DRAFT OAKLAND 2030 EQUITABLE CLIMATE ACTION PLAN (ECAP)

Issued for public comment: October 25, 2019

CITY OF OAKLAND

I. Introduction

The global climate crisis is not one that Oakland can solve on its own, but it is one in which our city can, as it has done for decades, be a global leader. Across the world, cities are the vanguard of innovation for climate and resilience action. At the same time, like so many other cities, Oakland is vulnerable to the effects of climate change. With 19 miles of San Francisco Bay shoreline, wildfire and drought vulnerability, and social inequities that exacerbate the human impacts of a changing climate, Oakland cannot afford *not* to lead the fight against the climate crisis.

Despite these risks, climate change also constitutes an opportunity for Oakland. A bold and equitable response can increase economic opportunity, particularly for residents who face barriers to full employment elsewhere in the local economy. It can restore ecosystems and lead to cleaner air and water. It can increase neighborhood resilience, stimulate innovation, and improve health outcomes. An equity-focused response to the climate crisis represents an unparalleled opportunity for Oakland to realize its full potential. It's time to seize that opportunity.

In 2018, Oakland City Council passed a **Climate Emergency and Just Transition Resolution**, calling for an urgent climate mobilization effort to reverse global warming, rapidly reduce greenhouse gas (GHG) emissions, and be more resilient in the face of intensifying climate impacts. This includes creating good green jobs, reducing pollution, and helping Oaklanders to thrive. With global consensus that we have only until 2030 to avert the most catastrophic impacts, the time to act decisively on this resolution is now. This 2030 ECAP is the City's roadmap for how to bring about an equitable transition to a low-carbon economy.

The goal of this ECAP is to identify an equitable path toward cost-effectively reducing Oakland's local climate emissions a minimum of 56%, and ensuring that all of Oakland's communities are resilient to the foreseeable impacts of climate change, by 2030. All actions and strategies in this plan are:

Equitable: Strategies must be structured to maximize benefits and minimize burdens on frontline communities, and prevent displacement; and they must respond to community priorities and values, addressing disparities in resource allocation and local vulnerability.

Realistic: Strategies must be actionable within the City's legal and functional sphere of control; cost effective and fiscally responsible; and measurable over the 10-year period of the plan.

Ambitious: Strategies must be responsive to the climate crisis, recognizing the urgency of immediate and game-changing actions that significantly and sustainably reduce local and/or lifecycle climate emissions, and directly addressing short-lived climate pollutants wherever possible.

Balanced: The plan should reflect a mixture of climate change mitigation and adaptation actions, including as many actions as possible that accomplish both; immediate and "moonshot" actions, ensuring that climate action will continue from day one of the plans adoption, yet be oriented toward long-term strategies that demand innovation; and local and lifecycle emissions, responsive to the urgent need to reduce those emissions over which we have direct control and ability to measure, but also recognizing the global impact of each and every activity and purchasing decision within Oakland.
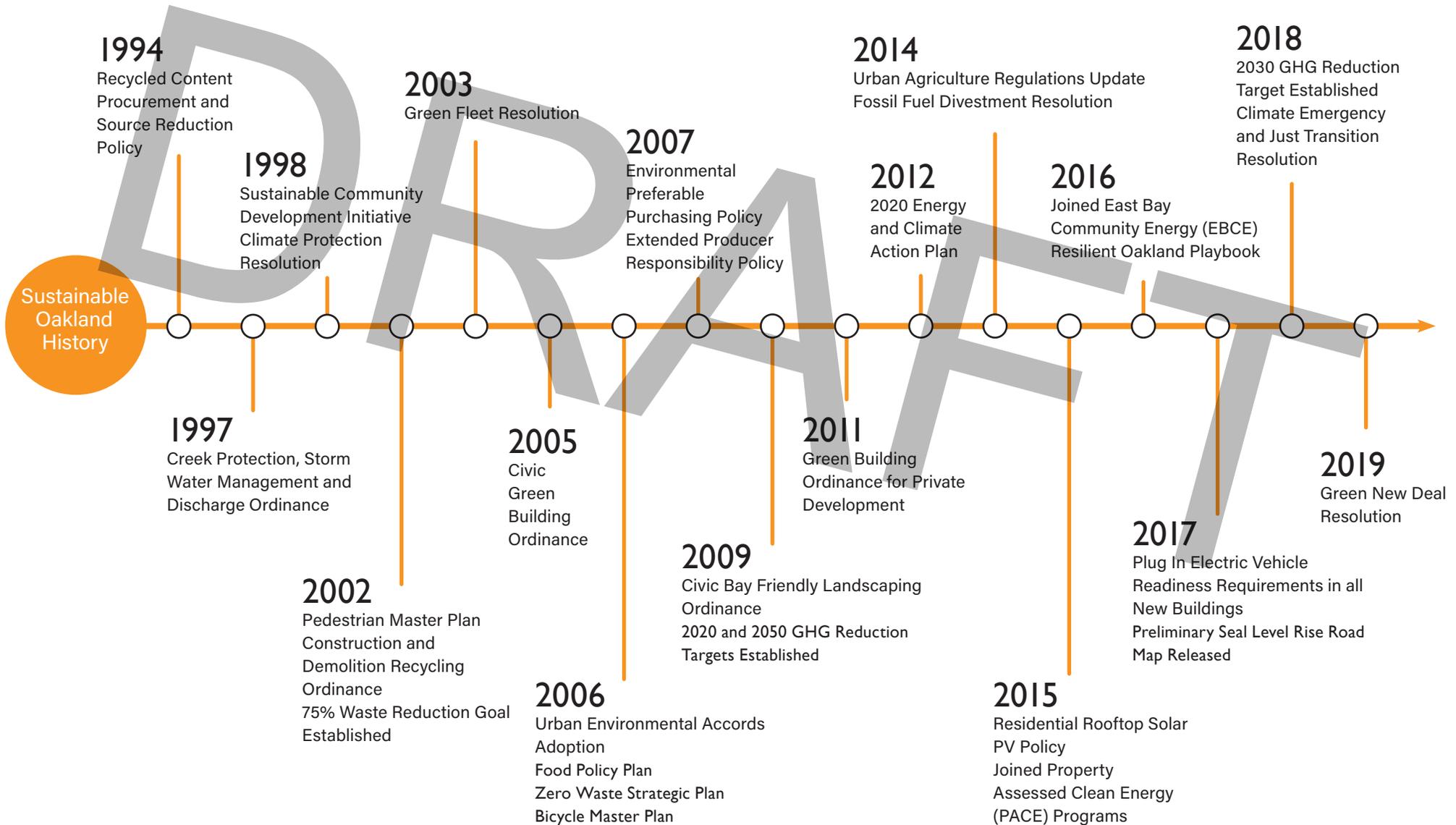
Adaptive: The plan should be flexible enough to accommodate technological, political, and cultural shifts over its 10-year implementation period.

Photo: Greg Linhares, City of Oakland

A History of Leadership

This ECAP builds on the City of Oakland's history of climate leadership by setting the path to equitably reach its ambitious GHG reduction targets and adapt to a changing climate. Oakland was an important player in the Paris Climate Accords and is a signatory to the Global Covenant of Mayors for Climate and Energy and the Pacific North America Climate Leadership Agreement. The City has formalized these commitments in a number of additional Resolutions and public declarations to reduce its dependence on diesel fuel, eliminate GHG emissions from the City's electricity supply, and meet or exceed the goals of the Paris Climate Agreement. The City's first ECAP (then titled Energy and Climate Action Plan), adopted in 2012 and outlining GHG reduction actions through 2020, provided a critical first look at Oakland's climate story. This Plan builds on lessons learned from past work to create a set of strategies that are accountable, flexible, ambitious, and equitable.

Sustainable Oakland History

1994
Recycled Content Procurement and Source Reduction Policy

1998
Sustainable Community Development Initiative
Climate Protection Resolution

2003
Green Fleet Resolution

2007
Environmental Preferable Purchasing Policy
Extended Producer Responsibility Policy

2014
Urban Agriculture Regulations Update
Fossil Fuel Divestment Resolution

2012
2020 Energy and Climate Action Plan

2016
Joined East Bay Community Energy (EBCE)
Resilient Oakland Playbook

2018
2030 GHG Reduction Target Established
Climate Emergency and Just Transition Resolution

1997
Creek Protection, Storm Water Management and Discharge Ordinance

2005
Civic Green Building Ordinance

2011
Green Building Ordinance for Private Development

2019
Green New Deal Resolution

2002
Pedestrian Master Plan
Construction and Demolition Recycling Ordinance
75% Waste Reduction Goal Established

2006
Urban Environmental Accords Adoption
Food Policy Plan
Zero Waste Strategic Plan
Bicycle Master Plan

2009
Civic Bay Friendly Landscaping Ordinance
2020 and 2050 GHG Reduction Targets Established

2017
Plug In Electric Vehicle Readiness Requirements in all New Buildings
Preliminary Seal Level Rise Road Map Released

2015
Residential Rooftop Solar PV Policy
Joined Property Assessed Clean Energy (PACE) Programs

A Call for Further Action

Regardless of Oakland's success in achieving our climate goals, no level of local ambition and funding can resolve the global climate crisis. That is why Oakland City Council's *Climate Emergency and Just Transition Resolution* called for immediate, regional collaboration. State and federal leadership and manufacturer and producer responsibility are also critical. For example, while this ECAP includes actions to reduce the presence of single-use plastics in our local economy, corporate manufacturing practice is the real key to eliminating plastic from our oceans, air, and water. Similarly, while Oakland can increase the availability of electric vehicle chargers city-wide, auto manufacturers can invest in more EV product offerings and a more robust charging network. We recognize the systems that have led to the climate crisis. This Plan focuses on changing those systems to ensure our community has the opportunity to make climate-friendly decisions that work with their lifestyles and needs.

We can all be part of making this Plan a reality. Every replacement of a gas-powered appliance with an electric alternative sends a strong market signal. Every time you choose to walk, bike, carpool, or take public transit rather than drive your car, you are reducing the amount of GHG emissions and local pollution that are worsening the climate crisis. We all have a role to play, both big and small. It starts at home. It starts in Oakland. It starts now.
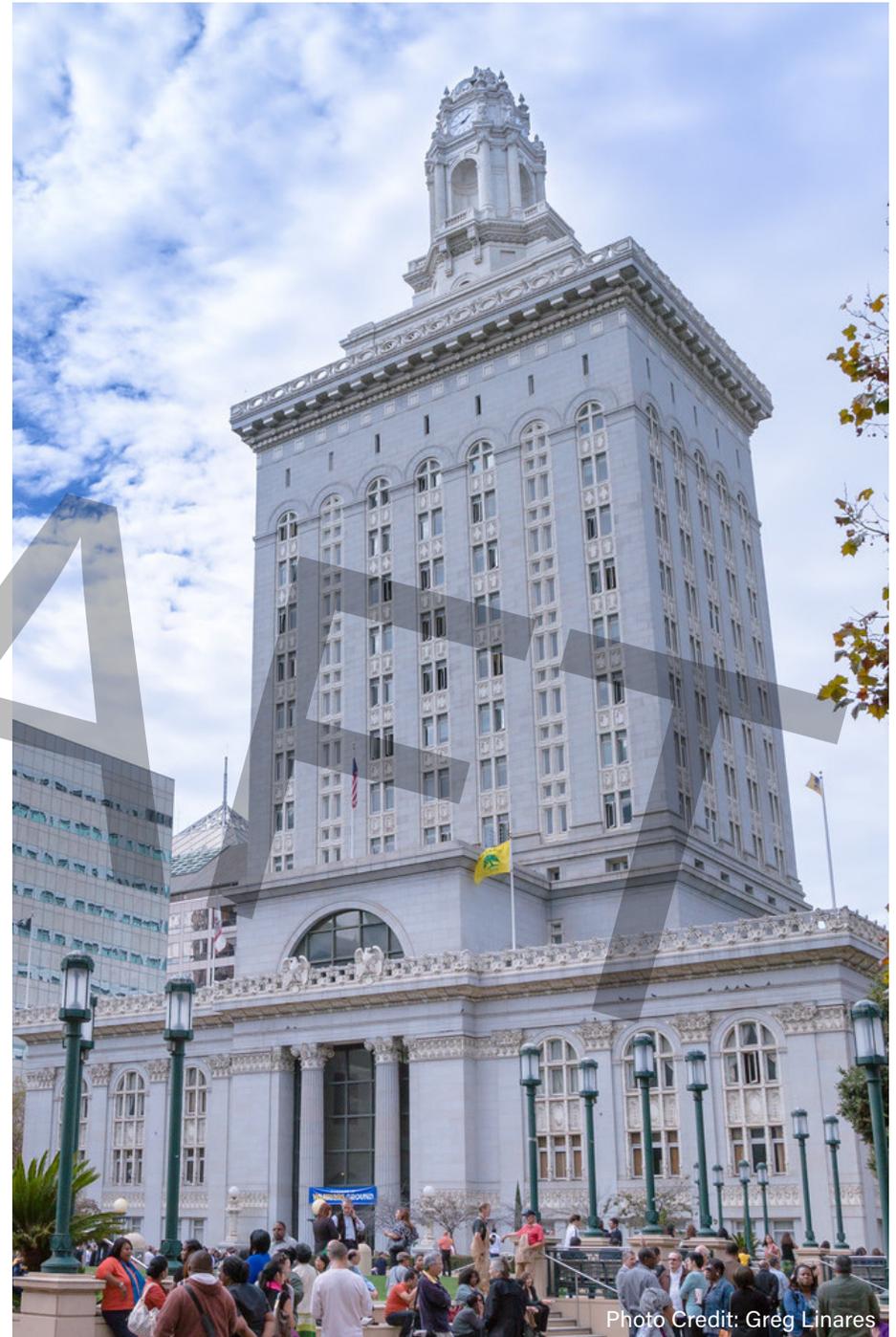

Photo Credit: Greg Linares

II. Leading With Equity

The climate crisis is the greatest threat to human society of our time. It is also a profoundly inequitable one. Historical policy decisions and discrimination have resulted in certain communities being more acutely impacted by poverty, lack of access to services, and unequal distribution of opportunities. As a result, these communities are most at risk from the threats of sea level rise, industrial pollution, poor air quality, and more. The City of Oakland is committed to being a leader in responding to the climate crisis in terms of ambitious policy and racially equitable policy and program implementation. That means both process equity – ensuring that those facing the greatest impacts, and with the most to gain from equitable approaches, are robustly represented in policy and program development – and distributional equity – ensuring that the benefits of Oakland's climate actions accrue first and foremost to the communities that have been hit hardest by social and economic injustices. Wherever possible, actions in this Plan are structured to increase the capacity of individuals, communities, institutions, businesses, and systems within a city to survive, adapt, and grow, no matter what kinds of chronic stresses or acute shocks they experience.

This Plan was carefully developed to fight and adapt to climate change without exacerbating displacement. The overall strategy is designed to reduce emissions while helping existing Oaklanders to stay rooted in their homes, including in cases of climate-related disasters and major changes to the built environment. This is accomplished in multiple ways, including lowering energy costs, reducing the risk of health problems from poor indoor and outdoor air quality, and lowering the risk of damage to homes from flooding or fire. Since reducing our emissions will require considerable changes to how our residents live, work, and play, it is also essential that each climate action support the critical need for safe and affordable housing. Thus, this Plan reflects that housing policy and climate policy are deeply interrelated. For example, if service workers cannot afford to live in Oakland's urban core, they will be forced to commute in from ever-greater distances, increasing vehicle miles traveled and worsening health outcomes. If residents do not have necessary services like grocery stores, banks, and schools near their homes, they will be unable to make the best use of mobility options like walking and biking. In all cases, actions items have been reviewed to ensure that improved outcomes and results focus on the communities most impacted by racial disparities. In doing so, these efforts can be part of creating a just transition to a cleaner and greener future for all Oaklanders.

Throughout this ECAP, we use the term **frontline communities**. These are the communities that have been and will continue to be hit first and worst by the impacts of the climate crisis and environmental injustice – and the least able to adapt, resist, or recover from those impacts. They are largely communities of color, low-income communities, and English-language-learning communities. Frontline communities in Oakland primarily live in areas with the worst air and soil pollution, traffic congestion, and diesel particulate exposure, and the least access to nature. This largely describes the flatlands and along the Interstate 880 corridor, where generations of industry have left their mark. Frontline communities suffer elevated rates of asthma, heart disease, and early death. The distinctions between Oakland's frontline communities and the rest of the city are profound: data from Alameda County Public Health show that, average life expectancy can vary by as much as 15 years depending on race within a one-mile distance from Oakland's flatlands to the Oakland Hills. The 2018 Oakland Equity Indicators report found that African American children in Oakland were 10 times more likely than White children to be admitted to the emergency department for asthma-related conditions. Educational attainment and average income are similarly disproportionate. Frontline communities have done the least to create the climate crisis, yet they are bearing the greatest burden of its impacts.

The City of Oakland defines "climate equity" as inclusive of environmental justice and racial and economic equity. Equitable climate actions help reduce or eliminate disparate harms from the effects of climate change by prioritizing communities who are most at risk from the impacts of climate change in solutions, including access to good green jobs and job pathways that result from a Just Transition to a low-carbon economy; clean air; reasonable costs of living and protection from displacement; improved public health and service access; access to healthy living opportunities; and local resilience. Climate Equity enables all people, regardless of identities such as race, ethnicity, gender, age, disability, or sexual orientation, to thrive in an environment without toxic pollution or environmental degradation.

Because the negative impacts of climate change tend to affect frontline communities first and worst, "climate equity" inherently includes an end to the climate crisis.

Building Oakland's Green Economy

The Oakland Equitable Climate Action Plan is not just a plan to reduce GHGs; it is also a plan for future equitable economic development. Frontline communities face the greatest negative impacts from climate change. As we invest in local regenerative systems, an equitable approach to climate action can ensure that they benefit first and foremost from good green job creation and economic development for all.

In January 2019, Oakland's City Council adopted a resolution calling for the principles of the Green New Deal to be incorporated into the City's climate action planning. In broad strokes, those principles are:

1. Achieve net-zero greenhouse gas emissions through a fair and Just Transition for all communities and workers;
2. Create good, high-wage jobs; and ensure prosperity and economic security for all Oaklanders;
3. Invest in Oakland's infrastructure and industry to sustainably meet the challenges of the 21st century;
4. Secure clean air and water, climate and community resilience, healthy food, access to nature, and a sustainable environment for all;
5. Promote justice and equity by stopping current, preventing future, and repairing the historic oppression of frontline and vulnerable communities.

Good green jobs underpin a sustainable, low-carbon economy. Installing solar panels is a well-known example, but this is only one of many ways that a Just Transition can create good, high-wage jobs for all. Mechanics and installers for heating and air conditioning systems, plumbers, electricians, energy auditors, arborists, construction workers, roofers, recycling collectors and plant workers, compost site workers, and repair technicians can all be good green jobs when created through the transition from inefficient, fossil fuel-based systems to alternatives based on clean energy and resource conservation. Good green jobs are local, sustainable, and difficult to outsource. For example, rooftop installation of solar panels creates more jobs than utility-scale solar construction. Local, closed-loop composting systems ensure that materials and resources stay here, as do the jobs.

As policies and technologies evolve, more green jobs will emerge. If our community invests more to reverse emissions through carbon farming or creek restoration, more local workers will be needed to install and maintain those systems. Programs and policies must be designed to ensure that new green jobs are good jobs: well-paying, long-term, with good benefits and promotional opportunities. Green jobs often pay more than equivalent jobs, without higher educational requirements. Roughly 50% of workers in clean energy and energy efficiency have only a high school diploma or equivalent. Decisive climate policies can help ensure ongoing demand for new services, giving employers the certainty they need to invest in more workers and long-term contracts.
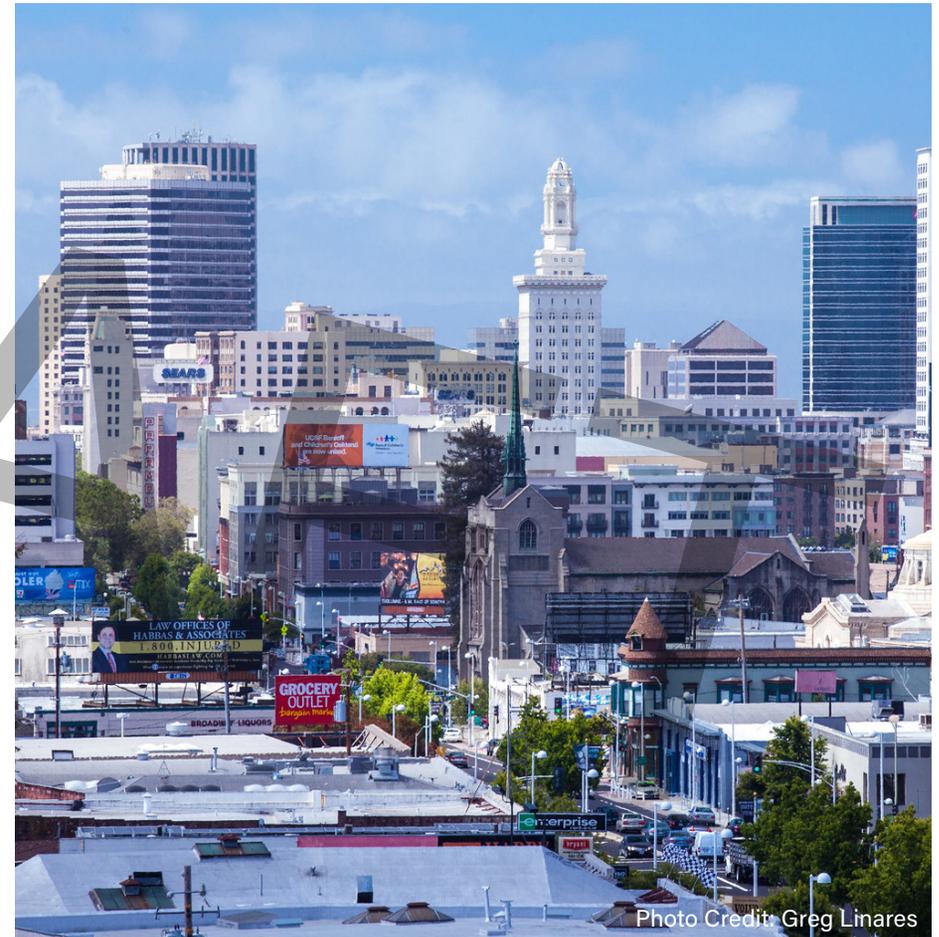
Historically, many of the fields noted above have lacked diversity. To ensure a Just Transition, Oakland must build on its early success in green job training for frontline communities: strong cross-sector partnerships with local, trusted community organizations; adequate funding; a well-structured, comprehensive curriculum; targeted recruitment; and wrap-around support services.
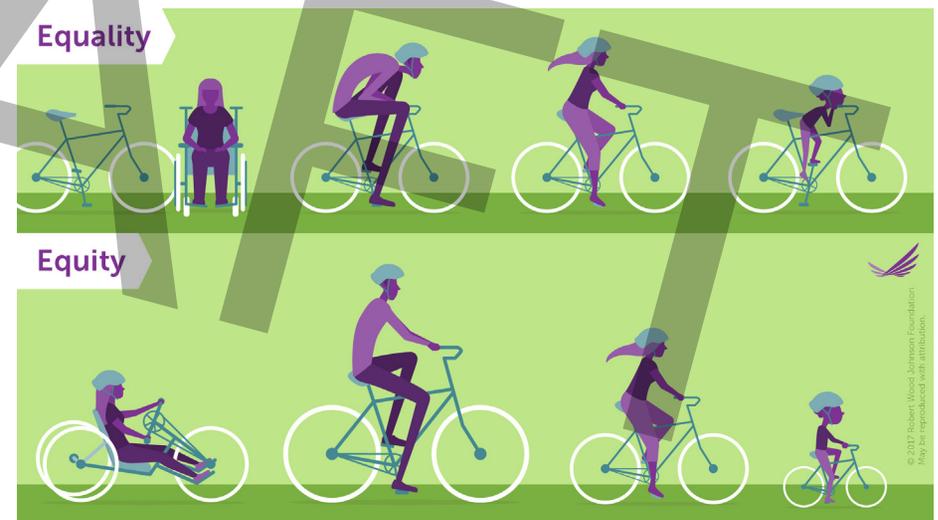
Many actions in this ECAP directly and indirectly support local job creation in frontline communities, now and in the future:

- **Eliminating natural gas**: Over the next two decades, every existing private building in Oakland will need to be retrofitted to replace on-site combustion of fossil fuels with modern electric systems such as air-source heat pumps, heat pump water heaters, and induction stovetops that run on clean electricity. This work will support jobs in Oakland for HVAC technicians, construction workers, electricians, and plumbers.

