

# Piedmont Climate Action Plan 2.0



Adopted March 19, 2018

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## Mayor's Statement

To all who live, work or sojourn in Piedmont:

I am pleased to introduce Piedmont's second Climate Action Plan, which includes and expands on the measures and goals introduced in our preceding 2010 Plan. With the recognition that some measures may have an up-front fiscal impact on the City and its residents, this revised version of the Climate Action Plan is intended to serve as a means to continue the City's commitment to keep reducing our carbon footprint as the signs of climate change have grown.

Recognizing the global impact of Climate Change, the City of Piedmont joined over 7,000 local governments as part of the Global Covenant of Mayors in 2016. As part of this commitment, cities pledge to consistently measure, create goals for, and reduce greenhouse gas emissions.

Since 2005, the Piedmont community has reduced its in-boundary carbon footprint from 48,818 metric tons of carbon dioxide equivalent (CO<sub>2</sub>e) to 38,498 MT CO<sub>2</sub>e, a reduction of 21%. This reduction was made possible in part by individual and collective actions taken by our community, but mostly, as a result of lower natural gas use during the very warm winters of 2014 and 2015.

Meeting our goals has allowed us to set new targets, more ambitious than the previous ones and in sync with those recently set by the State. Our new goal, a 40% reduction in emissions from the 2005 baseline by 2030, sets Piedmont on a path to successfully reduce its emissions by a substantial amount. This Climate Action Plan sets forth a set of measures and actions Piedmont residents can take on an individual basis and as a community to achieve this goal. One of the most immediate actions to come is the City's commitment to sourcing renewable electricity through East Bay Community Energy.

This Climate Action Plan has been written by City staff with the guidance and advice of the Piedmont Climate Action Plan Task Force, an advisory group made of concerned Piedmont residents. Since March of 2017, Task Force members and City staff have held monthly public meetings, in which Piedmont residents have expressed their concerns on climate change and shared their ideas on measures that our community can take to reduce greenhouse gas emissions.

With the guidance of this new plan, I am confident that we can take concrete actions to reach our goals and reduce greenhouse gas emissions leading to Climate Change, and I urge you to join in our local efforts to engender a better global future and a resilient Piedmont.

Sincerely,

A handwritten signature in blue ink, appearing to read "Robert McBain". The signature is stylized and includes a large, circular flourish at the end.

Robert McBain  
Mayor

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## Acknowledgements

### City Council Members

Robert McBain, Mayor  
Teddy Gray King, Vice Mayor  
Betsy Smegal Andersen  
Jennifer Cavanaugh  
Tim Rood

### Climate Action Plan Task Force

The following volunteers served as members of the Climate Action Plan Task Force. The City thanks this dedicated group of citizens for their commitment and dedication to writing this plan and to engaging the community to reduce Piedmont's greenhouse gas emissions through concrete actions.

Brett Hondorp  
Sophia Lincoln  
Margaret Ovenden  
Steven Schiller  
Bruce Wolfe  
Tracey Woodruff, Chair

### Planning Staff

Kevin Jackson, Planning Director  
Emily Alvarez, Assistant Planner  
Mira Hahn, Assistant Planner

### CivicSpark Fellows

Olivia Ashmoore, CivicSpark Climate Fellow for the City of Piedmont (2016-2017)  
Cody Ericksen, CivicSpark Climate Fellow for the City of Piedmont (2017-2018)

### Public Works Department

Chester Nakahara, Director of Public Works  
Robert Akiyama, Building Official, Building  
Craig Griffin, Plan Checker, Building  
Nancy Kent, Parks and Project Manager  
Dave Frankel, Supervisor of Maintenance

### Outside Agency Staff

Miya Kitahara, Program Manager, StopWaste

### Cover Page Images

Terry and Rob Smith  
Barry Miller

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# Introduction and Background

## Executive Summary

Climate change poses a real and significant threat to human health and the environment both globally and locally. More floods, wildfires, and other severe weather events will become increasingly more common due to climate change, with concurrent disruptions to residents, businesses, and economies.

