, including tradeoffs with other policy goals. The City cannot solve problems through business as usual approaches or with partial solutions. San Franciscans will need to embrace change, from new housing units to new bike lanes to new practices in our kitchens and more.

City and community leaders, local elected and appointed officials, state, regional, and federal agencies, the private sector, philanthropy, and the entire community must work together to increase climate investment, and secure commitments from all sectors to dedicate greater social, political, and financial resources toward implementing solutions that will benefit and protect us all.







**ENDNOTES**

1. On February 1, 2021 the Commission on the Environment [resolved](#) to state this land acknowledgement at the beginning of each meeting.
  2. According to the [Fourth National Climate Assessment](#), annual economic losses in the United States due to climate change in 2090 (in 2015 \$): Moderate warming (RCP 4.5): \$280 billion/year; Extreme warming (RCP 8.5): \$500 billion/year
  3. Public Policy Institute of California. "Income Inequality and Economic Opportunity in California" December 2020
  4. Data in table is from <https://cal-adapt.org/tools/local-climate-change-snapshot/> unless otherwise noted
  5. RCP 4.5 assumes emissions peak around 2040 and then decline. These emissions scenarios have been updated for the most recent IPCC report to reflect a broader range of possible emissions.
  6. RCP 8.5 assumes there are no significant efforts to limit or reduce emissions. Emissions continue to rise strongly through 2050 and plateau around 2100.
  7. What is considered extremely hot is location specific. Extreme heat threshold temperatures are commonly calculated as the 98th percentile of temperatures between April and October in an area. In San Francisco, an extreme heat day is 85F. By this same calculation, an extreme heat day in Sacramento is 104F.
  8. Number of consecutive days with precipitation of less than 1 millimeter for each year
  9. Sea level rise research used probabilistic projections, for more information see: [https://opc.ca.gov/webmaster/ftp/pdf/agenda\\_items/20180314/Item3\\_Exhibit-A\\_OPC\\_SLR\\_Guidance-rd3.pdf](https://opc.ca.gov/webmaster/ftp/pdf/agenda_items/20180314/Item3_Exhibit-A_OPC_SLR_Guidance-rd3.pdf)
  10. RCP 2.6 assumes stringent emissions reductions, with emissions declining by about 70% from 2015 to 2050, to zero by 2080, and below zero thereafter, meaning changes to land use and carbon capture technology might absorb large amounts of carbon dioxide emissions.
  11. "CO2e" represents an amount of a GHG for which atmospheric impact has been standardized to that of one unit mass of carbon dioxide (CO2), based on the global warming potential (GWP) of the gas. To estimate baseline emissions and track progress, global warming potential values are used to combine emissions of various greenhouse gases into a single weighted value for emissions, commonly referenced as metric tons of carbon dioxide equivalent (mtCO2e)
  12. Racial disparities described in [Ordinance to Create an Office of Racial Equity](#), July 2019
  13. The Environmental Justice Communities map is based on four inputs: CalEnviroScreen, income data from the state of California, local air pollution data, and demographic data. The demographic data used for the EJ Communities map is SFDPH's Areas of Vulnerability, which includes several indicators, including race.
- This is a draft version of the EJ Communities map that was released in December 2020. The San Francisco Planning Department is still in the process of gathering feedback from the general public and from other agencies. Because of this, the EJ Communities map may be revised during the fall or winter of 2021.
- CalEPA recently issued a draft of CalEnviroScreen 4.0 (which is the most heavily weighted data source in the EJ Communities Map), so it's likely that the EJ Communities map will be updated once CES 4.0 is finalized.
14. San Francisco Health Improvement Partnership. [San Francisco Community Health Needs Assessment](#), 2019
  15. American Community Survey and GeoLytics, Inc. [Bay Area Equity Atlas](#), 2019
  16. San Francisco Planning Department Analysis of 2014-2018 IPUMS-USA, University of Minnesota, [www.ipums.org](http://www.ipums.org). Underlying data from the U.S. Census Bureau.
  17. 18% was supplied by nuclear which is greenhouse-gas free but not renewable.
  18. Renewable energy in San Francisco is defined as solar (PV), wind, small hydro and existing large hydroelectric, geothermal, and biomass. For additional information see San Francisco's Environment Code Chapter 9.
  19. San Francisco Department of Environment. [2019 GHG Emissions Inventory At a Glance Report](#), April 2021
  20. CCAs provide supply where an investor-owned utility provides distribution services.
  21. San Francisco Public Utilities Commission analysis looked at January 2021 enrollment status and used 2019 historical loads.
  22. Disadvantaged communities are defined as the top 25% scoring areas from CalEnviroScreen along with other areas with high amounts of pollution and low populations. CalEnviroScreen is a tool developed by the CalEPA to identify communities disproportionately burdened by pollution and population characteristics that make them more sensitive to pollution.
  23. San Francisco Department of the Environment. [Methane Math: How Cities Can Rethink Emissions from Natural Gas](#), 2017.
  24. Co-benefit calculations are described in Appendix E.
  25. Facilities identified in the City's 2017 Resilient Solar and Storage Roadmap: <https://sfenvironment.org/solar-energy-storage-for-resiliency>
  26. Jobs analysis is described in Appendix F.
  27. 7% percent is the average of residential, municipal, and commercial buildings
  28. World Building Council, Alliance for Building and Construction and Architecture 2030.
  29. Co-benefit calculations are described in Appendix E
  30. This benefit is accrued outside of San Francisco because no natural gas power plants operate within its boundaries.
  31. Jobs analysis is described in Appendix F
  32. In July 2021, The SFMTA started to phase out the term "sustainable" in the context of modes of transportation and it has been replaced with "low-carbon." The modes included in this definition were still be evaluated during the development of this plan and updates will be posted to [sfclimateaction.org](http://sfclimateaction.org) when the analysis is complete.