- **Retrofitting City buildings**: City buildings will also need to be modernized to reduce energy use and eliminate on-site fossil fuel use; the City will need to contract for this work and has extremely strong local hire requirements, as discussed below.

- **New mobility**: Expanded zero-carbon shuttle service that prioritizes service to low-income communities can create increased need for shuttle drivers. Maintenance, charging, repair, and expansion of electric bikes, scooters, and other new mobility options represent a rapidly growing new sector of employment.

- **Edible food recovery and organic waste reduction**: Meeting City goals will create increased demand for compost management and strengthen the infrastructure for edible food recovery, both of which can create jobs in composting, food recovery, and food redistribution. Ensuring high-quality edible food reaches food-insecure Oaklanders can address a barrier to work for many vulnerable residents.

- **Reuse & repair economy**: Efforts to support the reuse and repair economy with community repair facilities and other resources will help grow the demand for repair/reuse workers.

- **Reduce construction and demolition (C&D) waste**: Sorting and recycling demolition waste will create new jobs and business opportunities in the construction sector.

- **Carbon removal**: Programs to reverse GHG emissions will create a new industry and new job opportunities for urban farming, tree planting and maintenance, and related employment with a focus on removing carbon from the atmosphere.

- **Ecosystem restoration & green infrastructure**: Expanding and maintaining tree canopy coverage will expand job opportunities in tree planting and tree maintenance. Ecosystem restoration and green infrastructure investments can provide an on-ramp to the green economy for Oakland youth.

The potential for ECAP actions to expand local green jobs is even greater in Oakland because the City has some of the most progressive local hire requirements in the country. Per Ordinance No. 12390 C.M.S., under the Local and Small Local Businesses Enterprise Program (L/SLBE), 50% of all City contracting must be awarded to local businesses. Additional procurement incentives favor bidders that hire Oakland residents. Directly and indirectly, actions in this ECAP represent a massive investment in the low-carbon economy of the future. These investments can directly support wealth creation in frontline communities while also helping prepare and defend those communities from the impacts of climate change.

Photo Credit: Greg Linares

Community Engagement

Enabling all members of the community to participate, debate, and have real ownership in the public dialogue is an important part of an equity-driven process. Extensive community engagement has been foundational in the creation of the ECAP, including community workshops, online resources and feedback, Town Hall meetings, and youth engagement. From April through July of 2019, the City and a local Equity Facilitator team (Oakland Climate Action Coalition, Environmental / Justice Solutions, and Blue Star Integrative Studios) held eight community workshops, including one in each Council District, with nearly 400 Oaklanders attending to learn about the ECAP and weigh in on the strategies they felt were most critical. An online survey drew 750 responses, providing more insights on what actions Oaklanders were excited to take, and the specific barriers they faced in implementing climate actions in their own lives. Two community-wide Town Hall meetings are being held in November, where participants will review and provide in-depth feedback on this draft.

Youth engagement has also been critical. In Spring 2019, the City worked with 10th grade students in Skyline high school's Green Energy Pathway program to analyze climate issues impacting Oakland residents. More than 100 students learned about the ECAP and made recommendations for how the City could equitably support youth and their families to tackle the climate crisis. Students researched topics from low-carbon mobility to adaptation and climate education strategies. At the end of the semester, students presented their research in small group poster sessions and at a program finale at UC Berkeley. In Summer 2019, the Equity Facilitator team worked with youth from New Voices are Rising (NVR), a summer youth program of the Rose Foundation, engaging a cohort of high school students to prepare recommendations for actions that should be included in the ECAP. The youth presented their visions at the West Oakland Community Workshop, and two NVR interns joined the Equity Facilitator team for the second half of June.

The ECAP ad hoc Community Advisory Committee also plays a pivotal role in reviewing draft ECAP strategies and advising the City on community concerns and resource needs. The 13-member Committee, which began meeting monthly in April 2019, includes a diverse membership with a range of expertise.

A detailed look at all community engagement that led to this ECAP draft is provided in Appendix A.

III. Greenhouse Gas Emissions in Oakland

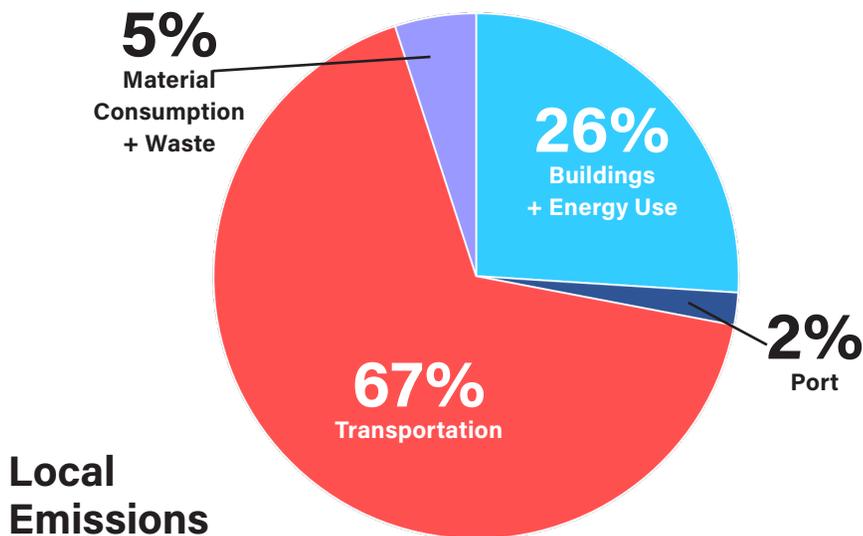This ECAP looks at Oakland's greenhouse gas (GHG) emissions through three different lenses:

- **GHG Inventory**: What are Oakland's current local and lifecycle GHG emissions?
- **No City Action**: What will Oakland's future GHG emissions be with no City action?
- **ECAP Actions**: How much will ECAP actions reduce Oakland's emissions?

GHG Inventory

The City updates Oakland's GHG Inventory every two years. Data sources vary in quality and availability, and each time the data improves, Oakland revises past inventories to be more accurate. The inventory shows where emissions are coming from and helps calculate progress towards reduction targets. Total GHG emissions in Oakland 2017 were 23% lower than the City's 2005 baseline.

The largest sources of local GHG emissions in Oakland are transportation and buildings. Both sectors have seen reductions in their total emissions since 2005. Buildings sector emissions decreased 38% – the largest of any sector – while transportation emissions decreased over 15%.
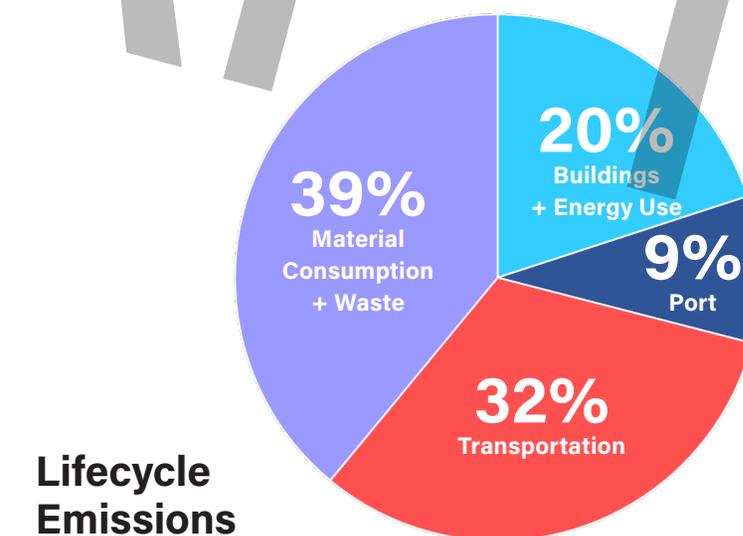
The remaining sources of local emissions in Oakland originate from the Port of Oakland (including seaport and airport), East Bay Municipal Utility District, and the material consumption and waste sector. The Port accounts for 2.4% of local emissions, with a 16.6% reduction in its total greenhouse gas emissions since 2005. The waste sector, which in 2017 was almost 5% of local emissions, made a 30% reduction in its emissions since 2005.

36% by 2020   **56%** by 2030   **83%** by 2050

Oakland's GHG Reduction Goals, compared to 2005 emissions.

Local vs. Lifecycle Emissions

Not all climate emissions are local. In fact, about two-thirds of the emissions for which Oakland is responsible occur outside of Oakland. These global or lifecycle emissions include both the emissions that occur locally (for example, tailpipe exhaust from auto trips), and the material extraction, manufacturing, shipping, and other activities that occur outside Oakland – often overseas – to satisfy local demand for materials and activities. From cars and clothes to condiments and concerts, everything we consume has a lifecycle carbon impact. In most cities, lifecycle emissions are about three times the amount of local emissions.

This deeper look at global emissions associated with Oakland's actions indicates that, while buildings and transportation have the highest emissions here in Oakland, the largest share of global emissions come from the climate impacts of our every-day purchasing decisions.

5% Material Consumption + Waste

26% Buildings + Energy Use

2% Port

67% Transportation

Local Emissions

39% Material Consumption + Waste

20% Buildings + Energy Use

9% Port

32% Transportation

Lifecycle Emissions

No City Action: What will Oakland's GHG emissions look like if we don't take further action to update City policies and programs?

The Business as Usual (BAU) forecast models GHG impacts from existing local and state policies, as well as anticipated population and jobs growth to predict what would happen to emissions without additional City action.

Forecasting BAU emissions relies on several assumptions related to electric vehicle adoption rates, GHG reductions implemented in Specific Plans, GHG from future electricity, and several other areas. The full set of assumptions is included in Appendix C.

This forecast is unable address the more complex possible emissions associated with changing lifestyles and individual decisions due to climate change. Burdens such as housing displacement, pollution-related diseases, high energy costs, and unemployment are intertwined with GHG emissions, and are likely to remain high along with emissions in the absence of strong intervention. The forecast also does not account for how the energy demand of buildings might change in the future due to climate change, like increased need for air conditioning due to increased frequency of heat waves. In California, climate change will primarily lead to increased electricity demand, which will
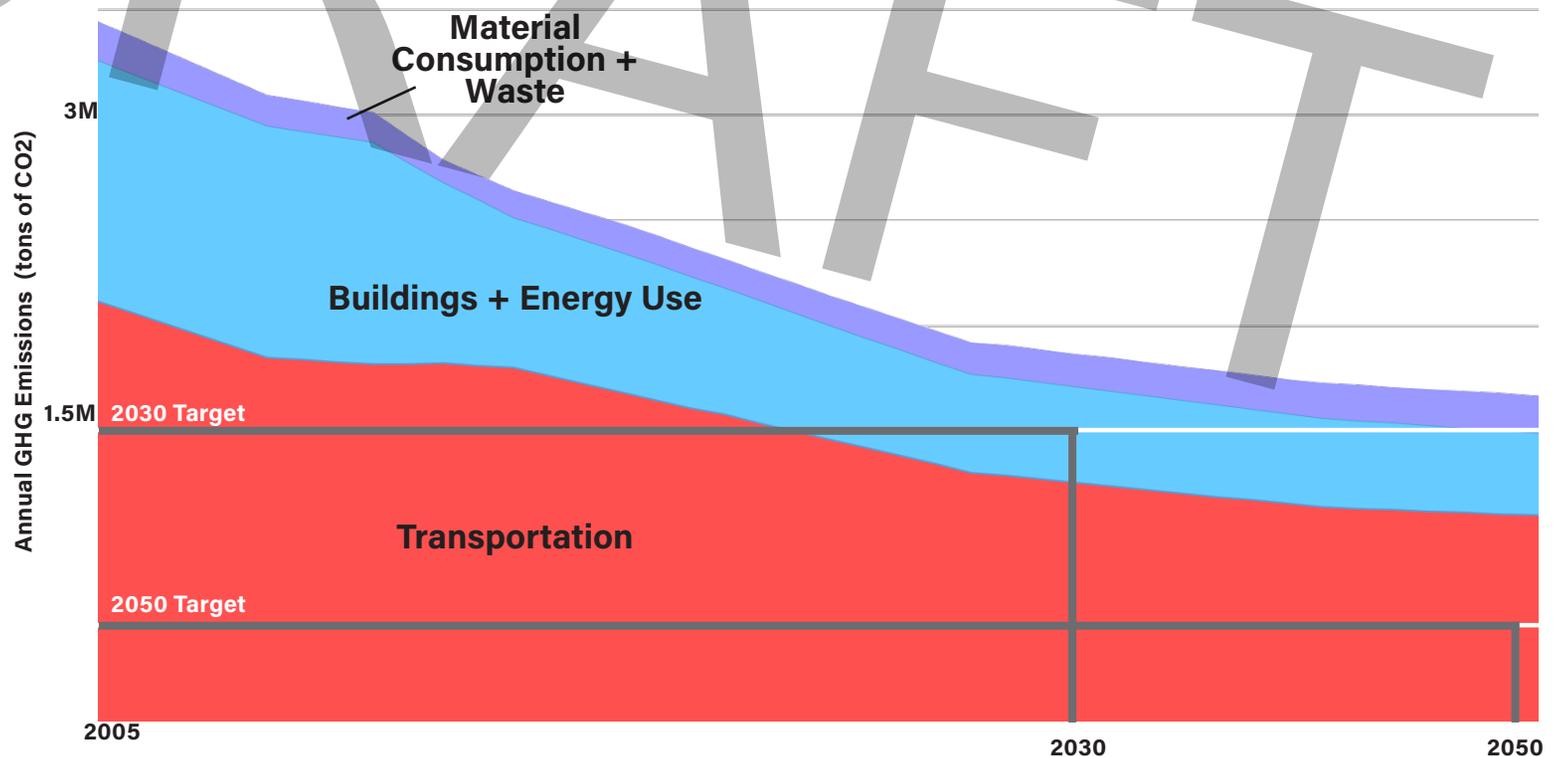
With current growth rates and current policies in place at the state and local level, **Oakland currently is not on track to meet its ambitious GHG reduction goals** without additional action. The graphs below show the sectoral breakdown of emissions forecast in a business-as-usual scenario, by sector:

Year	2020	2030	2050
No City Actions Reduction from 2005	-27%	-42%	-49%
Target Reduction from 2005	-36%	-56%	-83%

These graphs make clear that the most important factors to achieving Oakland's GHG targets will be:

▪ Changing land use policies and transportation patterns to reduce vehicle emissions
▪ Switching building energy systems from natural gas to electricity from clean sources
▪ Reducing solid waste emissions and building the local reuse economy

GHG Emissions : No City Action

Annual GHG Emissions (tons of CO2)

3M

Material Consumption + Waste

Buildings + Energy Use

1.5M — 2030 Target

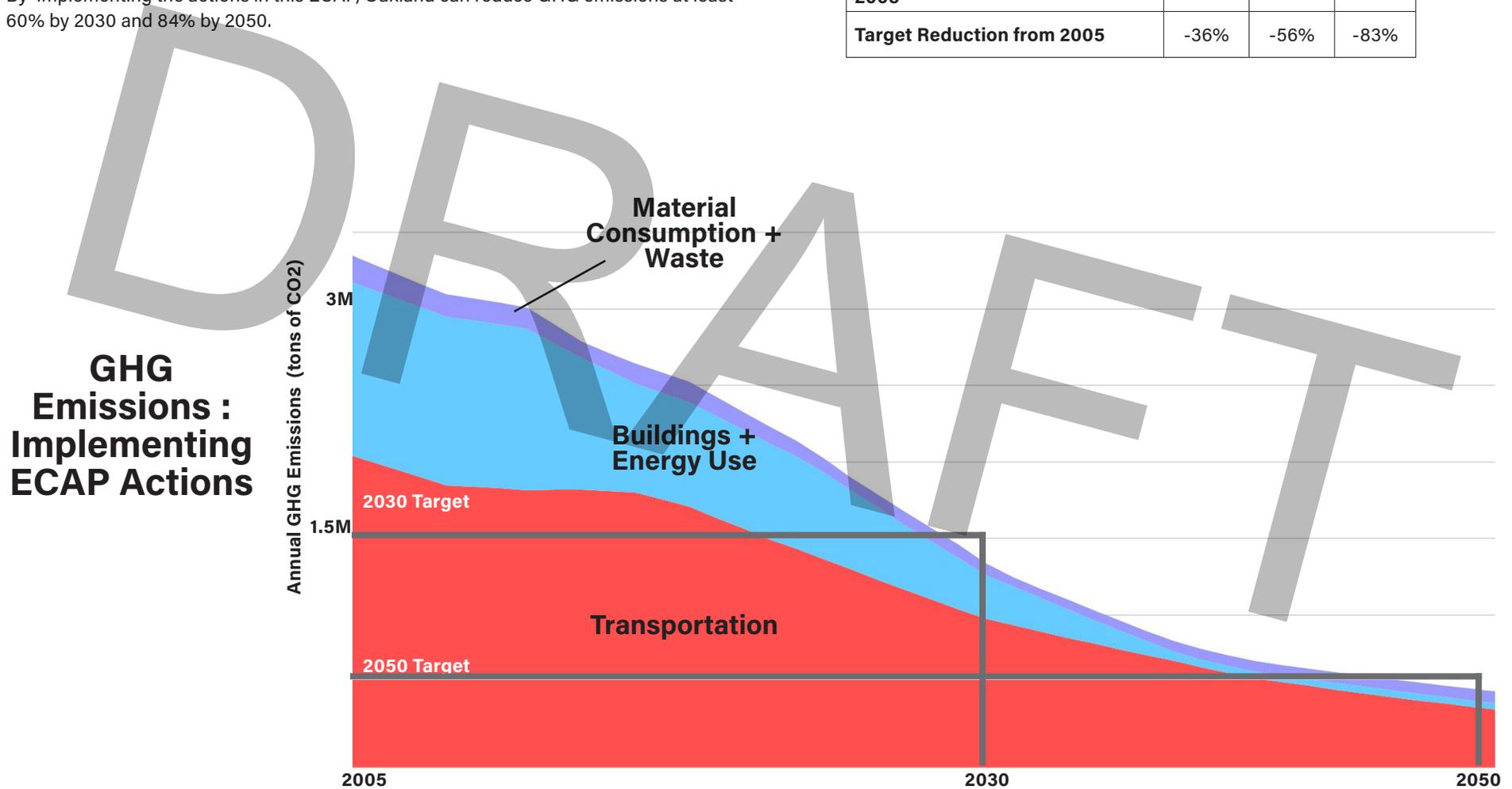Transportation

2050 Target

2005   2030   2050

ECAP Actions

The actions in this ECAP can achieve Oakland's ambitious carbon reduction targets. Forecasting emissions reductions in some areas is straightforward an in other areas is complex. Zero-carbon electricity is relatively easier to predict than electric vehicle uptake or bus ridership. Instead of presenting each action as a specific amount of GHG reductions, the reductions are aggregated by section. Actions and reductions are interrelated and should be considered as an integrated plan instead of a line-item list. By implementing the actions in this ECAP, Oakland can reduce GHG emissions at least 60% by 2030 and 84% by 2050.

The graphs below show the sectoral breakdown of emissions forecast if ECAP actions are carried out by the City:

Year	2020	2030	2050
ECAP Actions Reduction from 2005	n/a	-60%	-84%
Target Reduction from 2005	-36%	-56%	-83%

GHG Emissions : Implementing ECAP Actions

Annual GHG Emissions (tons of CO2)

Material Consumption + Waste

Buildings + Energy Use

2030 Target

Transportation

2050 Target

3M

1.5M

2005   2030   2050

IV. Strategies + Climate Actions

How to Read Each Section

Sector Focus

▪ Strategies: key areas for action in this section

Each section narrative explains Oakland's approach and rationale for developing the ECAP actions.

Centering Equity: This area highlights specific equity considerations related to the sector. How does this Section consider equitable outcomes in Oakland? How do the actions support a more equitable climate solution? This is a summary, rather than a comprehensive equity analysis.

Measuring Success: What does success look like for the actions ? How will the City know when Section Strategies are achieved or complete? Metrics provided for monitoring progress of actions, as well as completion.

Advocacy: Opportunities for Oakland to advocate to other municipalities and agencies

What we've heard

Here we describe the key challenges, issues, and solutions presented by Oakland community members through the Community Engagement Process.