Addressing climate change will require the cooperation of governments, businesses, and citizens. Roughly 70% of all greenhouse gas (GHG) emissions, a key contributor to climate change, come from cities<sup>1</sup>. Thus, cities are positioned to take a leading role in reducing emissions and creating sustainable and livable cities for their communities. Piedmont has been a leader in recognizing the need to address climate change and the need for local action. In 2017, Piedmont City Council passed a resolution expressing Piedmont's commitment to the goals of the Paris Agreement and also approved joining the Global Covenant of Mayors. As a signatory, Piedmont is committed to creating an updated Climate Action Plan (CAP) and providing periodic progress reports in the form of GHG inventories that are made available to the public. This CAP, or CAP 2.0, provides this update to the City's 2010 plan and sets GHG emissions reduction targets consistent with California targets of 40% below 2005 levels by 2030 and 80% below 2005 levels by 2050. This reflects Piedmont's ongoing commitment to addressing climate change, building on past success, and supporting state efforts.

However, policies, regulations and actions taken outside of Piedmont will play a significant role in reducing Piedmont's GHG emissions<sup>2</sup>. It is estimated that State and Federal actions will provide approximately 85% of the reductions needed and Piedmont will need to provide only the additional 15% necessary to meet the GHG reduction targets set out in this plan<sup>3</sup>. Thus, Piedmont's influence on actions outside of the City's borders are at least as important for addressing climate change as actions taken within the City, particularly given the relatively limited amount of GHG emissions associated with a small, residential community. The one probable exception to this is the imbedded or lifecycle emissions associated with our community's consumption of goods and services, which given Piedmont's affluent residents, is relatively high.

## Priorities and Call to Action

In 2015, the three largest sources of GHG emissions in Piedmont were building electricity use, natural gas use for space and water heating, and petroleum-fueled personal vehicle use. Although it may seem daunting at the individual level to affect real change, there are key measures presented in this plan that will allow residents to significantly accelerate Piedmont's progress toward reaching its new GHG reduction targets. To put it another way, without community engagement and the concerted action of individuals (all of us), we stand no chance of mitigating

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<sup>1</sup> "Global Report on Human Settlement 2011, Cities and Climate Change." *United Nations Habitat*. [http://mirror.unhabitat.org/downloads/docs/E\\_Hot\\_Cities.pdf](http://mirror.unhabitat.org/downloads/docs/E_Hot_Cities.pdf). Accessed 29 December 2017.

<sup>2</sup> Refers to Piedmont's Scope 1 and 2 emissions, or the GHGs that the city either directly emits from within its boundaries or indirectly emits from its consumption of purchased electricity, respectively.

<sup>3</sup> Calculation based on estimated forecasts of emissions due to current California policies and general trends.

climate change globally. As a call to action and to help Piedmonters take the most effective actions to reduce their carbon footprint, this Climate Action Plan includes the following priorities:

**For Residents:**

- 1. Curb your consumption:** The most cost-effective actions that residents can take involve simply reducing the number of trips made by car, increasing the amount of trips made on foot, bike, or public transportation, reducing your household's electricity use, and increasing your household's energy efficiency through retrofits. Piedmont residents can also work towards altering their consumption habits, particularly the consumption of food, goods, and services that aren't produced within the Bay Area. Reducing food waste, choosing low-carbon food options, supporting local businesses, increasing the reuse and recycling of goods, and purchasing carbon offsets for air travel are some of the actions that will allow Piedmont residents to leverage their purchasing power to significantly reduce GHG emissions beyond the City's boundaries. The City will increase community engagement and education efforts to raise awareness about the climate change impacts of consumption habits and ways to address them.
- 2. Support and purchase electricity from 100% renewable sources:** Residents, business owners, the schools, and municipal facilities should purchase 100% renewable electricity through East Bay Community Energy (EBCE), a newly-formed, community-owned power supplier that will be serving Piedmont and other jurisdictions in Alameda County beginning in 2018. In particular, this Climate Action Plan recommends that the default for energy purchase be 100% renewable. This would make it easier for Piedmonters to automatically source 100% renewables, while also providing customers with other options. Through EBCE, residents will be able to address one of the biggest sources of GHG emissions in Piedmont, building electricity use, in an easy and economical way.
- 3. Walk, bike, and take public transportation:** As previously mentioned, residents should make an effort to increase the number of trips made on foot, bike, and public transportation. The City should continue to implement its Pedestrian and Bicycle Master Plan (PBMP), with periodic reports on progress in meeting the plan's targets, to further encourage and facilitate these actions for residents.
- 4. Drive a Zero Emissions Vehicle (ZEV):** Petroleum-fueled personal vehicle use is the single largest source of emissions in Piedmont. Purchasing an electric or other zero emissions vehicle is another significant action that can be taken. When combined with the use of 100% renewable electricity, electric vehicles become significantly more impactful, as the additional electricity required for charging the vehicle would no longer be linked to electricity generated from fossil fuels. The City will investigate the possibility of installing public EV charging stations in public areas within Piedmont.
- 5. Switch to electric appliances:** Natural gas use for space and water heating is the second largest source of emissions in Piedmont. Purchasing 100% renewable electricity becomes much more impactful when all major appliances in the building run on electricity. Piedmont residents and business owners should begin to electrify their home and business appliances, a major goal of this updated CAP. Switching to electric appliances that are powered by 100% renewable energy is one of the most impactful actions that all building owners should strive towards in the near future, and one that the City plans to pursue in its municipal facilities as part of this CAP. The City will encourage switching to electric appliances by identifying and

sharing information on rebates and incentives and by identifying opportunities to encourage switching in either new construction, major renovation projects, or at point-of sale.

6. **Go solar:** Increasing your household's energy efficiency through energy audits and retrofits is a cost-effective way to address GHG emissions associated with the building sector. In addition, although residents will be able to purchase 100% renewable energy through EBCE, generating on-site renewable energy through rooftop solar or solar water heating systems still has the potential to be a cost-effective action that reduces your carbon footprint. Residents who choose to install rooftop solar or solar water heaters will benefit from lower monthly energy bills, help contribute to local energy generation, and complement EBCE by helping it meet its energy demands. Installing batteries along with the panels for energy storage enables the solar energy generated on site to be used during nighttime hours. The City will encourage energy efficiency and solar installations by identifying and sharing information on rebates and incentives and identifying opportunities to require energy assessments, rooftop solar, and "solar ready" roofs in either new construction, major renovation projects, or at point-of-sale.
7. **Act individually, act communally:** Becoming personally engaged and supporting the various GHG emission reduction efforts presented in this plan will be crucial to its success. See both the Individual Action section and the Community Engagement and Outreach section in Chapter 5 on pages 105 and 111, respectively, for more information on how to reduce your business' or household's GHG emissions and ways to stay involved.

#### For City Government:

1. **Support EBCE's 100% renewable option as the default for Piedmont:** The City government should have 100% renewable be the default option for all Piedmont electricity customers. However, electricity customers would still have the option to opt-down or opt-out of the program.
2. **Remove regulatory barriers and incentivize implementation:** The City government should take steps to support and encourage local GHG mitigation and climate change adaptation actions by continuing to streamline the application process and removing regulatory barriers for projects that reduce one's carbon footprint including switching to electric appliances, installing rooftop solar, and installing home EV chargers.
3. **Community outreach:** The City will provide continued outreach and education to the local community and will identify and share rebates and incentives that facilitate reductions in a resident's carbon footprint and facilitate the switch to electric appliances and vehicles.
4. **Lead by example:** The City government will source 100% of its electricity from renewable sources, commit to being a zero-carbon municipal government by 2050, address the need to adapt to the hazards posed by climate change such as storms, flooding, and wildfires, explore enacting procurement guidelines that provide preference for low-carbon goods and services, and explore enacting policies to consider mitigation and adaptation in all City policies, regulations, and activities.
5. **Support the PUSD's climate goals:** Along with the City, the Piedmont Unified School District is also pursuing its own climate actions, many of which coincide with the goals of this plan. Both the City and the PUSD have the capability to become community leaders and to have a significant impact on the effort to combat climate change and have the influence to inspire residential action. The future of our children depends on our actions today and there is perhaps no better place to demonstrate that through the actions of Piedmont's