33. ConnectSF: [2019 Statement of Needs](#); page 19-20; December 2018
34. SFMTA. [Shelter-in-Place Allows Muni to Analyze Sources of Delay May](#) 2020.
35. HEI Panel on the Health Effects of Traffic-Related Air Pollution. "[Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects](#)" Health Effects Institute. 2010
36. San Francisco Municipal Transportation Agency. [38-Geary Temporary Emergency Transit Lanes Project](#): Evaluation Report, May 2021
37. Bradley, Greene, Sana, Cooper, Castiglione, Israel and Coy. "Results of the First Large-scale Survey of TNC Use in the Bay Area". Unpublished Manuscript submitted to the Transportation Research Board. August 2020
38. San Francisco Department of Environment. [2019 GHG Emissions Inventory At a Glance Report](#). April 2021
39. Stephen Menendian, Samir Gambhir, and Arthur Gailles, "[Racial Segregation in the San Francisco Bay Area, Part 5](#)," Othering and Belonging Institute, August 2020
40. Michael C. Lens and Paavo Monkkonen, "[Do Strict Land Use Regulations Make Metropolitan Areas More Segregated by Income?](#)" Journal of the American Planning Association 82 (2016)
41. Cambridge Systematics, Inc. Climate Action Plan Transportation and Land use–Climate Change Mitigation Analysis: Prepared for San Francisco County Transportation Authority. October 22, 2021
42. Emissions reduction potential informed Cambridge Systematics, Inc Report; Other co-benefits were qualitative assessments by SFMTA & SFCTA Staff using the following definitions as guidance–Congestion: Potential to reduce vehicle miles traveled and congestion; Equity: Potential to improve access to destinations for income and marginalized communities; Public Health: Potential to improve physical fitness, air quality; mental health, ect.; Safety: Potential to improve public safety and reduces collisions; and Economic Vitality: Potential to support access to key destinations for jobs and commerce.
43. Co-benefit calculations are described in Appendix E
44. The City's housing production goal was first set by Mayor Ed Lee and carried forward by current Mayor London Breed. It references the 2021 Regional Housing Needs Allocation (RHNA) numbers established by the Metropolitan Transportation Commission (MTC), which sets housing targets for the nine Bay Area counties.
45. Just 22% of American Indian householders, 23% of Black, and 24% of Latinx householders own their own homes compared to 36% of white householders and 48% of Asian householders. IPUMS data 2014-2018.
46. Housing requires the orchestration of supportive infrastructure and services including transportation, schools, recreation and open space, civic institutions, the arts and cultural expression, health and social services, and businesses that support livelihoods and daily needs to create a sustainable neighborhood.
47. San Francisco Planning Department Analysis of 2014-2018 IPUMS-USA, University of Minnesota, [www.ipums.org](http://www.ipums.org). Underlying data from the U.S. Census Bureau.
48. AB 686 and AB 1771
49. Areas in every region of the State whose characteristics have been shown by research to support positive economic, educational, and health outcomes for low-income families — particularly long-term outcomes for children.
50. Adding to the limitation of resources to support affordable housing, State bonds are now competitive. Each state receives an annual federal allowance of tax-exempt, private activity bonds that can be issued to support public-serving projects including affordable housing. For nearly 15 years, California had not used all of its annual bond capacity but that changed this year, forcing the state to award bonds competitively and reducing availability. Because 4% Low Income Housing Tax Credits (LIHTC) must be paired with these bonds, the limit on bond availability also effectively limits LIHTC. MOHCD's affordable housing development pipeline is likely to slow down as a result of the slowing economy and the State bond shifts.
51. Griscom, B. W. et al, "[Natural Climate Solutions](#)." Proceedings of the National Academy of Sciences Oct 2017, 114 (44) 11645-11650; DOI: 10.1073/pnas.1710465114
52. San Francisco Department of the Environment, [Biodiversity Policy History](#), 2018
53. Carbon Cycle Institute, "[Carbon Farming](#)," 2021
54. Convention on Biological Diversity, [5th Edition Global Biodiversity Outlook](#), September 2020.
55. World Wildlife Fund, [Living Planet Report](#), 2020.
56. United Nations Environment Program, [Spotlight on Nature and Biodiversity](#), August 2021.
57. Conservation International, [Definition of Global Biodiversity Hotspots](#), 2021
58. White House Administration and President Joseph R. Biden, [Executive Order on Tackling the Climate Crisis at Home and Abroad](#), January 2021.
59. State of California Executive Department and Governor Gavin Newsom, [California Executive Order N-82-20](#), October 2020.
60. Kardan, O., Gozdyra, P., Misis, B. et al. "Neighborhood greenspace and health in a large urban center." Scientific Reports 5, 11610 (2015). <https://doi.org/10.1038/srep11610>
61. Dadvand, P. et al. "Green spaces and cognitive development in primary schoolchildren." Proceedings of the National Academy of Sciences June 30, 2015; 112 (26) 7937-7942; first published June 15, 2015; <https://doi.org/10.1073/pnas.1503402112>
62. Griscom, B. W. et al, "[Natural Climate Solutions](#)." Proceedings of the National Academy of Sciences Oct 2017, 114 (44) 11645-11650; DOI: 10.1073/pnas.1710465114
63. Office of the High Commissioner for Human Rights (OHCHR), "[The impact of climate change on the rights of persons with disabilities](#)," 2021

\* More information about the EJ Communities Map is included in endnote 13

\*\* The equity rating in this community benefits graphic was assigned independent of the application of the Racial and Social Equity Assessment Tool (RSEAT). More information on the RSEAT is in Appendix D