Community Leadership

Examples of community-led programs and initiatives around Oakland. Oaklanders are constantly finding creative new approaches to equitable climate action, and the City cannot meet its climate targets through government action alone.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Name of action	🍃🍃	**$$**	🫁 ⛑	PBD
Description of the action	Carbon 🍃 , 🍃🍃 , 🍃🍃🍃 , 🍃🍃🍃🍃 Impact of GHG emissions reductions associated with this action, with one dot meaning low impact, and four dots for very high impact.	**COST ($, $$, $$$):** Approximate cost of implementing the action, including both implementation and administrative costs, with one $ representing lower cost to City funds, and $$$ for highest costs.	🌳 **INCREASED RESILIENCE** ⛑ **POTENTIAL GREEN JOBS CREATION** 💗 **IMPROVED PUBLIC SAFETY AND HEALTH** 🫁 **IMPROVED AIR QUALITY** ♿🚌 **INCREASED MOBILITY**	OPW: Office of Public Works DOT: Department of Transportation PBD: Planning and Buildings Department OES: Office of Emergency Services EWD: Office of Economic and Workforce Development Resilience: Office of Resilience OPL: Oakland Public Library Port: Port of Oakland Finance: Finance CAO: City Administrator's Office

TRANSPORTATION + LAND USE

Photo Credit: Greg Linares

- **Invest in accessible, low-cost transit and active transportation**
- **De-subsidize and shift away from light-duty vehicle use**
- **Increase adoption of electric vehicles**

Transportation and land use policies are fundamental to how we live and move around in Oakland. They are addressed together in this ECAP because they directly influence each other. If housing is built far from transit and basic services, residents are likely to drive more, increasing greenhouse gas emissions. If there is not enough affordable housing near jobs, people who work here must commute from further away. Requiring unneeded parking in new developments increases the cost of constructing housing and subsidizes people who can afford to drive over those who lack access to cars. Land use policy can contribute to inequities in Oakland, but it is also one of the City's strongest tools for fighting climate change and supporting frontline communities.

Oakland cannot meet its GHG reduction targets unless all long-range policies and regulations take aggressive action to enable sustainable transportation modes. To meet its climate commitments, Oakland must build more housing near transit – especially affordable housing – and plan for neighborhoods where car use is limited and ownership is not necessary. New development projects must reduce their own carbon emissions and support carbon reduction projects elsewhere. Historically, these carbon reduction projects have been allowed anywhere in the United States, missing opportunities to provide needed investment in local projects. This ECAP steers those investments back to Oakland, specifically to frontline communities. While new developments must meet more aggressive climate requirements, the City must also address emissions generated by existing projects.

Oakland also cannot meet its climate goals without changing transportation patterns. Cars and trucks burning gasoline and diesel create most of Oakland's local GHG emissions, along with other local air pollutants that disproportionately harm frontline communities. Light-duty passenger vehicles, the cars of most residents and commuters traveling through Oakland, are the single largest source of GHG emissions in the city. In order to shift to more sustainable transportation modes, the City must remove existing subsidies for driving. Parking policy is inequitable by design: by reserving public lands for cars, drivers are subsidized at the expense of people without access to cars. The road network provides valuable public land and streets for low-cost private car storage, often to wealthier people who live outside of Oakland. Fully capturing the value of this asset and redistributing those funds to invest in transit improvements and active transportation infrastructure for frontline communities is one of the few areas where the City can directly influence transportation choices.

A large portion of emissions also comes from diesel-powered medium- and heavy-duty trucks, largely concentrated along corridors serving the Port of Oakland, that directly impact frontline communities. Unlike gasoline emissions from cars, diesel emissions from trucks can result in more serious health impacts like asthma and cancer risk. While direct emissions from the Port are a small part of Oakland's carbon emissions inventory, truck traffic to and from the Port severely impacts the health of low-income communities

of color. Delivery vehicles add diesel and GHG emissions throughout Oakland's road network; this source of emissions may increase as online retail grows. The City has limited opportunity to regulate medium and heavy duty trucks, but can take actions to influence these emissions through Port policies, electric vehicle infrastructure, and other mechanisms.

Finally, Oakland must plan for an equitable and low-carbon future against the backdrop of a rapidly changing mobility landscape. The arrival of shared mobility, including bikes, scooters, and electric and autonomous vehicles, will all have major impacts to Oakland that are not yet clear. Policies and programs related to these new mobility options must be adaptive and address equity impacts, as well as align with Oakland's GHG reduction goals. Oakland has been a national leader in electric vehicle adoption, but the City must invest in infrastructure to accelerate that transition.

Policies that subsidize vehicle use and storage create pollution and steer funds away from investments in transit, biking, and walking infrastructure. Below are some of the ways that cities can align policies with the true cost of driving (adapted from NACTO Blueprint for Autonomous Urbanism).

Price the Place:
Some cities have created a special charge for heavily congested downtown areas during peak times of the day.

Price the Curb:
Accurately pricing parking based on use, location, and demand can ensure that parking is available when needed while encouraging those who don't need to drive not to.
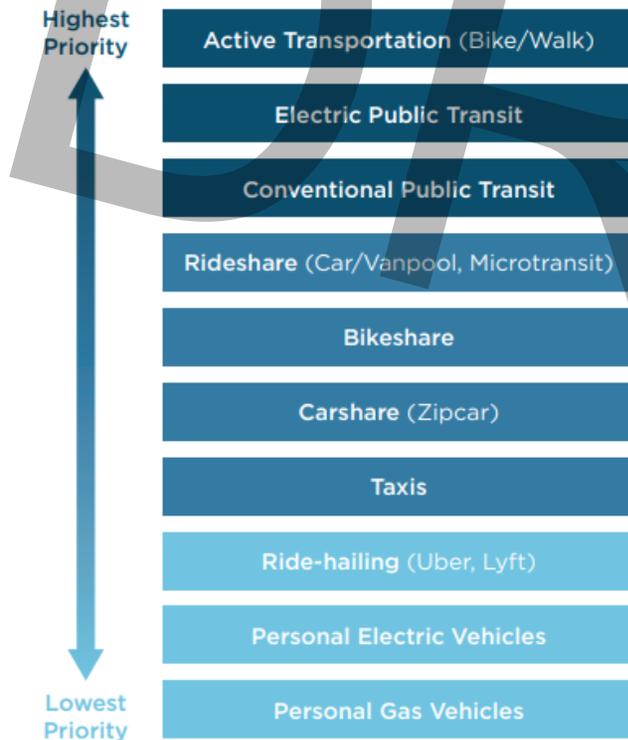
Price the Trip:
Carpool lanes, user fees, and other trip-based pricing controls help steer travelers towards more efficient modes

Prioritizing Mobility Strategies

To reduce the carbon and pollution impacts of vehicles, this ECAP prioritizes certain strategies. Generally, active transportation is the highest priority, followed by public transit, with electric vehicles being the lowest priority mode of transportation. But mobility choices are much more complicated and neighborhood needs are very different. The Mobility Equity Framework from the Greenlining Institute suggests a process that includes Community Needs Assessment, Mobility Equity Analysis, and Community Decision-Making. This process can help determine higher and lower priority transportation modes that respond to a community's specific characteristics.

Highest Priority

- Active Transportation (Bike/Walk)
- Electric Public Transit
- Conventional Public Transit
- Rideshare (Car/Vanpool, Microtransit)
- Bikeshare
- Carshare (Zipcar)
- Taxis
- Ride-hailing (Uber, Lyft)
- Personal Electric Vehicles
- Personal Gas Vehicles

Lowest Priority

Prioritizing mobility is place-specific. Different strategies are appropriate for different community needs and contexts. Here is an example of what an urban mobility prioritization might look like. *Image Source: Greenlining Institute*

Image Source: The Original Scraper Bike Team, Facebook Page

Community Leadership

The Scraper Bike Team is comprised of East Oakland youth who creatively restore and refurbish "scraper bikes" in their neighborhood bike repair facility. In 2019, In collaboration with Oakland's Department of Transportation, the Scraper Bike Team painted a street mural on 90th Avenue in East Oakland as part of the East Oakland Planning for Paving Initiative. The project also includes upgraded curb ramps, pedestrian safety zones, and high-visibility crosswalks.

Centering Equity

Access to safe, reliable, low-cost, high-quality mobility options for every Oakland resident is essential for helping our community transition away from cars, and critical to our ability to combat climate change. Frontline communities face serious health costs from air pollution, a higher financial cost burden to access transportation, and a higher time-cost burden through inadequate transit service location and frequency. Oakland's 2018 Equity Indicators Report shows that nearly two-thirds (64%) of Oaklanders commute to work in a car, truck, or van. At the same time, African Americans are three times more likely than Whites to lack access to a car.

Better transportation options can improve health outcomes and economic opportunities for frontline communities through reduced air pollution and wider access to regional jobs. Frontline communities have disproportionately experienced negative impacts from transportation and land use, and solutions to restore equity to these groups should be prioritized, incentivized, and subsidized in the City's climate strategy.

The housing affordability crisis has unfortunately meant that transportation is housing for the increasing number of residents living in vehicles or in parking areas. Building more affordable housing near transit is a critical action for Oakland. We also recognize that transportation and land use solutions must be designed to minimize impact on the most vulnerable residents.

Climate solutions will be most effective when they are developed together with frontline communities so that they respond to specific needs and concerns. For the transportation sector, existing frameworks and resources exist to help cities make an equitable transition to a low-carbon future. These include the Greenlining Institute's Mobility Equity Framework. These, along with the City's own Racial Equity Implementation Guide, should be used whenever the policies in this ECAP are implemented to ensure that community voices are heard and addressed, that unintended consequences are avoided, and racial disparities are remedied. Additional coordination with equity-based planning efforts like the Community Air Protection Program (also known as AB 617 Action Plans) will further support these integrated and collaborative solutions.

Measuring Success

- % of Residents within 1/2-mile of daily needs
  - % of Frontline Communities within 1/2-mile of daily needs
- Housing units built near transit
  - Affordable housing units built near transit
- Mode Share
- Car Ownership
- ZEV Adoption
  - ZEV Adoption in Frontline Communities
- Total Investment in Frontline Communities
- Air Pollutants (DPM, PM2.5) in Frontline Communities

Advocate

- For MTC to dedicate a portion of road toll revenue to transit and air quality improvements in Oakland frontline communities
- For AC Transit to roll out its electric bus fleet in frontline communities first and to provide more frequent and reliable service at a lower cost to frontline communities
- For new mobility providers to ensure equitable access to services in disadvantaged neighborhoods
- For Federal government transportation resources to support low-carbon mobility networks in frontline communities

What We Heard

- **Low cost or free bus fare**
- **Better frequency, reliability, safety, and coverage of bus service**
- **More affordable housing near transit**
- **Better, safer street infrastructure for people, not vehicles**
- **Develop complete neighborhoods to reduce auto dependence**
- **Switch to zero-emission buses**

Transportation + Land Use

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Align All Planning Policies & Regulations with ECAP Goals & Priorities	🍃🍃🍃	$$	🫁 🌳	PBD

Amend the General Plan, Specific Plans, Zoning Ordinance, Subdivision Regulations, and any other policies or regulations to be consistent with the GHG reductions in this ECAP. Specifically:

- Remove parking minimums and establish parking maximums citywide
- Require transit passes bundled with new developments near existing or planned transit
- Revise zoning to allow uses in all zones such that 90% of residents are within 1/2-mile of daily needs
- Provide density bonuses and other incentives for developments near transit

- Update the Transit Oriented Development (TOD) Guidelines to further prioritize development near transit
- Require structured parking be designed for future adaptation to other uses
- Institute graduated density zoning
- Remove barriers to and incentivize development of affordable housing

- Incorporate policies addressing sea level rise, heat mitigation, and other climate risks into zoning standards and all long-range planning documents. Revise these policies every five years based on current science and risk projections.
- Identify and remove barriers to strategies that support carbon reduction goals.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Free Transit	🍃	$	♿🚌 🌳	DOT

By 2023, develop a roadmap to provide free transit for low-income residents by 2030 and all residents by 2040.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Take Action to Reduce and Prevent Displacement of Residents and Businesses	🍃	$$	🫁	EWD

Expand support of Community Land Trusts, Community Development Corporations, and limited equity cooperatives to prevent displacement of residents and businesses. Ensure that anti-displacement programs align with other climate actions, such as increasing neighborhood-serving retail and electrifying and weatherizing buildings. Develop resources and incentives to support local entrepreneurs whose businesses are helping Oakland meet its climate goals, with an emphasis on entrepreneurs from frontline communities. Prioritize City support for community wealth building projects in Opportunity Zones.

Transportation + Land Use

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Rethink Parking	🍃🍃🍃	$	🫁 🌳	PBD, DOT

Revise pricing, availability, and location of parking to encourage active transportation, transit, and clean vehicles without increasing cost-burden to low-income residents. Use parking revenues to fund transit and active transportation improvements in frontline communities. Specifically:

- Amend Article 27 of City Charter to allow parking revenues to be used for low carbon transportation investments in frontline communities.
- Require parking costs to be unbundled from residential and commercial leases
- Enforce business compliance with parking cash-out requirements
- Eliminate time limits, expand hours of meter operation, and implement demand-based pricing for on-street parking
- Improve Parking Monitoring and Enforcement
- Establish Transportation Management Associations
- Establish Parking Benefit Districts
- Build no new off-street, City-owned parking
- Adopt an equitable fee structure in residential parking permit zones

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Create a Zero Emission Vehicle (ZEV) Action Plan	🍃🍃🍃	$	🫁 ♿🚌	DOT

By 2021, develop a ZEV Action Plan to increase adoption of electric vehicles while addressing equity concerns and prioritizing investment in frontline communities. The plan must set ambitious targets for ZEV infrastructure and must be coordinated with other mobility options so that ZEV ownership is not necessary for access to ZEV trips

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Ensure Equitable and Clean New Mobility	🍃🍃	$	🫁 ⛑ ♿🚌	DOT

Ensure that new mobility platforms and technologies equitably support City carbon reduction goals. Specifically:

- Demonstrate that new mobility programs align with and support GHG reduction goals in this ECAP
- Apply Greenlining Institute's Mobility Equity Framework to policies and programs related to new mobility
- Increase use of Intelligent Transportation Systems to give priority to transit and clean vehicles
- Provide incentives for carpooling and ride sharing and disincentives for fossil fuel-based on demand delivery
- Require carbon emission reduction plans for charging and rebalancing of micro-mobility fleets
- Explore potential for a "mobility wallet" to pay residents to take carbon- and space-efficient travel modes

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Align permit and project approvals with ECAP priorities	🍃🍃	$		PBD

Amend Standard Conditions of Approval (SCAs), as well as mitigation measures and other permit conditions, to align with the City's GHG reduction priorities stated in this ECAP. In applying conditions on permits and project approvals, ensure that all cost-effective strategies to reduce GHG emissions from buildings and transportation are required or otherwise included in project designs. Where onsite project GHG reductions are not cost-effective, prioritize local projects benefitting frontline communities to receive GHG mitigation funding.

Transportation + Land Use

| ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Expand and Strengthen Transportation Demand Management (TDM) Requirements	🌿🌿🌿	$$	🫁 🌳	PBD, DOT
Increase TDM performance requirements for new developments. Expand the TDM program to include requirements for existing employers. Fund ongoing monitoring and enforcement of TDM requirements.				
Expand zero-carbon shuttle service	🌿🌿	$$	🫁 🌳	DOT
Expand both fixed-route and dynamically routed shuttle service using clean vehicle technology. Prioritize service to low-income neighborhoods and affordable housing.				
Expand Neighborhood Car Sharing	🌿🌿	$$	🫁 🚌 🌳	DOT
Expand the Neighborhood Car Sharing program, ensuring that all shared vehicles are electric vehicles by 2030 and that shared vehicle services address the needs of families, people with disabilities, and frontline communities. Coordinate program expansion with New Mobility programs, EV infrastructure planning, and with revised parking policies. Evaluate feasibility of providing dedicated EV car sharing services in multifamily affordable housing buildings to increase access and reduce the car cost burden to lower income families.				
Establish temporary and permanent car-free zones	🌿	$$	🫁 🚌 ❤️	PBD, DOT
Establish temporary open streets areas and car-free zones citywide to enable creation of permanent car-free zones citywide. Use car-free zones for active transportation, parklets and green infrastructure, pop-up community and commercial activity, and other uses that address community needs. Develop and plan car-free zones together with community members to ensure that both community needs and equity impacts are adequately addressed.				
Evaluate the Potential for Road Pricing	🌿🌿	$		PBD, DOT
By 2025, assess the potential for road pricing options in Oakland. For any road pricing revenues, prioritize investment in transit and active transportation infrastructure in frontline communities.				

BUILDINGS

Photo Credit: Greg Linares

- **Eliminate natural gas use in buildings**
- **Provide low-cost clean energy to frontline communities**
- **Prevent refrigerant pollution**
- **Reduce embodied carbon of buildings**

Buildings

Oakland must change the way energy is used in buildings to achieve its climate goals. Buildings emit greenhouse gases indirectly by using electricity produced at power plants, and directly by burning natural gas for space heating, water heating, cooking, and clothes drying. California has been a leader in reducing emissions from electricity, which is 46% carbon-free today statewide. Oakland has gone even farther, with East Bay Community Energy (EBCE) supplying electricity to 97% of Oakland customers. In 2018 over 90% of Oakland's electricity from EBCE was carbon-free. Not all electricity in Oakland is provided by EBCE, but the statewide trend is clear: electricity is getting cleaner faster. To demonstrate its leadership in this area, in 2018 the City began providing electricity for all City buildings from 100% carbon-free sources through EBCE.

Unlike electricity, natural gas burned within our homes and buildings cannot be made clean. Natural gas, which is primarily methane, creates GHG emissions when it is burned, and in leaks throughout the gas distribution system. These leaks have severe climate impacts because methane is a far more potent GHG than carbon dioxide. Natural gas also poses a threat to public health and safety. Burning natural gas creates indoor air pollutants like carbon monoxide and nitrogen oxides in our buildings; these impacts are compounded in small, poorly-ventilated spaces like older apartments. By its very nature, natural gas presents an additional combustion risk for buildings, especially during and after major earthquakes.
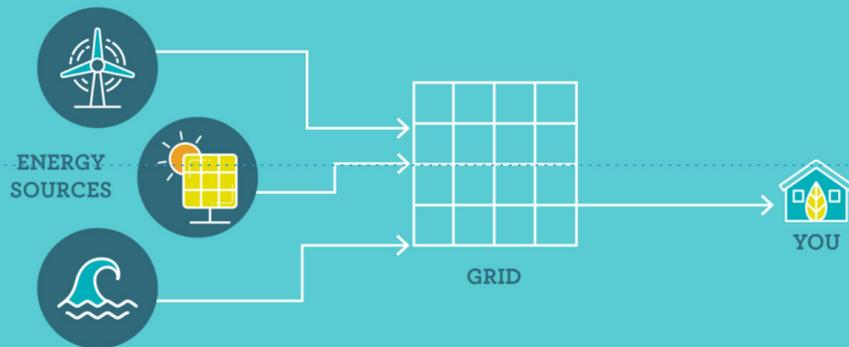
Apart from health and climate impacts, reducing energy use lowers costs for residents and businesses, and lessens impacts to the electric grid for infrastructure needs. California has been a national leader in energy efficiency: energy use has stayed level while population and the economy have grown. While there are many existing well-funded state and regional programs to address energy efficiency, they do not address the comprehensive climate, safety, and health impacts of the larger natural gas infrastructure. Without additional action, onsite natural gas combustion will become the primary source of stationary carbon emissions in Oakland.

Oakland cannot meet its climate goals without shifting quickly away from natural gas use. State policies and lower prices of renewables means that substituting natural gas with electricity is the quickest, safest, and least expensive path to eliminating natural gas. Efficient, all-electric buildings powered by a clean electric grid will reduce emissions while enabling emissions reductions from vehicle electrification. Modern electric appliances today perform much more efficiently and effectively than the electric appliances from past decades. Electric heat pumps can provide heating, air conditioning, and water heating, and heat pump clothes dryers can replace their gas-powered counterparts that are less efficient. Additionally, induction stoves can provide better cooking performance than gas stoves while also improving health and safety by eliminating burn risk and avoiding indoor air pollution. A successful building electrification effort must be paired with energy efficiency and weatherization, to ensure that energy bills remain low and unnecessary power is not added to the grid.

Eliminating fossil fuel use in buildings will mean an increase in refrigerants used in heat pump technologies. Although used in small quantities, refrigerants are also potent GHGs if released to the atmosphere. This ECAP includes action to avoid introducing new climate challenges from electrified buildings, as well as from the many existing systems that already use refrigerants.

Building materials also have a large amount of greenhouse gas emissions associated with their procurement, manufacturing, and transportation, collectively known as embodied carbon. As buildings get more efficient and are powered by low-carbon sources, these embodied emissions become a larger portion of the lifecycle emissions for which buildings are responsible. These emissions have not historically been the focus of reducing GHG emissions in buildings but are a focus of the City's strategy to make our buildings cleaner, safer, and more resilient.

In 2018, Oakland joined East Bay Community Energy (EBCE), which supplies renewable energy by default to all customers unless they opt out. In 2019, EBCE electricity was more than 90% carbon-free and by 2030 it is expected that 100% of EBCE supply will come from carbon free sources of electricity.

Buildings

Centering Equity

Reducing energy use through efficiency and weatherization can help Oakland residents and businesses by lowering costs and improving indoor air quality. Energy bill savings are critical for low-income residents, who face a higher relative cost burden. In 2019, gas remains generally cheaper than electricity; if done improperly, efforts to electrify buildings could negatively impact frontline communities. On the other hand, modern electric systems and appliances are more efficient than older natural gas-fueled technologies, and in some cases offer lower overall installation costs and utility bills. They also offer improved air quality and less exposure to pollutants like nitrogen oxides, known to exacerbate asthma and other pulmonary diseases, particularly among vulnerable populations like children and the elderly. Heat pumps add air conditioning capacity in areas with heat stress, and induction cooking is safer with lower exposure to hot surfaces. Eliminating natural gas in buildings can lower the risk of fire after earthquakes, and switching to electric appliances can dramatically reduce the likelihood of childhood asthma.

Frontline communities generally have lower ability to pay upfront costs, so it is critical to ensure that financial assistance is part of reducing carbon emissions in buildings. Combining electrification with efficiency retrofits like insulation upgrades and air sealing is important to build resilience and lower energy costs. Programs must be designed and implemented with appropriate protections to ensure that retrofits in rental properties are done properly, so that renters aren't burdened and instead enjoy the safety and comfort impacts of upgrades. All Oakland residents and businesses should benefit from air quality improvements of building electrification without adding to existing concerns of displacement and rising rents.

Switching from fossil-fuel energy sources to local, carbon-free renewable sources can also bring significant economic benefits to low income communities. Installation and maintenance of onsite solar energy systems, battery back-up systems, and local wind farms all support good green jobs. Community-owned solar energy is a strategy that many Oaklanders support for its potential to allow renters and frontline community members to financially benefit from shared installations. These strategies are important, though often outside the City's direct control. EBCE is supporting ongoing efforts to install local renewable energy and energy storage, both within Oakland and throughout the County. With a clean electric grid, shared solar doesn't reduce GHG emissions, but may provide financial benefits to co-owners. The City can support these efforts by modernizing planning, zoning, and building codes, and other regulations, to remove barriers to these important efforts (see Transportation + Land Use section for the corresponding Action Item).

What We Heard

- **Support community-owned solar.**
- **Support green jobs training and development.**
- **Promote all-electric buildings**
- **Support low cost/free weatherization programs**
- **Provide solar energy installation rebates for homeowners and renters.**
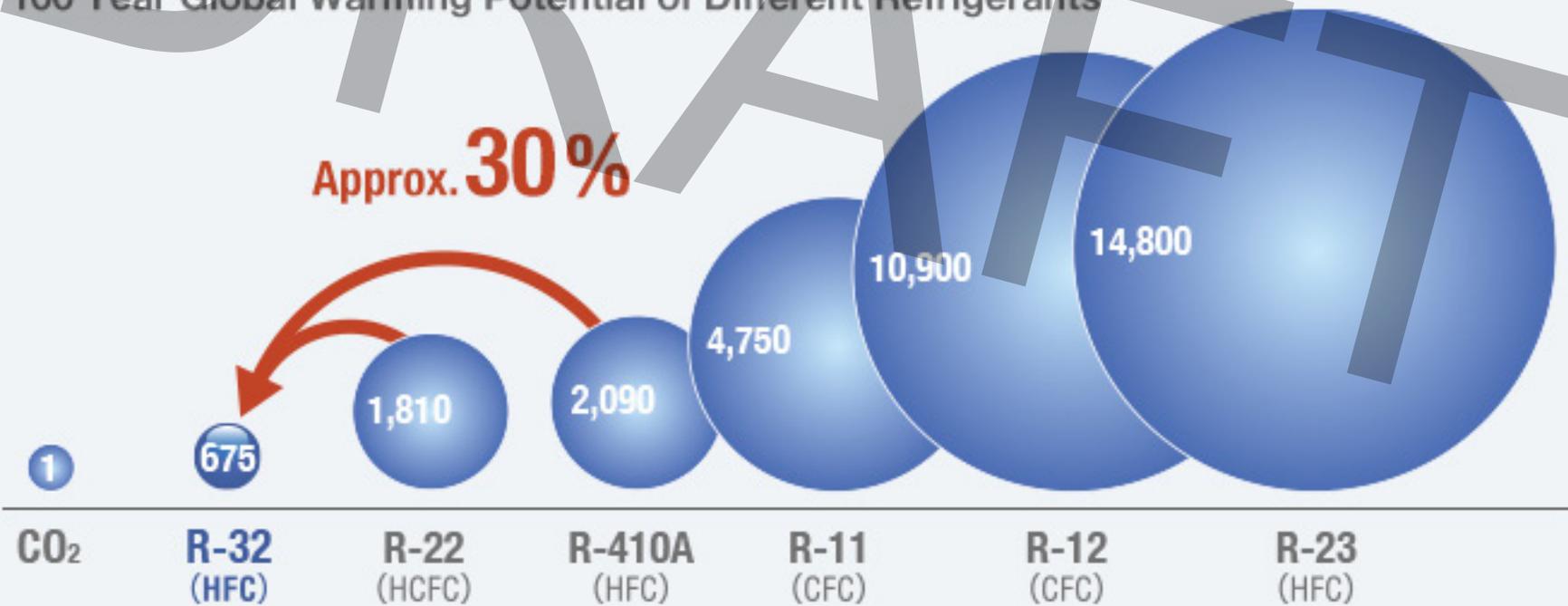
Photo Credit: Greg Linares

SHORT LIVED CLIMATE POLLUTANTS

Short-lived climate pollutants (SLCPs) are greenhouse gases that remain in the atmosphere for less time than carbon dioxide (CO2), but whose heat-trapping potential is far greater. methane, or natural gas, is a predominant SLCP, more than 80 times stronger than CO2. While atmospheric levels of CO2 have increased 30 percent from pre-industrial levels, methane levels have increased 125 percent. Globally, the primary sources of methane emissions are decomposing organic matter, exposed permafrost (itself a result of climate change), livestock farming, and natural gas leakage from the points of extraction, throughout the distribution pipeline, and the from appliances in our homes. Methane emissions are included in the City's GHG emissions inventories.

Another powerful class of SLCPs are refrigerants – the chemicals that make our air conditioners and refrigerators function. Though used in small quantities, refrigerants can be 1,000 to 9,000 times stronger than CO2 in warming the atmosphere. Refrigerants can be managed well, by preventing leaks from appliances and ensuring that units are disposed of properly; According to Project Drawdown, 90 percent of refrigerant leakage comes from improper disposal. Oakland's GHG emissions inventories do not track refrigerant leakage, because there is no methodology to do so. While the California Air Resources Board is acting to reduce the climate impact of refrigerants, this is an emerging area for city leadership and action.

100 Year Global Warming Potential of Different Refrigerants*

Approx. **30%**

CO₂	R-32 (HFC)	R-22 (HCFC)	R-410A (HFC)	R-11 (CFC)	R-12 (CFC)	R-23 (HFC)
1	675	1,810	2,090	4,750	10,900	14,800

Source: Values for 100 year global warming potential (GWP) from IPCC Fourth Assessment Report. Comparative 100 year GWP: HFC410A, 2,090; HFC32, 675.

Buildings

Measuring Success

- # of building electrification retrofits
- # of retrofits in frontline communities
- Citywide natural gas use
- Establishment of a refrigerant management program, with verifiable results for reduced climate impacts from refrigerant leakage
- Estimated reduction in GHG impact from embodied carbon standards

Advocate

- For additional funding for energy efficiency programs in frontline communities
- For faster adoption of zero-carbon electricity generation through EBCE
- For additional funding to eliminate natural gas systems in existing homes, particularly in disadvantaged neighborhoods
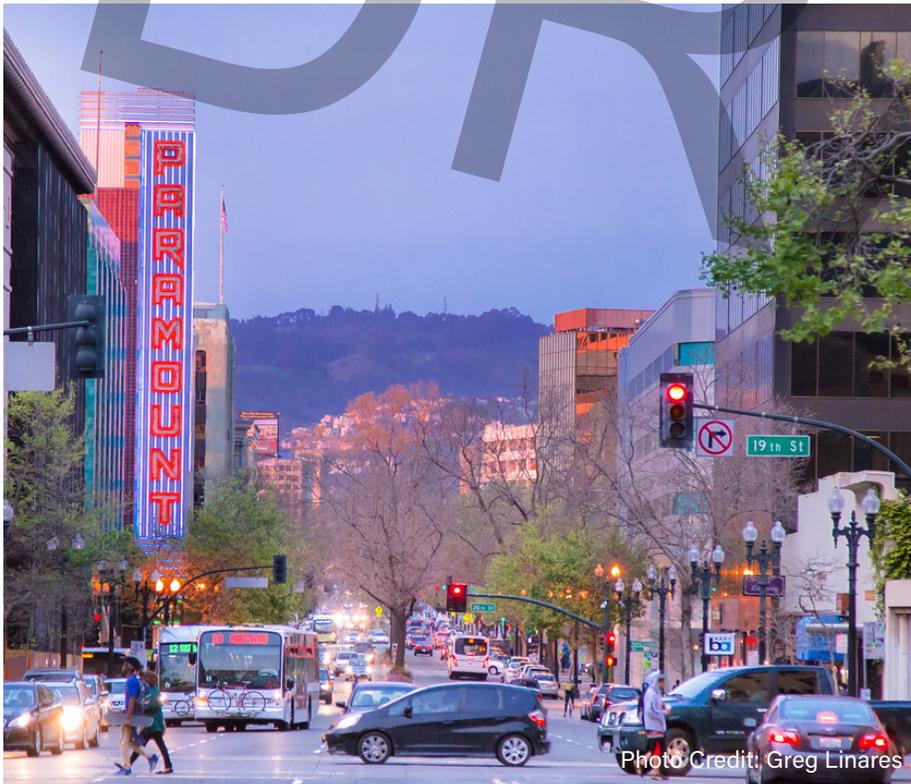

Photo Credit: Greg Linares

Image Source: East Bay Asian Local Development Corporation (EBALDC)

Community Leadership

Oakland-based non-profit GRID Alternatives has been installing no-cost solar electric systems for low-income homeowners and renters since 2004. In 2017, GRID partnered with the East Bay Asian Local Development Corporation (EBALDC) to bring solar power to the Marcus Garvey Commons in West Oakland, which will provide $177,000 in long-term energy cost savings for low-income tenants and prevent the emission of 364 tons of greenhouse gas over its lifetime.

Buildings

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Eliminate Natural Gas in New Buildings	🍃🍃🍃🍃	$	🫁	PBD

Require new buildings and major renovations to avoid connection to natural gas infrastructure by 2023.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Require all existing buildings to be all-electric by 2040	🍃🍃🍃🍃	$$$	🫁 ⛑️	PBD

By 2022, develop a policy roadmap to achieve decarbonization of the existing building stock by 2040, without additional cost burden or displacement risk to frontline communities. The roadmap must address:

- Equitable Process and Outcomes, including avoiding bill increases, ensuring benefits flow to renters, and local green jobs
- Incentives and requirements
- Regulatory obstacles
- Phasing of implementation
- Financial assistance for low-income residents and businesses

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Prevent Refrigerant Pollution	🍃🍃🍃	$$		OPW

By 2023, develop a refrigerant management program that:

- Establishes a phaseout timeline for high-GWP refrigerants in existing buildings
- Identifies financial assistance for low-income residents and businesses
- Aligns with refrigerant management strategies adopted by the State of California

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Reduce Embodied Carbon in Buildings	🍃🍃	$		PBD

By 2022, adopt a model concrete code for new construction that limits embodied carbon emissions. In subsequent building code updates, implement improved embodied carbon performance standards including additional materials. Ensure requirements are at least as stringent as the State of California procurement standards in effect at the time of the building code adoption.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Require all major retrofits of City facilities to be all-electric	🍃	$	🫁 ⛑️	OPW

Effective immediately, retrofits of City-owned or controlled buildings shall not install any new natural gas infrastructure or equipment. All major retrofit projects shall eliminate gas infrastructure from the building wherever technically feasible.

MATERIAL CONSUMPTION + WASTE

- **Eliminate disposal of compostable organic materials to landfill**
- **Reduce waste generation, upstream of disposal**
- **Support a circular economy**

Material consumption and waste produces a small portion of local GHG emissions, but 39% of lifecycle emissions. This category includes all food and goods that we make or purchase, and whether, when, and how we throw them away. It centers on individual choices, but a local economy of industries and regulations has been built upon the choices that residents tend to make. The inter-related nature of these two aspects create an opportunity for the City and its community to build upon strategies that reduce waste and help cultivate a circular economy. It is essential for Oakland to strengthen infrastructure and support programs that address lifecycle emissions, and eliminate disposal of compostable, recyclable, and reusable materials to landfill. The City has decades of experience with successful community programs to divert waste through robust recycling programs and compost collection. Now the City can transition to more impactful programs focused on reducing the waste generated, reducing pollution, and lowering costs for everyone in Oakland.

Organic materials in landfills release methane, a GHG and short-lived climate pollutant that traps over 80 times more heat than carbon dioxide. As compost, that same organic matter can pull greenhouse gases out of the atmosphere and contribute to healthy soils. Although Oakland already supports infrastructure for residential and commercial composting, compostable organics still end up in landfills, including high-value material like edible food. Finding innovative ways to get surplus food into the hands of the hungry not only reduces emissions, but also supports basic needs of our vulnerable populations. To support both local and lifecycle emissions reduction, full participation by residents, businesses, and institutions in compost collection systems is necessary, with systems that are easy to understand and access. Fundamentally, compostable material should be managed as an important resource rather than "waste."

Lifecycle emissions are everything created upstream (prior to purchase and use) of products we consume. Every item that is purchased created GHG emissions on its way to the consumer. Raw materials were harvested, parts were manufactured, products were shipped; all these processes are usually powered by fossil fuels. Diverting material from landfills to be composted, recycled, or reused is an important strategy, but it is the last opportunity to solve the problem, not the first.

To reduce lifecycle emissions, this ECAP includes actions that empower residents to eliminate wasteful purchases. For example, disposable single-use plastics will not be needed if infrastructure for reusable food service ware is more widespread. Supporting repair and reuse industries reduces the need to buy new goods, while keeping items from the landfill and simultaneously supporting local jobs and economic growth. Many actions to reduce waste will also lower costs for consumers, helping to keep people rooted in Oakland. Actions to encourage reuse of building materials and establish physical spaces to promote repair economies further support these goals.

Single-use plastic packaging and products are a particularly acute source of both local and global pollution. Manufactured petrochemical-based items, from plastic soda bottles to single-use forks, cause severe air and ground contamination for communities that live near the factories producing them. Single-use plastic items have made their way to the deepest parts of the ocean, contaminate recycling streams, litter our streets, and are a significant source of preventable lifecycle emissions. Though cities have little control over the manufacturing and proliferation of these items, they are forced to pay the costs of managing the resulting litter and pollution. Oakland can make a difference by strategically banning certain products, encouraging reusable products wherever possible, and advocating for extended producer responsibility.

For the City to meet its GHG goals and California's waste diversion requirements, additional investments are needed to cultivate the local circular economy. Oakland's climate actions will help replace the linear process of make-take-waste with a circular reuse system that avoids landfill disposal altogether. This ECAP includes mandatory requirements in areas where the City has direct control and requires further evaluation of areas for potential future action.

Circular Economy refers to a system in which nothing is wasted . All materials are repurposed and kept in use, instead of being disposed. Through better design and consideration of a product lifecycle, circular economies keep products in use, regenerate natural systems, and eliminate the need for disposal.

REGENERATE NATURAL SYSTEMS

DESIGN OUT WASTE AND POLLUTION

WE ARE **SHIFTING** TO A SYSTEM WHERE WE

KEEP PRODUCTS AND MATERIALS IN USE

Centering Equity

In Oakland, improved compost, recycling and edible food recovery infrastructure and a strengthened repair economy can lead to healthier streets and social spaces for all communities, especially those who lack permanent housing. Many of Oakland's frontline communities are food-insecure, yet quality edible food is disposed to landfill. Steps to recover edible food can help fight climate change while also building food security and community health.

Frontline communities in Oakland and around the world are disproportionately impacted by the pollution from harmful manufacturing and wasteful disposal practices. Changing destructive consumption patterns can both protect frontline communities from climate change and help decrease illegal dumping. Plastic pollution has had a particularly visible impact on both streets and natural areas in Oakland's frontline communities. Considering the increasing likelihood of climate change-related flooding and wildfires, street pollution will become an increasing health risk.

In addition to addressing food insecurity and public health, the City can facilitate job creation and support local economies by building infrastructure to support edible food recovery and repair and reuse activities. The repair and reuse industry has historically operated through social enterprises that not only hire and train people with barriers to traditional work, but also provide access to affordable essential goods.

What We Heard

- **Ban single-use plastics**
- **Divert quality unused food**
- **Support establishment of cooperative businesses**

Measuring Success

- % of compostable organic waste in landfilled material
- # of community repair facilities
- Estimated tons of upstream avoided waste

Advocate

- For additional funding for energy efficiency programs in frontline communities
- For strengthened extended producer responsibility legislation
- For additional State action to ban or limit the most harmful and least recyclable plastic materials

Image Source: Food Shift

Community Leadership

Oakland-grown Food Shift is a multi-pronged social enterprise that rescues "imperfect" produce destined for disposal and transforms it into nutritious food and job opportunities. Staffed by formerly houseless apprentices, the Food Shift Kitchen saves, sorts, and processes over 1,000 pounds of produce that would otherwise be wasted each week.

Held throughout Alameda County, including at the Oakland Public Library, Fixit Clinics help people dissemble, troubleshoot, and repair their broken electronic items in the hopes of keeping them out of the landfill. Fixit Clinic is supported by local jurisdictions and mini-grant funds disbursed by StopWaste, an Alameda County regional agency.

Material Consumption + Waste

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Eliminate Disposal of Compostable Organic Materials to Landfills	🌿🌿🌿	$$		OPW

Fully fund and implement the requirements of SB1383 and eliminate disposal of compostable organic materials to landfills. Ensure robust engagement with businesses and institutions to effectively keep compostable material out of the landfill-bound waste stream. Work closely with franchise hauler to ensure that the compostable material stream is uncontaminated so that compost created is high-quality.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Establish a Deconstruction Requirement	🌿	$	⛑️	PBD

Establish a deconstruction requirement to reduce demolition waste from construction and renovation and facilitate material reuse. Regulate hauling and processing of construction and demolition debris to ensure that salvageable materials are identified and removed for reuse instead of being recycled or disposed to landfill.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Expand Community Repair Facilities	🌿	$$	⛑️	OPL, EWD

Expand tool lending library services to 5 other OPL branches or other community facilities by 2030, prioritizing frontline communities. Ensure tool lending facilities support repairable household items and transportation modes, including bicycles. Explore potential for onsite community partnership programming to teach repair skills and promote local repair businesses.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Eliminate single-use plastics in food preparation, distribution, and sale	🌿	$		OPW

By 2022, develop a plan to eliminate single-use plastics in food preparation, distribution, and sale by 2030. The plan shall incorporate both incentives and requirements and address equity concerns for small businesses and low-income residents. By 2025, expand on the City's ban of expanded polystyrene food containers to other categories of single-use plastic food service ware, promoting reusable take-out and eat-in food service ware to consumers and food service establishments.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Strengthen Infrastructure for Edible Food Recovery	🌿🌿	$$	⛑️ 🌳	OPW

Support existing capacity, and develop new capacity, to recover edible food that is otherwise wasted, and distribute that food for human consumption. Engage with stakeholders including local food donation, recovery, and collection organizations to build robust collection and food storage capacity, and reliable and equitable distribution systems. Engage with food generators such as supermarkets, wholesale distributers, large hotels, and institutions, to increase their access to food recovery organizations and to ensure food generators comply with the Edible Food Recovery requirements of SB 1383.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Support the Reuse and Repair Economy	🌿	$$	⛑️	OPW

By 2025, create a community reuse and repair program to increase waste diversion and reduce material consumption and create green jobs. As part of creating this program, the City will also explore creating or designating live/work or other spaces dedicated to material repair and upcycling, and selling of repaired and upcycled goods. Specifically:

- Remove land use and other barriers to developing businesses that reuse or repair consumer goods
- Develop resources to support direct donation to charitable organizations
- Increase public awareness of and access to opportunities for reuse, product rentals, repair, and donation

- Support and expand the City's reuse infrastructure
- Establish a methodology to assess benefit of reuse and repair programs to goals for waste diversion, GHG emissions, and economic development
- Partner with local vocational programs and/or OUSD to launch at least one high school or junior college-level Repair Arts Academy

- Develop a grant, recognition, or incentive program to celebrate and encourage local repair businesses or leaders

Photo Credit: Greg Linares

- **Embed climate action in City budgeting, procurement, and planning**
- **Celebrate and amplify community leaders**

City Leadership

Oakland's *Climate Emergency and Just Transition Resolution* acknowledged the severity of the climate crisis and the City's intent to be a leader on equitable climate action. It is imperative for the City to demonstrate that leadership throughout its operations. Local emissions from City operations are small compared to community-wide emissions, but the City controls them directly. Most of Oakland's municipal emissions come from buildings and vehicles that the City owns and operates. To reach its GHG reduction targets, City buildings and vehicles must be retrofitted or replaced with low-emissions technology.

The City's policies and procedures influence a much broader set of climate impacts. Some of these are more intuitive, such as reducing the amount of employee air travel or purchasing reusable instead of disposable items. Others may be less obvious. New technology can reduce vehicle emissions by deploying services like street sweeping and parking enforcement more efficiently. Rethinking basic City procurement policies can reduce waste, support low-carbon alternatives, and strengthen the local economy. *How* the City carries out every day municipal services matters as much as *what* those services are.

Celebrating local leadership can inspire more community action. Oakland has many examples of community leadership on climate issues. Their stories can provide ideas for new programs and inspiration for new leaders. Formally celebrating them is an important way that the City can demonstrate the importance of community work for solving the climate crisis, as well as Oaklanders' dedication and commitment to improving Oakland's future.

Finally, although many areas for climate action are within the City's direct sphere of control, many others require action from and collaboration with other agencies and jurisdictions. Ride hailing companies are regulated by the California Public Utilities Commission. Air quality enforcement is the purview of Bay Area Air Quality Management District. The California Coastal Commission oversees land use decisions in any coastal zone. Oakland must continue to strengthen relationships with these and other agencies and work together to achieve a low carbon future that benefits frontline communities.

Centering Equity

The City established an Office of Race and Equity in 2016 to maintain diversity, eliminate racial disparities, and achieve racial equity. This Office coordinates across City Departments and has developed tools and resources like the Racial Equity Impact Guide (see Appendix C) to help City policies and programs achieve equitable outcomes. As staff develop programs and policies in accordance with this ECAP, this guide must be used to ensure that the needs of frontline communities are prioritized. Equity impact tools are especially important because the climate crisis demands innovative actions whose impacts to frontline communities may not be fully understood. As the City evolves its own internal policies and practices, frontline communities should benefit first from efforts to reduce climate pollution and enhance resilience.

City Success Since 2012 Energy + Climate Action Plan

In partnership with Oakland's Planning Bureau, twelve community-based organizations make up the East Oakland Neighborhoods Initiative (EONI) to deliver equity-based planning for Deep East Oakland. In 2019, EONI conducted a year-long community outreach process to identify the primary concerns, goals, and priorities for East Oakland communities and stakeholders.

The City's Environmental Stewardship programs maintain Oakland's public spaces through volunteer cleaning, greening, and beautification. This includes the Adopt a Spot and Adopt a Drain programs, and three annual clean-up events where thousands of Oaklanders come out to clean and green The Town. 2019 saw more than 7,000 volunteers across the three major events.

In June 2018, East Bay Community Energy (EBCE) became the official electricity provider for commercial and municipal accounts in most of Alameda County. Locally governed, EBCE provides its customers with higher percentages of renewable & carbon-free energy compared to PG&E and invests in energy-related programs within its participating communities, while putting its revenue back into the local economy. The City of Oakland "opted up" its municipal accounts to 100% carbon-free service, significantly reducing greenhouse gas emissions and increasing carbon-free energy use in the community.
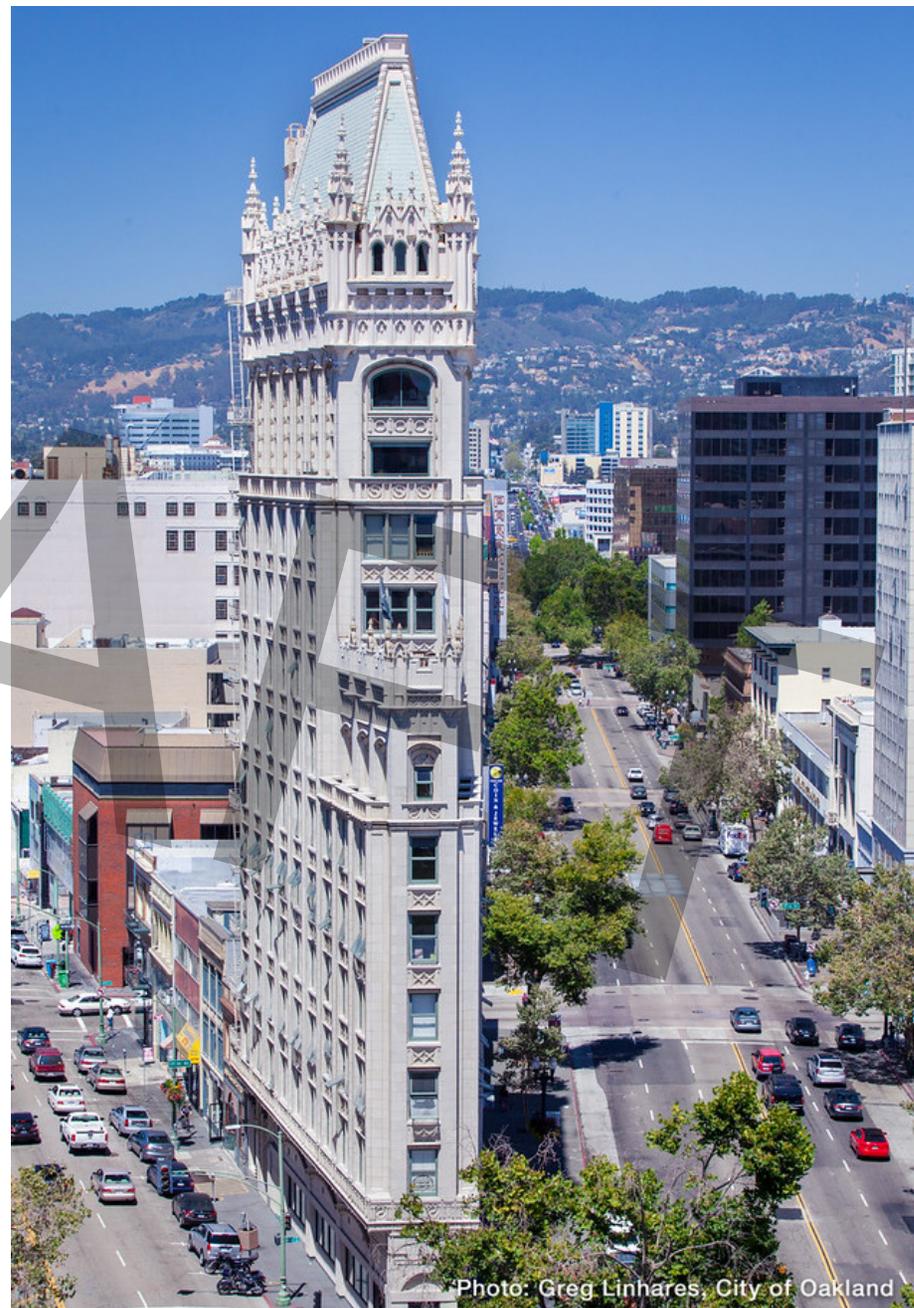
Photo: Greg Linhares, City of Oakland

City Leadership

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Evaluate Climate Impacts of City Expenditures and Operations	🌿🌿	$		CAO

By 2021, develop a GHG Impact Analysis for incorporation into budget, capital, and work plans at the departmental level.
By 2024, track annual embodied GHG emissions related to City expenditures for construction, building maintenance, travel, and food.
By 2025, establish maximum GHG performance thresholds for these and other appropriate City purchases

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Phase Out Fossil Fuel Dependency in All City Agreements and Contracts	🌿🌿	$		CAO

Explore ways to eliminate fossil fuel reliance in all agreements and contracts entered into by the City of Oakland, including utility and contractor franchise agreements, facility and infrastructure design and construction contracts, and other agreements in which fossil fuels will be directly or indirectly utilized to conduct the City's business.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Accelerate City Fleet Vehicle Replacement	🌿	$$	🫁 🌳 ❤️	OPW

By 2030, ensure that over 50% of the City's fleet uses alternative fuels, with 100% of all non-emergency response sedan purchases being zero emission vehicles. By 2030, the increase the number of electric vehicle chargers dedicated to fleet vehicles by 300% compared to 2020. By 2025, develop a feasibility study to identify zero emission and alternative fuel solutions for heavy-duty and emergency response vehicles and equipment.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Establish annual Climate Champion Awards.	🌿	$		OPW

Establish an annual public awards ceremony to celebrate residents and businesses who are advancing climate action within the community

ADAPTATION

Photo Credit: Greg Linares

- **Assess and reduce climate risk, starting in frontline communities**
- **Build resilience hubs**
- **Expand green infrastructure**

Even if global carbon emissions ended tomorrow, Oakland would still be impacted by climate change. Carbon in the atmosphere will continue to influence sea level rise, wildfires, and other threats for years to come; those risks will keep increasing the longer it takes us to eliminate carbon emissions. Frontline communities feel the impacts of climate change first and worst, a trend that will only be amplified without corrective and protective action.

The main direct climate risks to Oakland are extreme heat, flooding, and wildfires. Oakland residents are also susceptible to regional climate impacts, such as drought and food system shocks. Oakland also must adapt to indirect impacts from climate change. Oakland residents will intermittently be without electricity as the region contends with public safety power shutoffs during wildfire season. Children may miss more school days as threats from flooding and smoke inundation increase. Credit ratings agencies have begun to account for exposure to climate risks, which could increase Oakland's cost of borrowing in the future. Many communities are seeing property values decline where climate risks are highest. Understanding and reducing these indirect financial risks is an important way that Oakland can prepare for a changed climate while continuing its essential services. Throughout California, insurance premiums are steeply increasing and policies are being discontinued for homes that have high wildfire risks. Low cost measures like vegetation management or screening attic vents can help protect Oakland's housing stock and increase fire safety community-wide, while longer-term solutions like compost applications in fire prone areas are analyzed and eventually deployed.

Oakland has good initial information on general climate risks, but a more granular and comprehensive vulnerability assessment and adaptation plan are needed to develop detailed responses to neighborhood-level risks. This is particularly important for disproportionately impacted communities: transit-dependent populations such as the elderly, children, and disabled; outdoor and informal workers; low-income communities; indigenous people; undocumented immigrants; and incarcerated populations. While we plan for future climate impacts, resilience infrastructure and risk reduction measures are needed immediately to address the most serious risks to health and safety, particularly in frontline communities.

Following a string of intense hurricanes and wildfires in 2017, ratings agencies reported that the state and local governments' exposure to climate risk could affect their credit ratings. Failure to prepare for climate change could negatively affect Oakland's credit rating, increasing the cost of City projects and services.

One way to improve community resilience is to create physical spaces with supportive infrastructure and resources in well-known community locations to help people prepare for and recover more quickly from an adverse event. These resilience hubs should respond to local priorities, vulnerabilities, and climate hazards and provide resources to augment social cohesion and support every-day resilience. They should include design elements that address likely climate risks: energy efficient systems, all-electric design, solar energy with storage, vehicle charging, cooling centers, food storage and distribution, and air and water filtration. These hubs could be on City property or developed in coordination with existing community spaces and organizations, like schools or houses of worship.

Green infrastructure strategies can help mitigate flooding while providing more community benefits than traditional gray infrastructure, like access to green space, habitat protection, and cleaner air and water. Oakland can build on its success with past creek restoration and watershed improvement projects to invest in flood protection and green space for frontline communities.
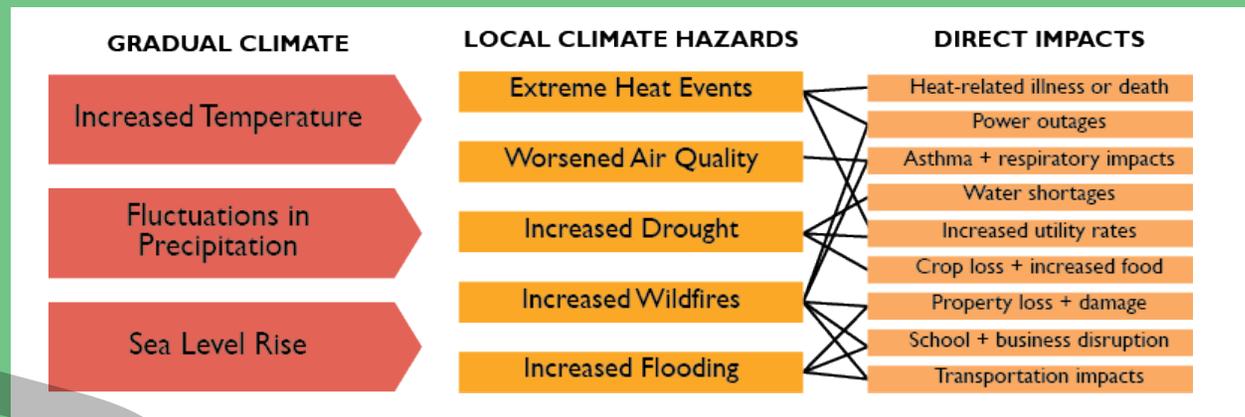

Photo Credit: Greg Linares

Climate Hazards in Oakland

Oakland currently experiences physical impacts from climate change that are expected to worsen in the coming decade as warming of the atmosphere and oceans continues. Key climate-related hazards in Oakland result from changes in precipitation (leading to worsened flooding and increased droughts); increasing temperatures (leading to extreme heat and increased risk of fire); and sea level rise (leading to increased flooding, coastal infrastructure threats, and increased exposure to groundwater and soil contamination). The compounded impacts of these hazards on all communities, and on frontline communities particularly, are profound, ranging from exacerbated respiratory diseases from smoke inhalation during fires, to job or housing displacement when homes or infrastructure are destroyed by floods. Increased fire risk creates additional GHG emissions from fires, further exacerbating climate change. Local sources of climate emissions also produce direct health impacts, as fossil fuels burned in Oakland – from natural gas in our homes and gasoline in our cars – produce harmful byproducts that cause or exacerbate asthma and other respiratory conditions and diseases.

These impacts are amplified among the frontline communities that are already vulnerable due to lower incomes and housing insecurity, elevated rates of illness and disease that come from living along heavily polluted corridors, and reduced access to opportunity resulting from transit dependence, linguistic isolation, or lower educational attainment.

The map on the right illustrates 4 and 5 ft of sea level rise in Oakland. Image from Oakland Sea Level Rise Roadmap - Figrue 4.

Adaptation

Centering Equity

Frontline communities in Oakland feel the impacts of climate change first and worst. Sea level rise will increase flooding in West Oakland and near the Coliseum. Heat impacts will be most severe in urban areas with low tree canopy coverage. Frontline communities often have fewer resources to protect themselves from these impacts or to recover from them after they occur. Lower income residents tend to have less access to air conditioning, lower tree canopy cover to protect against hotter weather, and fewer financial resources to rebuild or repair homes after a wildfire. It is a clear and pressing priority for Oakland to remedy historic inequities by investing in protection for frontline communities and co-creating solutions from the bottom up that respond to community-driven priorities and needs, addressing current stresses while preparing for future risks.

Resilience hubs and green infrastructure not only offer protection to frontline communities from climate risks but are also everyday community resources that provide education and training, access to nature and open space, community connections, and green jobs.

Measuring Success

- # of Resilience Hubs created
- Incorporate Vulnerability Assessment and Adaptation Plan into Local Hazard Mitigation Plan
- Implementation of recommendations of Adaptation Plan
- Reduced climate risk to frontline communities

What We Heard

- **Neighborhood Disaster preparedness**
- **Reduce explore to local toxic air contaminants**
- **Green jobs training**
- **Restore creeks and wetlands to reduce flood risk**
- **Disaster recovery centers**

Image Source: Food Shift

Community Leadership

Oakland-based nonprofit City Slicker Farms leads the urban farming and food justice movement in West Oakland, having transformed a vacant brownfield site into a thriving community park and urban farm. City Slicker has built more than 400 backyard and community gardens since 2001, with the West Oakland Farm Park now serving as a community hub.

Founded in 2008, Planting Justice (PJ) is a Bay Area non-profit that works to address structural inequalities in our food system, and as of 2019, PJ has hired and trained more than 40 formerly incarcerated people. In 2016, PJ purchased a two-acre lot in Sobrante Park, Deep East Oakland, for its Rolling River tree nursery. In partnership with Sogorea Te' Land Trust (STLT), an urban indigenous women-led community organization, PJ facilitated the transfer of the Rolling River Nursery's plot back into Chochenyo and Karkin Ohlone stewardship. This partnership recognizes the history of Ohlone land here in Oakland and will grant STLT access to the land in perpetuity.

Adaptation

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Fund Creation and Operation of Resilience Hubs	🌿	$$$	👷 🌳	OPW, Resilience

By 2022, identify and prioritize specific resilience needs and gaps in frontline communities. Assess feasibility of establishing Resilience Hubs at both municipal and community facilities in areas with prioritized gaps. By 2025, develop three Resilience Hubs that build community resilience in frontline communities.

| **Fund and Implement Citywide Vulnerability Assessment and Comprehensive Adaptation Plan** | 🌿 | $ | 🌳 💓 | PBD |

Update the Local Hazard Mitigation Plan to include a citywide vulnerability assessment and comprehensive adaptation plan addressing climate risks using forward-looking projections. By 2025, implement key recommendations addressing risks in frontline communities first. Update these documents every 5 years to incorporate evolving climate and risk projections and adaptation best practices.

| **Wildfire Risk Reduction** | 🌿 | $$ | 🫁 🌳 💓 | Finance, Resilience |

Fully fund and implement a Vegetation Management Plan for high-fire risk areas. Require building owners in high-risk areas to maintain defensible space and implement low-cost fire prevention measures. Increase wildfire safety requirements for new construction or major renovations in high fire risk areas.

| **Expand and Protect Green Infrastructure & Biodiversity** | 🌿 | $$$ | 👷 🌳 | OPW, OES, Resilience |

Fund and implement a green infrastructure program for the installation and maintenance of projects to improve stormwater management, support biodiversity, and increase access to natural spaces. Prioritize investment in frontline communities. By 2023, identify funding to expand green stormwater infrastructure citywide.

| **Identify and Reduce Financial Risks from Climate Change** | 🌿 | $$$ | 🌳 | OPW, Resilience |

By 2024, evaluate existing and potential financial risks posed by climate change to both City and community. Recommend strategies to mitigate these risks through insurance products, green infrastructure bonds, real estate strategy and other appropriate mechanisms.

CARBON REMOVAL

Photo Credit: Greg Linares

- **Protect and invest in the urban forest, prioritizing frontline communities**
- **Evaluate potential for other biological approaches**
- **Plan for a negative carbon economy**

Carbon Removal

Unlike other climate action strategies that are focused on reducing the amount of GHGs we emit, carbon removal (also known as sequestration) refers to removing carbon dioxide from the atmosphere. Reducing emissions is still the best and most cost-effective way to fight climate change, but there is increased awareness that carbon removal is also necessary to avoid the worst climate impacts. While it is technically possible through many geologic and atmospheric processes, those are not yet commercially viable and are often not applicable or relevant for dense urban areas like Oakland. However, several biological approaches to carbon removal may have potential in Oakland:

- Preservation and expansion of the urban forest
- Aquatic vegetation restoration
- Riparian area preservation and restoration
- Compost application in City owned open spaces

These biological approaches can provide additional community benefits, like shade, stormwater retention, increased food security, increased resilience, and habitat for insects and birds. They can also help address inequities in historic resource allocation, especially regular access to open space and nature.

Existing research suggests that the overall carbon benefit for these strategies is low and less cost effective than reducing carbon emissions in the first place. For example, planting one million trees would capture 35,000 metric tons of carbon dioxide annually – less than 2% of Oakland's baseline emissions. Other sequestration strategies may have higher carbon removal potential, but the overall net impact on carbon emissions is similarly low. Nonetheless, the urban forest is a critical community asset. Urban trees reduce heat stress, improve stormwater infiltration, and increase access to nature, among numerous other benefits. To address existing inequity among urban green spaces, Oakland must first prioritize protecting the trees it already has, while increasing investment in tree plantings in frontline communities with lower canopy coverage.

Aquatic ecosystems can also remove carbon from the air. Seagrass has the potential to store 10 to 40 times more carbon than forests; however, it requires specific conditions of water depth and clarity, salinity, and minimal disruption. Finding a suitable location may be challenging due to Port activity, water quality in Lake Merritt, and competing uses along much of Oakland's waterfront. Aquatic approaches are likely better approached as a regional Bay Area collaboration among multiple jurisdictions.

Applying compost to soil - also known as carbon farming - can substantially increase the amount of carbon stored in the soil while also enhancing water-holding capacity and vegetation growth. This additional water-holding capacity may have the added benefit of reducing fire risk from tree-covered areas in the Oakland hills. Most research on carbon farming focuses on agricultural and rangelands. Less is known about the carbon removal potential for urban soils, which are distributed in smaller, disconnected parcels. Carbon farming appears to offer the best potential for carbon removal in Oakland while also supporting other community priorities such as urban agriculture. This approach would benefit from further research.
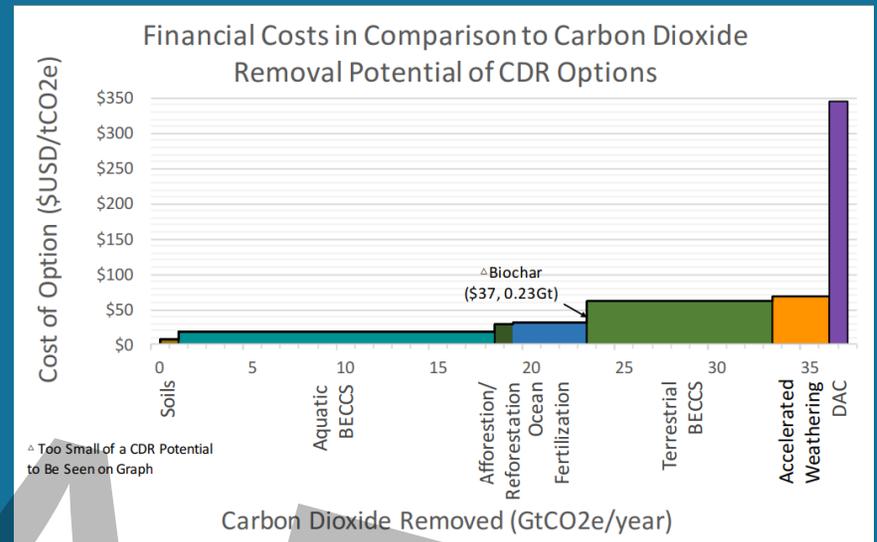
Although geologic and technological carbon removal are not cost effective as of 2019, many public and private sector organizations are showing increased interest in these areas. This stands to become a growth industry as more ambitious climate targets are implemented, and Oakland is well-positioned to be a leader in this emerging sector of the green economy. New development projects in Oakland could be a source of revenue to fund local carbon removal projects. With proximity to agricultural lands, riparian and aquatic environments, top research universities and workforce development programs, and existing industrial space, Oakland can explore ways to further carbon removal technology and research and invest in local projects. This exploration should prioritize ways to create jobs for frontline communities.

Carbon Removal

New technologies are emerging to directly remove carbon dioxide from the atmosphere, like direct air capture (DAC). The graph above shows comparative costs between DAC and biological sequestration strategies

Financial Costs in Comparison to Carbon Dioxide Removal Potential of CDR Options

Cost of Option ($USD/tCO2e) vs Carbon Dioxide Removed (GtCO2e/year)

△Biochar ($37, 0.23Gt)

△ Too Small of a CDR Potential to Be Seen on Graph

Soils, Aquatic BECCS, Afforestation/Reforestation, Ocean Fertilization, Terrestrial BECCS, Accelerated Weathering, DAC
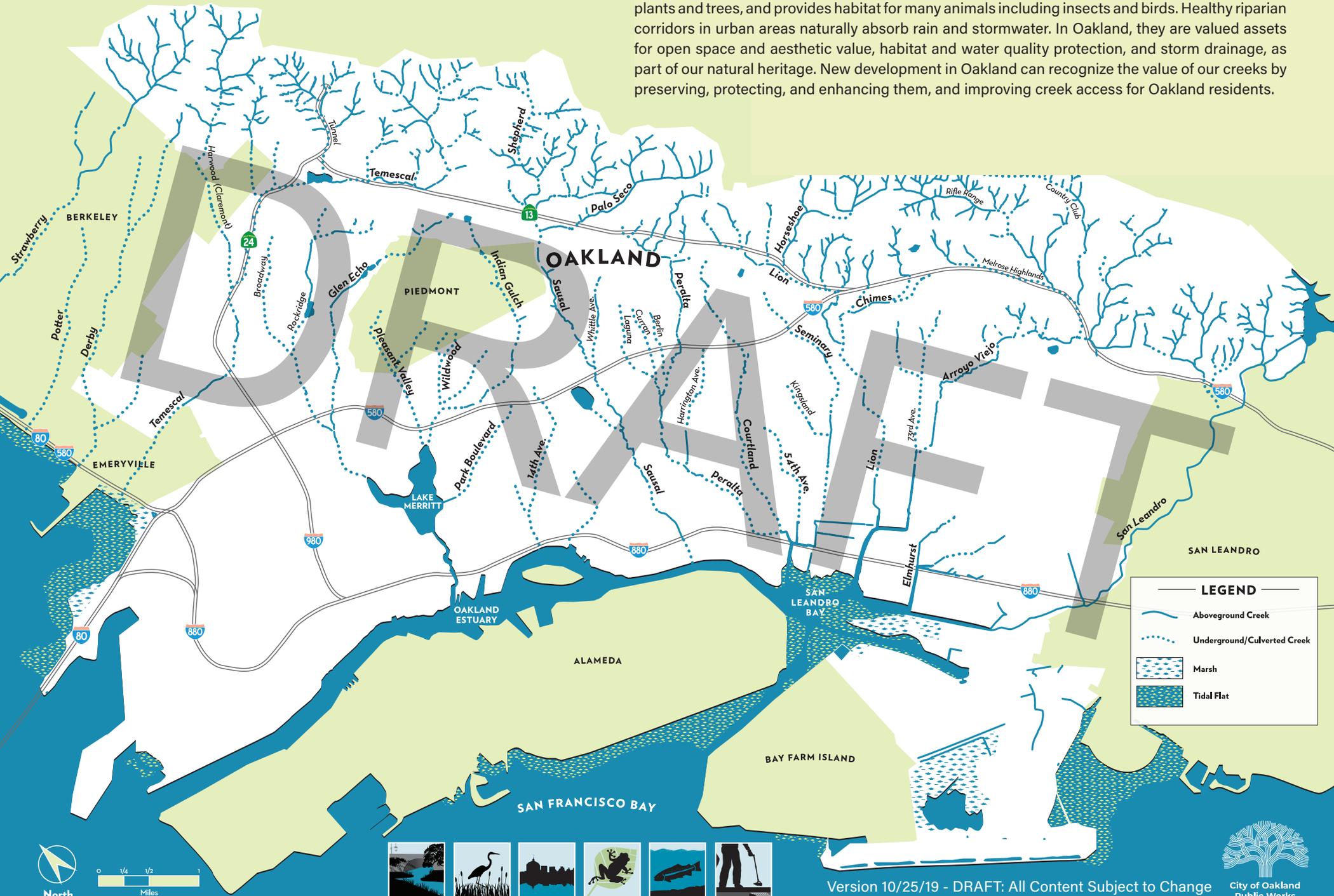

The Powerful Benefits Of Healthy Soils

Community Environmental Council

Learn more about Regenerative Agriculture and Carbon Farming at cecsb.org/carbon-farming

improved profitability — Improve plant health and yields

mitigation of climate change — Sequester and reduce greenhouse gasses

a more resilient community & ecosystem — Improved biological diversity

improved ecosystem health — Reduce sediment erosion and dust

reduced water demand — Increased water infiltration

improved community health — Improved water and air quality

Oakland's Creeks

A Riparian corridor includes a watercourse – a creek, stream, or river – and the area alongside it where vegetation typically found near watercourses flourishes. Numerous plant species have evolved to thrive along creeks and streams, and form a rich ecosystem that includes low-lying plants and trees, and provides habitat for many animals including insects and birds. Healthy riparian corridors in urban areas naturally absorb rain and stormwater. In Oakland, they are valued assets for open space and aesthetic value, habitat and water quality protection, and storm drainage, as part of our natural heritage. New development in Oakland can recognize the value of our creeks by preserving, protecting, and enhancing them, and improving creek access for Oakland residents.

DRAFT

OAKLAND

BERKELEY
EMERYVILLE
PIEDMONT
SAN LEANDRO
ALAMEDA
BAY FARM ISLAND

LAKE MERRITT
OAKLAND ESTUARY
SAN LEANDRO BAY
SAN FRANCISCO BAY

Strawberry
Potter
Derby
Temescal
Harwood (Claremont)
Tunnel
Shepherd
Temescal
Palo Seco
Broadway
Rockridge
Glen Echo
Indian Gulch
Sausal
Whittle Ave.
Peralta
Horseshoe
Lion
Rifle Range
Country Club
Melrose Highlands
Chimes
Seminary
Berlin
Curren
Laguna
Kingsland
Arroyo Viejo
Pleasant Valley
Wildwood
Park Boulevard
14th Ave.
Harrington Ave.
Sausal
Peralta
Courtland
54th Ave.
Lion
73rd Ave.
San Leandro
Elmhurst

LEGEND

— Aboveground Creek
···· Underground/Culverted Creek
▨ Marsh
▨ Tidal Flat

North
0   1/4   1/2   1
Miles

City of Oakland Public Works

Carbon Removal

Centering Equity

Carbon removal itself contributes to an equitable Oakland through general climate defense: since frontline communities face the impacts of climate change first and worst, efforts to remove carbon from the atmosphere will help reduce those impacts over time. Carbon removal strategies also generally include restoring healthy ecosystems, which provide many physical and mental health benefits in stressed environments. Some strategies like urban forestry may not remove as much carbon as other actions, but can contribute to important community needs and priorities, such as providing shade and respite in heat-stressed areas, lowering utility bills, improving student performance, and mitigating flooding. Even with these known benefits, Oakland must carefully embed equity in choices about how to sequester carbon. New technologies may be promising, but we need to plan for how they can create jobs and wealth for frontline communities. Anecdotal evidence suggests that poorly-planned urban forestry efforts can exacerbate gentrification. Oakland must work to ensure that the benefits of sequestration and habitat restoration are felt by existing Oaklanders, without contributing to displacement.

Most of the strategies proposed in this section imply an increase in green jobs, from tree planting and maintenance to research and development of technological solutions. The City's approaches to promoting these activities should prioritize job training and employment pathways in frontline communities wherever possible.

Measuring Success

- Trees planted
- Canopy coverage in frontline communities
- Investments in local projects

Image Source: UrbanReleaf, Facebook Page

What We Heard

- **Green buffer zones near schools and residential areas adjacent to freeways and other pollution sources**
- **Grow & maintain urban forest**
- **Increase local food production and access through urban farming and gardens**
- **Restore creeks and wetlands**
- **Permeable concrete, bioswales, and rain gardens**

Community Leadership

Founded in 1998 with an environmental justice mission, Urban Releaf has planted more than 15,000 trees in Oakland's neighborhoods while building community, mentoring youth, enriching underserved neighborhoods, and improving local air quality. Combined with the Sierra Club Tree Team, the two groups received more than $1 million in grants from CalFire's Cap and Trade Program in 2015 to plant and maintain for three years a total of 2,600 trees in frontline communities.

Carbon Removal

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Develop Local Carbon Investment Program	🍃	$$	Increased Funding for Local Projects	EWD, PWD, OPB

By 2023, Establish a program for both voluntary and compliance GHG mitigation fees to be invested locally. Prioritize projects in frontline communities, such as tree planting, building electrification, creek restoration, and neighborhood EV car share.

Partner with Oakland businesses to establish a "Carbon Neutral Oakland Business" designation, with any offset or "Polluter Pays" fees invested locally, with priority benefit to frontline communities.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Expand and Protect Tree Canopy Coverage	🍃	$$	⛑ 🌳 💓	OPW, Resilience

By 2022, create a fifty-year Urban Forest Master Plan that:
- Prioritizes strategies to address inequities among neighborhoods in tree canopy coverage
- Ensures that carbon sequestration is a major factor in tree planting targets, selection of tree species, and tree management practices.
- Establishes a clear and sustainable funding mechanism for ongoing tree maintenance
- Establishes a protocol and goals for community partnerships for tree planting and maintenance

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Explore Carbon Farming	🍃🍃	$$	⛑ 🌳	PDB, OPW

Explore potential for carbon farming on vacant public or private land, and in coordination with other public landowners in Oakland. Consider requirements and incentives and prioritize investments in frontline communities where feasible. By 2023, establish a pilot carbon farming project to evaluate carbon removal opportunities.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Rehabilitate Riparian Areas and Open Space	🍃	$$	⛑ 🌳	OPW, Resilience

Identify funding to continue and expand programs to restore creeks and provide ecosystem services in coordination with stormwater management planning, prioritizing investment in frontline communities that reduces climate risks. Include funding for ongoing maintenance.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Assess Feasibility for Sequestration Incubator	🍃🍃	$$$	⛑ 🌳	EWD

By 2025, evaluate the potential for a Carbon Sequestration Incubator in Oakland to incubate and develop green jobs in urban agriculture, urban forestry, aquatic and riparian restoration, engineering technology, and/or other forms of carbon removal. Assess market opportunities, policy drivers, potential locations, and existing businesses and non-profits that may benefit from co-locating in such a space.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Explore Regional Aquatic Sequestration Opportunities	🍃🍃	$$	⛑ 🌳	OPW

Coordinate with other Bay Area municipalities, non-profits, and agencies to develop a regional approach to aquatic sequestration in San Francisco Bay by 2030.

PORT OF OAKLAND

- **Reduce emissions from direct Port activities**
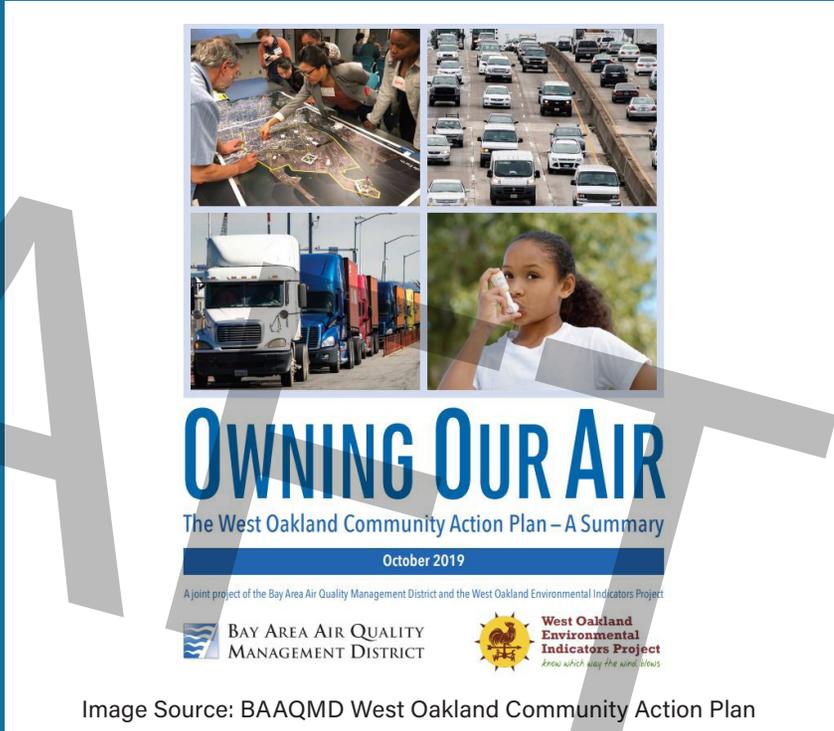- **Influence indirect emissions connected to the Port**

The Port of Oakland oversees Oakland International Airport (OAK), the 5th largest seaport in the United States, and much of the land along Oakland's waterfront. More than 1,500 ships visit the Port annually carrying the equivalent of 2.5 million 20-foot containers. Between 3,000 and 5,000 trucks haul boxes daily at the Port. The Port is an essential economic driver for Oakland and the region, but also contributes to pollution in frontline communities.

Emissions from airport and seaport buildings are reflected in the Buildings sector of Oakland's Greenhouse Gas Emissions Inventory. While jet and aviation fuel use at the airport involve substantial GHG emissions, they are not included as part of local emissions in the inventory since the airport serves the entire region. These emissions are instead included in the City's lifecycle emissions inventory, which accounts for emissions that the responsibility of Oakland, but occur outside of city boundaries. Emissions from ocean-going vessels and tugboats also fall into the lifecycle emissions inventory. However, air travel is an important source of global emissions and existing industry best practices that are relevant for Oakland are being implemented at airports worldwide.

At the seaport, direct local emissions come from onsite sources: container handling equipment, trucks, rail, and vessels at berth. While direct emissions from the seaport itself represent a small portion of Oakland's GHG emissions, diesel vehicles concentrated along corridors serving the seaport account for over 9% of Oakland's emissions. Although both diesel and gasoline engines create GHG emissions, diesel emissions result in more serious health impacts like asthma and cancer risk. The seaport reduced diesel particulate matter emissions from trucks and ships 76% from 2005 to 2015 and has developed a plan to transition the seaport to zero-emissions operations. This plan, the Port of Oakland Seaport 2020 and Beyond Plan, was adopted in 2019 and is scheduled to be updated by 2023. In 2017, State legislation AB 617 required community-focused air quality planning to reduce community exposure to existing sources. West Oakland was identified as a high-priority community for this process and a final West Oakland Community Action Plan was released in 2019. While particulate matter emissions have achieved significant reductions, greenhouse gas emissions have not been reduced at a similar rate. Total GHG emissions from Port activities and uses have been reduced 16.6% between 2005-2017, a lower rate than overall Citywide emissions.

The Port of Oakland continues to plan for reducing the GHG emissions of both seaport and airport activities. Because the Port largely operates independently of the City, with an independent Board of Directors, this ECAP has limited ability to direct actions for Port activities. However, as a major source of emissions and as a visible and important part of the local economy and community, it is essential that the Port's strategies work collaboratively with the City's climate actions to achieve the low-carbon future described in this Plan. This section seeks to provide guidance to the Port, Port tenants, and public agencies regulating Port-related activities to demonstrate where such coordination can occur within existing planning and operations, respecting the Port's independence and autonomy in determining how to implement needed changes over the 2020-2030 timeframe.

Image Source: BAAQMD West Oakland Community Action Plan

Community Leadership

The West Oakland Environmental Indicators Project has a long track record of organizing community members to advocate for City, Port, and Federal action to reduce pollution in their community. In 2018-2019, WOEIP partnered with the Bay Area Air Quality Management District to create "Owning Our Air: The West Oakland Community Action Plan," responsive to State legislation directing air regulators to develop
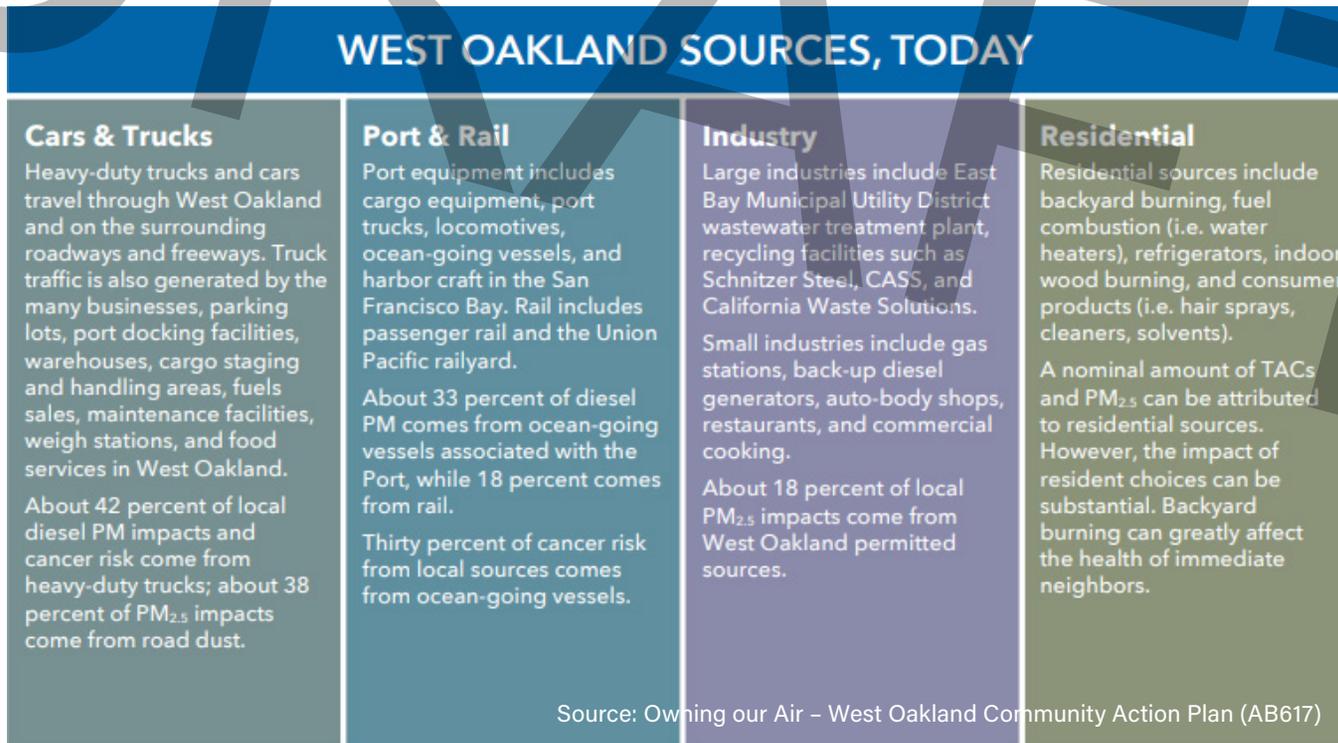
Centering Equity

Frontline communities disproportionately face direct and indirect pollution burdens from the Port, and have for decades. Effective community organizing, combined with government regulations and other interventions, have improved conditions considerably. Still, disparities persist for communities adjacent to Port operations. Ocean-going vessels and heavy-duty trucks both contribute substantial additional health risk in the form of diesel particulate matter. Some West Oakland neighborhoods experience nearly three times the cancer risk from local pollution sources compared to neighborhoods farther away. These pollutants exacerbate exposure in West Oakland frontline communities due to other sources like manufacturing operations, concrete production, and power generation. Heavy-duty trucks coming to and from the airport and seaport also heavily utilize the I-880 corridor through Oakland, creating similar air pollution for lower elevation areas of both East Oakland and West Oakland. State legislation has opened new opportunities for community-led processes to clean West Oakland's air. Actions in this ECAP can help amplify and support community-led planning for a cleaner, healthier Oakland.

Measuring Success

- GHG emissions reductions
- DPM emissions reductions
- % of zero emission CHE operating at seaport
- % of vessels participating in Voluntary Speed Reduction program
- % carbon-free electricity delivered by Port

Advocate

- For more aggressive freight pollution reduction requirements by the State
- For more funding to reduce emissions associated with Port activities
- For additional funding for electric truck charging infrastructure at Sea Ports and along major interstates

WEST OAKLAND SOURCES, TODAY

Cars & Trucks

Heavy-duty trucks and cars travel through West Oakland and on the surrounding roadways and freeways. Truck traffic is also generated by the many businesses, parking lots, port docking facilities, warehouses, cargo staging and handling areas, fuels sales, maintenance facilities, weigh stations, and food services in West Oakland.

About 42 percent of local diesel PM impacts and cancer risk come from heavy-duty trucks; about 38 percent of $PM_{2.5}$ impacts come from road dust.

Port & Rail

Port equipment includes cargo equipment, port trucks, locomotives, ocean-going vessels, and harbor craft in the San Francisco Bay. Rail includes passenger rail and the Union Pacific railyard.

About 33 percent of diesel PM comes from ocean-going vessels associated with the Port, while 18 percent comes from rail.

Thirty percent of cancer risk from local sources comes from ocean-going vessels.

Industry

Large industries include East Bay Municipal Utility District wastewater treatment plant, recycling facilities such as Schnitzer Steel, CASS, and California Waste Solutions.

Small industries include gas stations, back-up diesel generators, auto-body shops, restaurants, and commercial cooking.

About 18 percent of local $PM_{2.5}$ impacts come from West Oakland permitted sources.

Residential

Residential sources include backyard burning, fuel combustion (i.e. water heaters), refrigerators, indoor wood burning, and consumer products (i.e. hair sprays, cleaners, solvents).

A nominal amount of TACs and $PM_{2.5}$ can be attributed to residential sources. However, the impact of resident choices can be substantial. Backyard burning can greatly affect the health of immediate neighbors.

Source: Owning our Air – West Oakland Community Action Plan (AB617)

Port of Oakland

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Reduce emissions from Port vehicles and equipment.	🍃🍃	$$	🫁	Port

- Deploy 14 battery electric trucks by 2021, and 21 battery electric trucks by 2027;
- Deploy 44 zero emission yard tractors by 2025;
- Ensure new rubber tired gantry cranes are hybrid electric or best available technology

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Explore additional low-emission vehicle and fuel options.	🍃	$		Port

- Study the feasibility of renewable diesel in Port sources of GHG emissions.
- Study the effect of the extra weight of battery electric trucks on the overweight corridor.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Educate Port stakeholders	🍃	$		Port

Expand outreach to licensed motor carriers who drive short distances and target outreach on incentives programs in coordination with the BAAQMD

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Reduce emissions from electricity	🍃🍃	$	🫁	Port

By 2023, Port of Oakland should procure 100% carbon-free electricity for Port operations and all electricity supplied to tenants or other end users.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
Replace Airport vehicles with zero-emission vehicles.	🍃	$$	🫁	Port

Replace 50% of diesel and compressed-natural gas airport shuttles to zero-emission airport shuttles by 2030.

ACTION	LOCAL CARBON IMPACT	COST	COMMUNITY BENEFITS	LEAD DEPT.
OAK to pursue Airport Carbon Accreditation (ACA)	🍃	$$	🫁	Port

OAK airport to achieve "Reduction" certification through ACA by 2022 and achieve "Optimization" Certification by 2025. Through the ACA's third-party certification, the airport will benchmark carbon emissions and demonstrate reduction.

THE 2030 EQUITABLE CLIMATE ACTION PLAN COMMUNITY ENGAGEMENT PROCESS

From January through November 2019, the City of Oakland is conducting extensive engagement to ensure that the 2030 ECAP reflects the concerns and insights of Oaklanders. This work is being conducted in partnership with the City's two ECAP consultant teams: An Equity Facilitator (co-led by Oakland Climate Action Coalition and Environmental / Justice Solutions) and a climate technical consultant, led by Oakland-based Integral Group. As of early October 2019, this process has directly engaged more than 1,100 Oaklanders, as well as dozens of technical experts. Many more Oaklanders will join the process by reviewing and commenting on the online ECAP draft, and participating in citywide Town Hall meetings in early November.

The City of Oakland pioneered the Equity Facilitator (EF) model to ensure process equity in the ECAP's creation. The City sought a team with deep local knowledge, experience designing and assessing equity-based processes and plans, and awareness of climate equity issues. The Oakland Climate Action Coalition is a cross-sector coalition with over three dozen member organizations, organizing and advocating for sustainable, equitable, and community-based economic development. Based in the East Bay, Environmental / Justice Solutions consults on climate and environmental justice law and policy, from community engagement to implementation. The EF led outreach for the workshops, online survey, and Town Hall meetings described below; worked with the City to design and facilitate the workshops and Town Hall meetings; and is conducting the racial equity impact analysis of the ECAP in late 2019. The EF-led process is designed to particularly engage frontline community members and ensure that their voices are meaningfully incorporated in the ECAP by eliminating barriers to participation.

The following is an overview of all community engagement conducted for the 2030 ECAP process through October 2019:

• **Neighborhood Leadership Cohort: I**n February, the EF recruited a Neighborhood Leadership Cohort (NLC) of two residents from each City Council District. The EF trained the NLC on City government process, equity principles and climate equity, basics of climate science, and the origins and goals of the ECAP. NLC members receive an hourly stipend to co-lead outreach and co-facilitate their district workshop and Town Hall meetings. The EF works with NLC members to develop and review outreach materials.

• **Community Workshops:** From May through July, the EF and City staff delivered eight community workshops – one in each Council District, and one citywide. Nearly 400 Oaklanders attended. All workshops were free and included a full meal. Simultaneous interpretation in Chinese and Spanish and childcare were available upon request. Residents shared knowledge about their communities, and identified local values and priority community needs. EF and City staff provided education on the climate crisis and Oakland-based solutions that could reduce greenhouse gas emissions while addressing community social and economic priorities. At the end of each workshop, attendees participated in a dot-voting exercise to identify the most critical equity-based climate solutions for their communities.

• **Stakeholder Interviews:** Throughout the ECAP's development, the City, Integral Group, and the EF are conducting interviews with technical experts in transportation and mobility, material consumption and waste, building science, energy systems, racial and environmental equity, carbon sequestration, climate resilience, and more. These have informed the analysis of what strategies will be technically feasible and most likely to produce intended outcomes. They also inform community discussion by enriching the baseline of data and potential solutions that Oaklanders can explore in imagining local solutions for equitable climate protection and adaptation.

• **ECAP ad hoc Community Advisory Committee: I**n April, the ad hoc ECAP Community Advisory Committee, appointed by Mayor Libby Schaaf, held its first meeting. The Committee was formed pursuant to legislation passed by the Oakland City Council to advise City staff in the development of the ECAP. It consists of 13 members and two alternate members, reflecting the racial and geographic diversity of Oakland. The Committee meets monthly until final adoption of the ECAP by City Council.

▪ **Online Survey:** For two and a half months, from August through October, Oaklanders responded to an in-depth online survey that reflected many of the questions posed at the Community Workshops, as well as additional topics, to provide detailed information on the types of climate actions that Oaklanders want and need. More than 700 Oaklanders responded to the survey, identifying priorities and helping the project team understand community concerns.
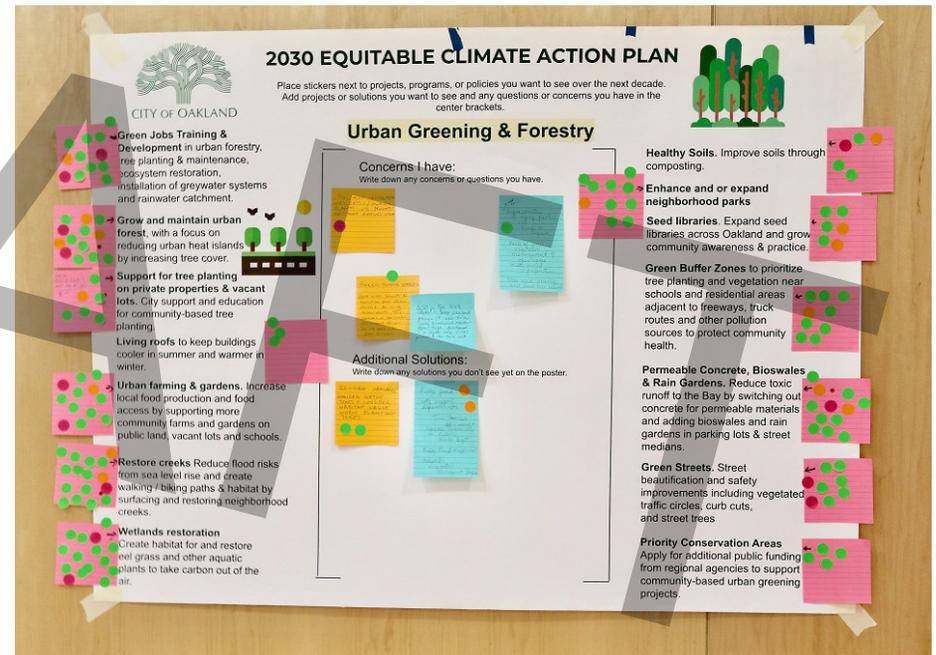
▪ **Additional Plans:** Several additional community planning processes on topics similar to the ECAP have taken place in Oakland in 2018 and 2019. These include the East Oakland Neighborhoods Initiative (EONI), and the West Oakland Community Action Plan (WOCAP). EONI and WOCAP focused on developing plans to build resilience and address environmental harms in Deep East Oakland and West Oakland: communities hard-hit by environmental pollution and a historic lack of investment, and deeply at risk from the impacts of climate change. Both plans included extensive community engagement. The City has incorporated findings and recommendations from both in the ECAP.

▪ **Pop-Up Engagement and Climate Equity Work Days:** Led by the EF, this work has involved meeting people where they are and through hands-on projects that make climate action tangible and relevant. These have included presentations to neighborhood and church groups, and projects such as tree planting, building tiny homes, and coastal cleanup. These events are used to spread the word about the ECAP, and encourage participants to join the workshops or access the online survey.

▪ **Youth Engagement:** Youth voices have been increasingly prominent in the global discussion of the climate crisis; that is no less true in Oakland. Through the Youth-Plan Learn Act Now (Y-PLAN) program, run by UC Berkeley, the City worked with four sophomore classes at Skyline High School on engagement and equity in the 2030 ECAP. There, more than 100 students learned about the City's climate efforts, making recommendations for ongoing youth engagement and equitable strategies. In addition to Y-PLAN, the EF worked directly with high school youth through the Rose Foundation's New Voices are Rising (NVR) program, where the ECAP became the focus of NVR's 2019 Summer Academy, and NVR students participated in delivering the District 3 community workshop.

▪ **Online Draft:** The City published the draft ECAP online in late October for all Oaklanders to review and publicly comment on through November.

▪ **Town Halls:** In early November, the EF and City will lead two citywide Town Hall meetings, designed to engage ordinary Oaklanders in Democratic Deliberative Decision-making, led by Environmental / Justice Solutions. This process is designed to engage all community members, particularly those from frontline communities, in a deep exploration of the draft ECAP, to provide detailed feedback and recommendations for improving the plan and increasing its relevance in their communities.

INTRODUCTION

This ECAP builds on the Climate Action for Urban Sustainability (CURB) analysis, which the City undertook in 2018 through support from Bloombers Associates. All current data is based directly on the most recent 2017 GHG Inventory completed by the City and provided to the City's technical consultant team. In broad strokes, building energy use is sourced from utility data provided by PG&E, and then converted into emissions using location and fuel-specific GHG intensities, transportation emissions are sourced from the California Air Resources Board, and waste emissions are calculated based on City waste management data.

The consultant team developed an Excel-based GHG emissions model to inform and model plan actions, that accounts for all sources of GHG emissions in Oakland. The consultant team used the model to estimate future energy and emissions under a business-as-usual (BAU) scenario, and to quantify the potential impact potential actions would have on different sectors. The model is intended to inform the City on how it can achieve its 2030 and 2050 climate targets; it is not meant to quantify all actions or assign savings to specific actions. Given this purpose, the model was used to quantify actions in different ways. The team quantified specific programs and policies where actions are more directly quantifiable, such as new construction codes. In other cases, where actions to not directly tie to specific savings, the team focused on determining the scale of action required to achieve the District's climate and energy targets.

The model is not intended to be a predictive tool and does not account for costs or externalities other than GHG emissions. The intent of the Plan is to provide the City with a roadmap to achieving its GHG reduction targets. The Plan provides this roadmap through a package of policy and program recommendations, with additional information and recommendations regarding the design and implementation of such actions based on available research and experiences in other leading jurisdictions. The specific design and implementation of many of these actions will take further analysis, including understanding the potential cost-effectiveness and relative feasibility of program and policy approaches and designs.

One key source of GHGs that deserves mention are industrial and manufacturing facilities. The State of California Public Utility Commission follows a "15/15" rule where energy use data on a class of customers can only be shared with the third party (in this case, the City) when that class is bigger than 15 customers and no customer makes up more than 15% of the total. In Oakland, this threshold has never been met by the industrial sector. Therefore, industrial emissions are considered outside the scope of both the City's inventories and the modeling that was done for this plan.

BASELINE ASSUMPTIONS AND BAU WITHOUT POLICIES

The first step of the BAU scenario is estimating what emissions will look like in the absence of policies, simply considering increases in floor area and mobile transport. This forms the top line of all the wedge charts presented in the plan.

Buildings:
Buildings were split up into four categories—single family residential, multifamily residential, commercial, and local government. While commercial encompasses many building types with different energy use profiles, varying commercial energy use profiles relate more to the electricity consumption and less to thermal energy demand. Because Oakland's electricity will be 100% carbon-free by 2030, detailed modeling of various electricity use profiles was not necessary.

Building Energy Use Intensity assumptions were developed from the most recent Oakland GHG inventory. The low EUIs of multifamily residential buildings suggests the possibility that some of the energy use for multifamily buildings may be in the commercial rate sector; because actions are applied evenly to multifamily residential and commercial buildings in the modeling, it was judged to be more important to align with authoritative records.

	2017 Gross Floor Area (ft2)	Baseline EUI (kBtu/ft2)	Electricity EUI (kBtu/ft2)	Natural Gas EUI (kBtu/ft2)	Total Energy Use (kBtu)	Total Electricity Use (kBtu)	Total Natural Gas Use (kBtu)
Single Family Residential	234,854,312	20.3	5.9	14.4	4,774,800	1,381,440	3,393,360
Multifamily Residential	158,293,759	20.1	5.8	14.3	3,183,200	920,960	2,262,240
Commercial	167,819,507	46.8	26.1	20.7	7,851,500	4,374,600	3,476,900
Local Government Facilities	2,607,400	151.1	89.0	62.1	393,872	232,029	161,843
Total	563,574,978				16,203,372	6,909,029	9,294,343

The BAU scenario starts with population growth projections and building floor area growth projects that are consistent with the City's best estimates and prior modeling done for CURB. This plan does not aim to achieve any change in city population, but simply recognizes that ongoing population growth is forecast to occur and must be addressed in the City's plans to cut citywide GHG emissions. We assume a 1.09% annual population growth rate per year, with total city population rising from 425,204 in 2017 to 608,090. Consistent with the assumptions in CURB, we make the following assumptions for floor area. Average Annual Growth Rate (AAGR) is the growth rate of total citywide floor area based on new buildings being built; assumptions for this differ by building type and time period. Additionally, a 1% annual replacement rate is assumed, representing old buildings that are replaced by new buildings (or subject to a gut-rehab); these new buildings still trigger code requirements even though they don't increase city floor area.

	2020-2030		2031-2050		2017	2050
	AAGR of building stock	Replacement Rate of building stock	AAGR of building stock	Replacement Rate of building stock	Baseline Floor Area	2050 Floor Area
Single Family	0.4%	1.0%	1.4%	1.0%	234,854,312	315,782,345
Multifamily	0.4%	1.0%	1.4%	1.0%	158,293,759	212,839,926
Commercial	0.6%	1.0%	2.0%	1.0%	167,819,507	247,780,566
Local Gov't	0.6%	1.0%	2.0%	1.0%	2,607,400	3,849,750
Total					563,574,978	780,252,587

Transportation:

Transportation emissions are forecast based on the EMFAC emissions model developed and used by the California Air Resources Board (CARB). The EMFAC emissions model is developed and used by CARB to assess emissions from on-road vehicles including cars, trucks, and buses in California, and to support CARB's regulatory and air quality planning efforts to meet the Federal Highway Administration's transportation planning requirements. USEPA approves EMFAC for use in State Implementation Plan and transportation conformity analyses. EMFAC 2014 was used to project BAU VMT emissions, as it has been approved by U.S. EPA. The following assumptions were made in the BAU scenario for VMT based on the EMFAC calculations.

The first BAU scenario run through EMFAC assumes current vehicle stocks going forward, with very limited uptake of electric vehicles. This is not likely given the rapid uptake of electric vehicles due to both policies and market conditions, but appropriately represents the worst-case BAU.

The latest GHG inventory for Oakland no longer includes airport transportation emissions for outbound or inbound transboundary flights, as these are Scope III emissions. Therefore, the model also excludes these emissions. Airport stationary energy use and emissions are taken from the 2017 inventory and held constant in the BAU.

Seaport emissions are sourced from the Port of Oakland's own inventory, with the exception that no emissions from moving ships are included. These emissions are also held constant in the BAU.

Amtrak, Union Pacific Rail, WETA Ferry, and BART emissions are sourced from their respective agencies, and are held constant.

Car Type	Fuel	VMT			GHGs (tCO2e)		
		2017	2030	2050	2017	2030	2050
Passenger Cars	Gasoline	3,432,387,542	3,498,446,449	3,582,510,378	1,253,896	859,244	772,966
	Diesel	28,838,285	41,693,334	44,771,309	10,382	10,814	10,464
	Electricity	0	801,841	1,074,672	0	0	0
Buses	Gasoline	5,993,535	8,287,224	9,303,891	8,896	10,609	11,787
	Diesel	15,629,286	10,583,025	10,645,338	32,876	18,018	16,227
Light/Medium-Duty Trucks	Gasoline	59,276,183	35,513,894	31,328,295	54,974	32,966	28,704
	Diesel	118,120,386	152,379,956	177,988,993	116,658	146,695	174,086
Heavy Duty Trucks	Gasoline	919,833	1,090,404	1,140,328	1,681	1,784	1,839
	Diesel	150,567,732	216,310,937	275,789,999	250,227	318,232	406,921

Appendix B. GHG Modeling Assumptions

Material Consumption + Waste:
Overall waste output of Oakland residents is assumed to increase in proportion to population. Overall waste output of Oakland residents is assumed to increase in proportion to population. The current waste split is 73% landfill (including Alternative Daily Cover (ADC), 13% recycling, and 14% compost; as the inventory only includes landfilled waste, those percentages were used to estimate the total waste tonnage inclusive of recycling and composting.

Per State rules, Alternative Daily Cover (ADC)—the waste cover that is laid atop a landfill each day—is not counted in the formula for waste diversion, though starting in 2020 organic ADC waste will need to be included as landfilled (non-diverted) waste. As no numbers existed for the percentage of ADC that was organic, 0% was assumed, to keep future projections consistent with historical data. ADC tonnage was kept proportional to all other landfilled waste based on the 2017 ratio of 81%. Given these facts, the official current diversion rate for waste diverted from landfills is 39.6%.

Waste emissions includes emissions from collection trucks, and trucks taking waste to the landfill; these are also increased proportional to population. They don't change with waste diversion because the waste must be transported from collection points to transfer or disposal or processing points, regardless of whether the waste is headed to a landfill, a recycling plant, or a composting site.

CURRENT POLICIES FOR THE BAU SCENARIO
To get an accurate picture of where emissions will be in 2030 and 2050 without further action, we then layer on a series of policies currently in effect at the local, state, and federal level. This forms the true BAU scenario against which all savings from the ECAP are measured.

Carbon-Free Electricity:
In 2018, Oakland joined East Bay Community Energy (EBCE), which supplies renewable energy by default to all customers unless they opt out. It is assumed that by 2030, 98% of all customer load that was historically supplied by PG&E will use EBCE. EBCE is currently at least 82% renewable, and by 2030 100% of EBCE supply will come from renewable sources of electricity. The model linearly increases uptake in EBCE to 98% by 2030, and linearly decreases the GHG intensity of this portion of supplied electricity to 0 by 2030.

15% of commercial customers, however, do not use either PG&E or EBCE, and instead have direct access contracts with third parties for electricity. The City has little visibility at present into these contracts of the GHG emissions resulting from this electricity use. Historically, the City has simply assumed those customers had the same electric GHG intensity as the PG&E mix. However, with EBCE going to 100% carbon-free power within a decade, the GHG intensity of direct access customers will differ dramatically. In the longer term, those third-party suppliers will still need to provide carbon-free energy by 2045 under state legislation. The model applies current and project PG&E emissions intensity to 15% of the electricity; this decreases to 0 by 2045.

By 2030, carbon-free electricity will reduce annual CO2e emissions by 176,858 tons of CO2e per year, and by 2050, it will have reduced annual emissions from Oakland by 250,799 tons of CO2e per year, relative to current grid intensity.

This leaves natural gas use in buildings, and gasoline and diesel transportation, as the main sources of emissions in Oakland that this plan must concern itself with. The model holds natural gas emissions intensity as constant due to both a shortage of cost-effective biogas (sometimes called "renewable natural gas") options, and the absence of programs to infuse biogas, if it were available, into the gas distribution network.

New Construction:

California's Title 24 has long set the gold standard as the most efficient energy code in the nation, and, along with appliance standards and other efficiency programs, has helped keep California's building energy use flat for decades despite massive growth in economy activity, building stock, and population.

By 2020, under Title 24, all new single-family construction will need to be Zero Net Energy (ZNE). Title 24 for commercial and multifamily buildings will continue to get more stringent at a rate of 5% per 3-year cycle; the 2030 Title 24 will also require commercial and multifamily buildings to be ZNE. The model assumes that implementation of a new code lags by 2 years for single-family homes and 3 years for all other buildings, as codes take time to be effective and buildings already permitted remain subject to the old code.

ZNE typically means a building that is so efficient that it can and does generate all the energy it needs on site from renewable sources, over the course of a year. As most tall buildings in urban contexts like Oakland cannot achieve ZNE with just onsite renewables, going offsite is allowed in order to meet the remainder of the demand, so long as all on-site efficiency and renewable opportunities have been maximized. Critically, ZNE standards from entities like the International Living Future Institute (ILFI) do not allow on-site combustion of natural gas. While the full Title 24 definition of ZNE is not set, at present the CEC does not actually prohibit the use of gas in ZNE buildings—the building owner simply must offset all the energy consumed onsite, on a source energy basis, with offsite renewable energy. Furthermore, community choice aggregation (CCA) programs like EBCE that achieve 100% carbon-free energy can also be used to meet the renewable electricity needs of ZNE buildings served by that CEE. Because this plan is focused on GHG reductions, and the BAU includes 100% clean electricity by 2030, there is no net difference to modeling the renewable electricity as coming from EBCE or generated on the building; nor is there any true difference from an emissions standpoint from assuming ZNE buildings to be all-electric or assuming that they use gas but over-procure renewable electricity to compensate. For these reasons, the model does treat ZNE buildings as all-electric buildings.

To calculate what EUI should be assumed for each building type in each year, we referenced a recent study from the New Buildings institute that estimated model ZNE EUIs by climate zone for various building types. For climate zone 3C, this study pegs a ZNE multifamily residential building at an EUI of 16 kBtu/ft2, and a ZNE office at 20 kBtu/ft2, with most other commercial building types having similar EUIs.

The model reduces existing EUIs by building type by a percentage representing estimated code savings for each code cycle, applied to both fuels. For the ZNE code, however, gas use is reduced by 100% and electric use is increased to make up the difference, up to the reference ZNE EUIs. Because of the very high baseline EUIs for local government buildings, the model assumes much greater energy savings from those buildings, to bring them down to appropriate ZNE efficiency levels by 2030.

Building Type	Code Model	Effective Year	EUI Reduction	Electricity Change	Gas Change	ZNE EUI Target
Single Family Residential	Title 24 – 2016 - Res	2018	20%	20%	20%	N/A
Single Family Residential	**Title 24 – ZNE - Res**	**2022**	**60%**	**-38%**	**100%**	**9**
Multifamily Residential, Local Government, & Commercial	Title 24 – 2016 - Com	2019	20%	20%	20%	N/A
Multifamily Residential, Local Government, & Commercial	Title 24 – 2019 - Com	2022	30%	30%	30%	N/A
Multifamily Residential, Local Government, & Commercial	Title 24 – 2022 - Com	2025	35%	35%	35%	N/A
Multifamily Residential, Local Government, & Commercial	Title 24 – 2025 - Com	2028	40%	40%	40%	N/A
Multifamily Residential	**Title 24 – ZNE - Com**	**2033**	**30%**	**-142%**	**100%**	**17**
Local Government Facilities	**Title 24 – ZNE – Com**	**2033**	**85%**	**74.5%**	**100%**	**22**
Commercial	**Title 24 – ZNE – Com**	**2033**	**60%**	**28%**	**100%**	**20**

By 2030, these codes will reduce annual CO2e emissions by 52,033 tons of CO2e per year, and by 2050, they will have reduced annual emissions from Oakland by 308,705 tons of CO2e per year.

Existing Buildings:

California AB 82 mandates benchmarking and disclosure of energy use of all buildings over 50,000 gross square feet. While the act of benchmarking does not itself save energy, buildings that do benchmark their energy usage tend to notice opportunities to reduce energy use and on average, buildings that consistently benchmark their energy use see reductions of 10% over a period of 3 to 6 years. While some of these buildings may already have been benchmarking, and thus already achieved some savings, most have not. Only 31 buildings over 50,000 ft2 have achieved ENERGY STAR certification in Oakland in the last decade with scores of 85 or higher and thus are likely to have addressed many of the low-hanging fruit of energy savings opportunities. The floor area of these buildings total 11 million ft2, which is less than 10% of the total 115 million ft2 of covered buildings in Oakland. The model assumes that over the next decade, 85% of covered buildings will comply, and these buildings will see energy savings of 2% per year for five years. By 2026, this measure will avoid 8,367 tons of CO2e per year.

The California PUC Zero Net Energy Strategic Plan calls for 50% of commercial buildings to be retrofit to ZNE by 2030. In order to achieve this, 6% of commercial buildings in Oakland would need to be retrofit for a 60% energy use reduction between 2020 and 2030. This 6% annual retrofit rate is well in excess of current best-in-class retrofit rates, and the current incentives and regulations in place in California and Oakland are unlikely to achieve this goal. Therefore, for the BAU scenario, only 1.67% of the commercial floor area is assumed to be retrofit each year from 2020 to 2030, achieving a 60% energy use reduction. No multifamily or single-family buildings are assumed to be retrofit in the BAU scenario. By 2030 and thereafter, this measure will avoid 52,250 tons of CO2e per year.

Transportation:
Several policies in will reduce transportation emissions in the BAU scenario.

Oakland has a policy whereby all new development projects that are under the Small Area Plans must take efforts to reduce the VMT that would be generated by their construction by 15%. As shown in the table below, by 2030 this will have reduced citywide VMT by 3% relative to what would happen otherwise, and by 2050 it will have reduced VMT by 8%.

Year	Total New Building Area	Total Building Area	% of Total Area	VMT Reduction by 15% equals an overall VMT reduction by...
2025	66,796,891	585,285,871	11%	2%
2030	108,544,949	598,855,179	18%	3%
2040	255,601,150	689,553,883	37%	6%
2050	402,657,351	780,252,587	52%	8%

The second thing altering VMT projections and the resulting GHG emissions is the rapid uptake of electric vehicles. The state has a target of 1.5 million EV cars by 2025, and 5 million EV cars by 2030, per EO B-48-18. This equates to 3.85% of all passenger cars to be EVs by 2025, and 12.162% of all passenger cars to be EV by 2030. This will require rapid update of electric vehicles by new customers. Already, Oakland outpaces the nation in EV addition, with EVs making up 10% of all new car sales. As the state has not set EV adoption targets out past 2030, we assume that the rate of EV vehicle sales continues at the same pace after 2030, which will result in 34% of all VMT being by EVs by 2050. This is a conservative assumption, because the adoption curves of new technologies are not linear. Market forecasts call for many new cars to be EVs by 2040. Nonetheless, this conservative assumption is appropriate for the BAU, and EV adoption will be a key focus of plan actions.

Overall, these changes in VMT and EV adoption will reduce passenger car GHG emissions by 44% and reduce overall on-road emissions by 29%.

In addition, CARB has mandated that all buses in the state become zero-emission by 2040; Oakland area buses are assumed to transition to run on fuel cells that use hydrogen that is generated with renewable electricity.   The transition period is 2023 to 2040, with a 5.88% turnover per year.

By 2030, these combined transportation policies will reduce annual CO2e emissions by 152,223 tons of CO2e per year, and by 2050, they will have reduced annual emissions from Oakland by 391,037 tons of CO2e per year. Transitioning the busses to fuel cells avoids an additional 11,467 tons of CO2e per year by 2030, and 25,845 tons of CO2e per year by 2050.

Material Consumption + Waste:
Oakland is not currently on track to meet its 2020 or 2025 waste diversion goals, nor are policies in place to achieve this. Therefore, no GHG emission reductions for solid waste were included in the BAU.

PLAN ACTIONS

The ECAP has aggressive actions that will achieve major savings in GHGs, reducing GHGs by over 60% by 2030 and over 84% by 2050. Nor every action in the plan could be modeled. Rather, the modeling assumptions discussed below capture the expected effect of the combined plan actions per sector.

Buildings - New Construction:

The ECAP will calls for a requirement that all new buildings and major renovations avoid connection to natural gas infrastructure by 2023. The BAU already assumes that single-family construction is all-electric beginning with 2022, because of the Title 24 ZNE requirements. As discussed above, Title 24 does not require NZE be all-electric, but rather requires that NZE offset any gas use with additional renewable energy on a source energy basis; from a carbon perspective this is equivalent to assuming all-electric buildings with a 100% carbon free grid. The additional savings come from all new multifamily, commercial, and local government buildings being all-electric beginning in 2023. This is modeled as an adjusted Title 24 to these sectors for Title 24-2019, 2022, and 2025, where the overall EUI savings are the same as modeled in the BAU, but the building is all-electric, so the actual electric EUI increases to replace the gas use. The BAU already assumes the ZNE code for multifamily, commercial, and local government buildings will be effectively all-electric beginning in 2033. Thus, the total savings from this action come from the avoided natural gas use in any non-single-family buildings built between 2022 and 2033. This action avoids 14,306 tons of CO2e by 2032.

Buildings - Existing Buildings:

The plan calls for development of a plan by 2022, to achieve decarbonization of the whole existing building stock by 2040. Since the plan would not be ready until 2022, and it will take a couple years to implement, we assume that decarbonization retrofits will begin in 2024 (though local government buildings could begin in 2022). It is assumed that 100% of local government buildings will in fact be retrofitted by 2040, but only 90% of all private buildings, to account for exemptions and non-compliance.

Buildings - Existing Buildings (continued):

Further, the 15% of commercial buildings that were assumed to be retrofit in the BAU are not retrofit a second time. During the period prior to 2030 when those BAU retrofits are occurring, the rate of decarbonization retrofits is slower, recognizing that both retrofit actions will draw from the same pool of workers and capacity.

- From 2024 and 2040, 90% of single-family homes and multifamily properties are retrofitted to eliminate all use of natural gas (6% annual uptake rate)
- From 2022 and 2040, 100% of all local government buildings are retrofitted to eliminate all use of natural gas (5.9% annual uptake rate)
- From 2020 and 2030, 15% of commercial buildings are retrofitted to NZE levels—this is already in the BAU (1.67% annual uptake rate)
- From 2024 and 2040, 75% of commercial buildings are retrofitted to eliminate all use of natural gas (4% annual uptake rate 2024-2030, 6.9% annual uptake rate 2031-2040)

The following assumptions inform the fuel switching:
- All buildings that are undergoing a fuel switching retrofit and are not already subject to state benchmarking requirements see a 10% energy savings due to realization of no-cost/low-cost energy efficiency opportunities (these savings are captured in BAU for buildings subject to benchmarking).Space Heating: 85% efficient gas-fired boiler is replaced with 200% efficient Air Source Heat Pump (ASHP)
- Domestic Hot Water (DHW): 63% efficient gas-fired boilers are replaced with mix of electric resistance boilers and heat pumps, averaging 94% efficiency
- Cooking & other equipment: 65% efficient gas equipment replaced by 75% efficient electric/induction equipment
- Based on these efficiencies, electric use in retrofitted buildings increases by an amount equal to ~50% of the eliminated natural gas use (50% increase for single-family, 49% increase for multifamily, and 54% increase for commercial and government buildings). This increase is an average and will vary greatly on a building-by-building basis.

To be clear, these annual retrofit rates of 6% are well in excess of best-in-class community-wide retrofit programs anywhere in North America, and this action deserves notice as being particularly challenging to achieve.

Energy Supply:

As in the BAU, EBCE is modeled at being 82% renewable in 2019 and 100% renewable in 2030. Per the plan, the seaport and airport also transition to carbon-free electricity by 2030, so the GHG intensity of port and airport electricity declines to 0.

Because the decarbonization retrofits increase electricity use, only part of their savings is captured in the existing building wedge. However, since that electricity is renewable by 2030, there are additional savings in energy supply, that reflect this increased electricity use being carbon-free.

The combination of the decarbonization retrofits and the renewable electricity supply avoids 180,436 tons of CO_2e by 2030, and 326,580 tons of CO_2e by 2050.

Transportation - Vehicle Electrification:

Based on national data, we assume that 6.67% of vehicles turn over each year.

In Oakland, 10% of new passenger cars are EVs. This is substantially ahead of the national average, and the global projections for EV adoption. However, technology innovation and adoption curves have standard shapes, as shown below. Therefore, we can reason that the entire EV adoption curve is shifted ahead in time for Oakland by 10 years, and market forces, technological innovation, and state incentives will continue to accelerate EV adoption well beyond the BAU projections.

To forecast EV adoption, we used projections from Bloomberg New Energy Finance for global vehicle adoption. We then shifted the adoption curve forward by 10 years, and extended it forward in time by 20 years, to create new estimates for passenger car EV uptake in Oakland out to 2050.

Using a vehicle stock turnover model, we then calculated how the total VMT would be divided between EVs and conventional fuel vehicles over time.
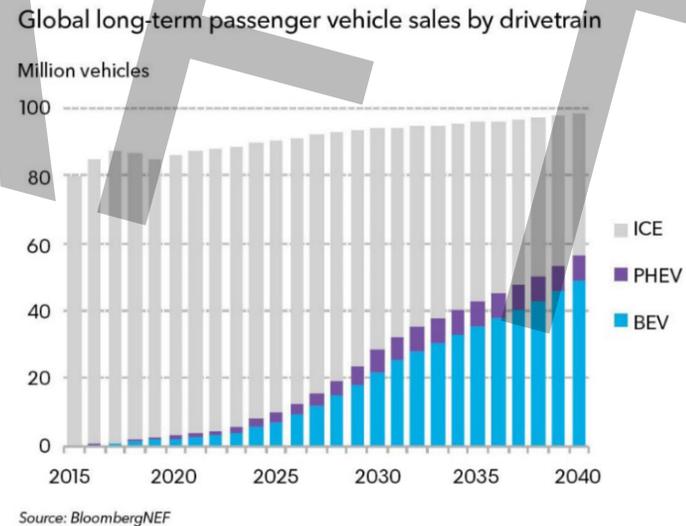

Figure 1: Typical Adoption Curve

Figure 2: Global passenger vehicle sales projections

EVs are now spreading into the SUV market as well. As EMFAC does not separate out SUVs and pickup trucks from other light/medium duty vehicles, we assumed that all gasoline-fueled light duty vehicles in the EMFAC projections were subject to the same electrification trend as passenger cars. Light/medium-duty trucks running on diesel, and heavy-duty trucks, continue to use the VMT and emission projections from EMFAC 2014, with no shift towards electric or other carbon-free fuel source.

EV %	2020	2025	2030	2040	2050
Percent of new sales	10%	20%	40%	75%	95%
Percent of total VMT of passenger vehicle stock	2%	7%	18%	51%	85%

These increased percentage of total VMT were then applied to the EMFAC 2014 projections in the model, to shift the distribution of passenger car and light-duty truck VMT between gasoline-powered vehicles and electric vehicles, with intermediate years interpolated on a linear basis. The new total GHGs for on-road transportation are subtracted from the BAU GHGs to calculate the savings from vehicle electrification.

Increased vehicle electrification avoids 44,019 tons CO_2e by 2030, and 350,812 tons CO_2e by 2050.

Transportation - Mode Shift Assumptions:

Mode shift refers to actions that shift people from using cars to other transit modes for commuting to work and traveling around the city. To align with past analysis, the model uses the CURB "deep decarbonization" targets for mode shift.

Travel Modes	On Road	Today	2030 Deep Decarbonization	2050 Deep Decarbonization
Private Autos and Trucks	Yes	69.1%	40.0%	20.0%
Motorcycle	Yes	1.6%	1.6%	1.6%
Taxi/TNC 1or2 pass.	Yes	1.6%	3.0%	3.0%
TNC Pooled Ride	Yes	Not avail.	5.0%	5.0%
Shared Minibus	Yes	Not avail.	9.0%	10.0%
Standard Bus/BRT	Yes	11.9%	15.0%	19.9%
BART	No	6.5%	8.0%	14.0%
Amtrak	No	1%	3.0%	3.0%
Ferryboat	No	0.1%	0.4%	1.0%
Biking	No	3.3%	7.5%	10.0%
Walking	No	4.9%	7.5%	12.5%

Since the categories in CURB are slightly different than EMFAC, "private autos and truck" mode share is divided between passenger, light/medium duty, and heavy duty based on the relative VMT for 2017 in EMFAC. Mode share percentages are calculated for the on-road portion only, and intermediate years are interpolated on a linear basis.

Since EMFAC only contains on-road mode share, it is assumed that EMFAC VMT mode share in 2017 matches the on-road mode-share in 2017 from CURB and the American Community Survey for Alameda County. Father, it is assumed that changes in mode share apply equally to all fuel types for a given vehicle class in a given year.

GHGs emissions for each on-road vehicle and fuel type are multiplied by the ratio between the CURB target and the CURB baseline for that year, divided by the ratio between the EMFAC VMT mode share percentage for that year and the EMFAC 2017. This adjusts VMT by vehicle type to match the CURB projections, adjusting for the increases projected in EMFAC. Since this adjustment is applied to the road transportation GHG projections after the vehicle electrification actions, there is no double counting (indeed, the mode share savings are less than they otherwise would be because a decrease in EV VMT has no GHG impact in Oakland).

To fairly capture the impact of this shift, GHGs from Buses, BART, and Amtrak are also increased based on the ratio between the CURB target mode share and 2017 baseline mode share. This ensures that GHG savings from mode share are reduced to account for the projected increase in non-road mass transit modes. The effect is quite marginal, since as stated above, BART is zero carbon by 2030 and buses are zero-carbon by 2040.

While ECAP also has actions related to ride-sharing and carpooling, it is not known if the mode share targets from the CURB analysis already assumed an increase in carpooling. To be conservative and avoid double-counting, no additional VMT reductions from carpooling are modeled, on top of the already aggressive mode shift goals. The mode shift is modeled at avoiding 272,482 tons CO_2e by 2030 353,756 tons CO_2e by 2050.

Transportation - Fleet Electrification:

The model assumes that by 2030, 80% of the City of Oakland vehicle fleet is electrified. In lieu of detailed VMT by vehicle class for City fleet, GHGs from City fleet vehicles are simply decreased by 80% by 2030, avoiding 6,302 tons CO_2e.

Material Consumption + Waste:

The City of Oakland is not on track to hit the 2020 state waste diversion target. However, with the actions in ECAP, we project that the City could hit the 2025 state target. This increases overall waste diversion to 70% by 2025, with per capita waste dropping to 2.6 lbs./person/day (not including ADC, per state guidelines).

Total waste is reduced by an amount equal to 1% of plastic weight, to reflect single-use plastics ban (these plastics tend to be very light).

Hard numbers on the exact percentage of citywide waste that is Construction & Demolition (C&D) waste were not available; as a first approximation, we assume that the category known as "Other (includes C&D)" is C&D, and that half of that waste is recovered and recycled by 2030. Since "other" is 28% of the waste stream, this reduces total waste sent to landfills by an additional 14%.

By 2035, to reflect a zero waste, goal, diversion rate (not including ADC) is increased from 75% (where it is due to the above changes) to 80%.

The ratio of ADC cover to the tonnage of waste from franchise haulers and self-haul remains constant at 2017 levels, so ADC waste declines in proportion to all other landfilled waste.

Waste actions avoid 71,830 tons of CO2e by 2030 and 108,127 tons CO2e by 2050.

EQUITABLE IMPLEMENTATION

In 2015, a "majority of current Oakland residents could not afford to rent or purchase homes at the current prices in their neighborhoods." More than a quarter of Oaklanders are foreign-born, and 63 percent are people of color. With major freeways crisscrossing the city, the 5th busiest seaport in the country, and a history of industry, Oakland's complex climate challenges demand an equity-centered response. Actions in the 2030 ECAP direct City staff to develop and implement specific policies, plans, programs, and projects over the next 10 years to achieve the City's climate goals.

To ensure equity in the outcomes of that work, the City must gauge to whom and where the benefits of each Action happen, and whether those benefits are small or large, short-term or lasting. Benefits of the overall strategy should be equitably distributed through Oakland and responsive to the unique needs of each community. Benefits (direct or indirect) of individual Actions should be targeted to increase frontline communities' access to key determinants of physical, social, and economic well-being, thereby reducing disparities and/or increasing opportunity.

Each ECAP Action targets different sectors of the economy, the community, and the climate crisis. Staff tasked with implementing each Action must confirm the degree to which the proposed approach is likely to accomplish or enable the following:

1. Prioritize and maximize benefits of climate investments to frontline communities:
   ▪ Address priority community needs (key determinants of physical, social and economic well-being, such as cost-savings or improving public health).
   ▪ Distribute climate benefits geographically, responsive to the needs of each community (such as fire prevention efforts in the hills or flood protection near the Coliseum), and/or by income, and/or by race.
   ▪ Preserve and strengthen local cultural assets and values.
   ▪ Reduce disparities by remedying or mitigating existing harms (e.g., air pollution, lack of tree canopy) and avoiding additional harms.
2. Help businesses and industries improve the environment and restore our communities; and/or
3. Foster local green job creation, entrepreneurship, community empowerment, and/or cooperative ownership opportunities for members of frontline communities.

Negative impacts must also be considered. In an era of acute housing affordability concerns, and with a major homelessness crisis plaguing the region, there is more need than ever to assess potential impacts on housing and business affordability. This need is emphasized throughout the ECAP, and must be a specific point of analysis when assessing potential policy and program approaches.

The definition of "frontline community" vary across Actions. CalEnviroScreen 3.0 (CES), developed by the California Environmental Protection Administration (CalEPA), is useful for identifying frontline communities. CES assesses and ranks cumulative impacts by combining 20 indicators that include environmental, socioeconomic, and health vulnerabilities, where higher scores mean more disadvantage and risk. In ranking all of California's 8,000 census tracts, it "provides a scientific assessment that corroborates the lived experience of many Californians," and a clear map of the communities that have historically been "exposed to more environmental problems and are more vulnerable to the effects of pollution than others" – burdens that have generally been "unfairly distributed along race and class lines."

As a policy tool, CES can help identify where residents face disproportionate risks and which census tracts need additional resources. CES also illuminates areas of greatest geographic disparity among census tracts. For ECAP implementation, CES can be combined with other indicators to identify areas deserving greatest focus:

▪ CalEnviroScreen highest-ranking tracts (generally East Oakland, I-880 Corridor, West Oakland)
   ▪ Tracts in the top 25% statewide, and top 25% for Oakland
   ▪ Tracts in the top 25% for individual indicators (for example, those not in top 25% of risk overall might be in top 25% for specific indicators like asthma)
▪ Other factors related to ECAP action topics where not in top CalEnviroScreen tracts, such as renters and low-income multifamily properties, areas with lowest tree canopy or decaying gray infrastructure, areas with high rates of traffic-related injuries, etc.

The City's Department of Race and Equity created a Racial Equity Implementation Guide in 2018. The Guide assists City staff and Departments in developing policies and programs that will ensure more equitable outcomes by reducing disparities and centering the needs of historically underserved or disproportionately burdened communities. The Guide should be employed early in the development of any policy or program that results from this ECAP, and consulted throughout implementation – from design to evaluation – to ensure that approaches not only achieve the desired climate impact, but also reduce disparities and improve climate equity.

1. PolicyLink, 2015. Oakland's Displacement Crisis: As Told by the Numbers. https://www.policylink.org/sites/default/files/PolicyLink%20Oakland's%20Displacement%20Crisis%20by%20the%20numbers.pdf

2. CalEnviroScreen: A Critical Tool for Achieving Environmental Justice in California. California Environmental Justice Alliance, 2018. https://caleja.org/wp-content/uploads/2018/08/CEJA-CES-Report-2018_web.pdf

RACIAL EQUITY IMPLEMENTATION GUIDE:

City of Oakland Municipal code 2.29.170.1 specifies that "the City of Oakland will intentionally integrate, on a Citywide basis, the principle of "fair and just" in all the City does in order to achieve equitable opportunities for all people and communities.

CITY OF OAKLAND
Department of Race and Equity

Equity practice focuses on developing systemic approaches to addressing racial disparities in life outcomes for residents of Oakland. The 2018 Oakland Equity Indicators Report showed Black residents to be the most extremely impacted by racial disparities in most indicators of well-being, with significant degrees of impact for other communities of color as well. To implement change that will improve these outcomes in our communities of color, your department will need to analyze policies, procedures, and practices to identify elements that have, or could contribute to, or improve these conditions. This worksheet will help guide your project or program planning and implementation process by explicitly naming equity outcomes, identifying and engaging those most impacted by disparities and taking a structured, analytical approach to designing and implementing community informed equity solutions.

1. Racial Equity Outcome(s)- What is the racial equity outcome for this effort? Your stated goal, or description of improved future conditions for residents should include addressing the needs of those most impacted by racial disparities. Use relevant disparity data to start to define specific focus for outcomes. (Example of data to guide equitable housing policy development – housing cost burden, average median income, eviction rates, and homelessness data, disaggregated by race.)

2. Identify and plan to engage stake holders - What is the best way to inform, outreach and engage community members most impacted by racial disparities? Strategize to remove barriers to community engagement in your equity process. (Use Inclusive Outreach and Engagement Guide for planning outreach that will engage those most impacted by disparities as well as other key stakeholders needed for development and implementation of policy and program recommendations.)

3. Gather supplemental information/qualitative data – What are the systemic issues driving disparities? Identify root causes that drive related disparities and possible solutions, centering the observations of communities most impacted by racial disparities, to deepen City awareness and understanding of current conditions and needed action.

4. Identify Equity Gaps (burdens and barriers)- Using data and information gathered from community, identify any current or anticipated barriers and burdens impacting access for those most impacted by racial inequity. (Housing barrier example – affordable housing serving those with income above 30% of AMI excludes most Black residents from accessing that housing based on low median household income data for that group.)

5. Address Equity Gaps- Based on information gathered, what action could be taken to advance equity? Design strategies that will address root causes of disparities, remove system barriers to equity, and/or create new equity approaches. Connect back to specific disparity indicators used to set equity outcome, root causes of disparities, and ground truth proposed strategies with community.

6. Implementation – What steps are needed to implement action(s) identified? Based on the findings of the analysis, identify implementation steps to write or rewrite policy/ program documents, address budget needs, create necessary partnerships, get approvals needed to implement equity strategies. As needed, propose plans to address gaps in resources or other barriers to implementation.

7. Evaluation and accountability- How will success/equity be measured? Who will be better off and how will we know? Establish meaningful performance measures as guided by Result Based Accountability (RBA) model, see below; plan to track outcomes and make course correction as needed. Plan for collecting data disaggregated by race and feedback from communities most impacted by disparities for each performance measure. Design reporting mechanism that will keep internal and external stakeholders informed of progress, lessons learned, and emerging best practices.

Racial Equity Result Based Accountability (RBA) Meaningful Measures Model

2019 Downtown Oakland Specific Plan
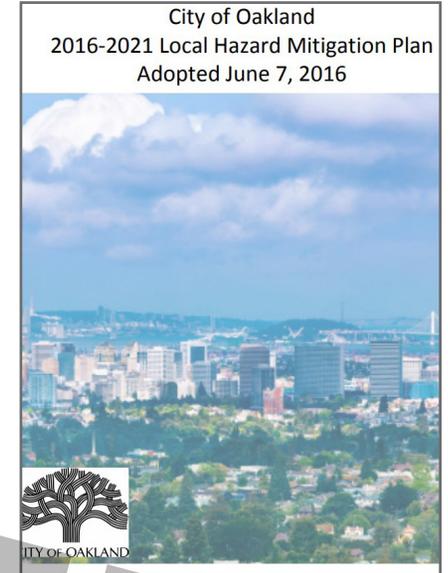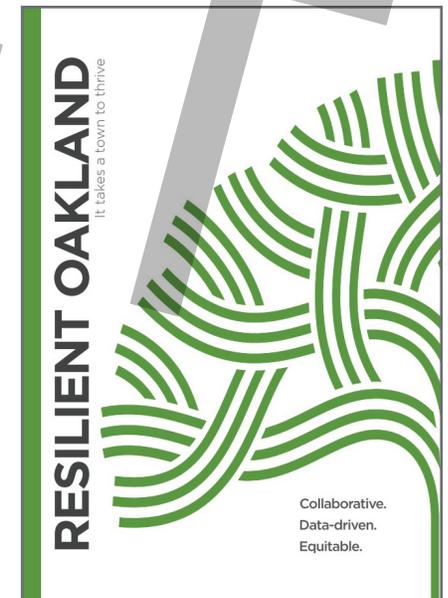

2019 Let's Bike Oakland Oakland Bike Plan

2017 Oakland Walks! Pedestrian Plan Update

2016 Local Hazards Mitigation Plan

2016 Resilient Oakland Playbook

THANK YOU!

CITY OF OAKLAND