leading community organizations – its schools. The City and PUSD should pursue opportunities for increased collaboration, resource-sharing, and joint community engagement efforts.

- 6. Invest in staff’s capacity to pursue sustainability:** The City should further invest in sustainability by continuing to participate in the CivicSpark program, but also by exploring grant and funding opportunities, exploring ways to increase staff capacity for climate action, and dedicating funds for community engagement efforts.

In addition to the priorities listed above, CAP 2.0 proposes over 200 measures and actions that can be taken to further reduce Piedmont’s GHG emissions and contribute to the State of California’s efforts to reduce GHG emissions. There exists two new elements in this CAP that were not included in Piedmont’s 2010 CAP; an Adaptation chapter that describes how Piedmonters can adapt to hazards resulting from climate change and a section on Piedmont’s consumption-based emissions, which accounts for significant GHG emissions generated by goods and services produced outside of Piedmont’s borders. This document aims to guide City staff and residents in their efforts to reduce GHG emissions through 2030 and to set the stage for emissions reduction through 2050.

## Purpose and Scope

### Purpose

The destabilization of Earth’s climate poses both a threat to the globe and the Piedmont community. Addressing global warming will require stabilizing GHG emissions and drawing down GHGs already in the atmosphere. The purpose of this CAP is to support current statewide climate efforts, provide a pathway for Piedmont to reduce GHG emissions 40% by 2030, and be on track to reducing emissions 80% by 2050. Specifically, this plan aims to:

1. Provide clear guidance to City staff regarding when and how to implement key provisions of the plan;
2. Inspire and engage residents and businesses to participate in community efforts to reduce GHG emissions
3. Demonstrate Piedmont’s commitment to comply with state GHG reduction efforts.

The CAP will enable Piedmont to contribute to the global effort to slow climate change while increasing community resiliency and meeting state goals.

### Scope

The CAP is intended to reduce GHG emissions generated by municipal and community-wide activities. GHG reductions will be achieved in the areas of building and community energy use, waste diversion, water conservation, and transportation. The plan contains strategies, objectives, measures, and actions that will direct the City’s reduction efforts and provide guidance for residents and businesses in how to reduce their individual GHG emissions.

## Climate Action Plan development process and community engagement efforts

In 2010, the City of Piedmont adopted its first CAP, which was developed by City staff and the consultant, AECOM. This CAP, or CAP 2.0, provides an update to the original plan. The development of CAP 2.0 relied heavily on the hard work and engagement of Piedmont residents. In an effort to increase community engagement in the development process, City Council appointed an advisory body to City staff called the Climate Action Task Force on January 17, 2017. The CAP Task Force was comprised of Piedmont residents with expertise and/or interest in various aspects of climate solutions. While City staff and CivicSpark fellows researched the latest emissions reduction strategies and developed the draft CAP, the Task Force reviewed the draft CAP, provided staff with comments and advice on how it might be improved before it is considered by Council, and collaborated with staff to propose a target for emissions reductions by 2030 and 2050. Consideration was given to the feasibility of and interest in suggested GHG emissions reductions measures. Piedmont Unified School District (PUSD) staff were also consulted with to ensure the plan includes climate action goals that the school district has already identified for itself and to create a comprehensive plan.

The CAP Task Force held public monthly meetings with staff since March 2017. At their first meeting, the Task Force recommended that the City of Piedmont adopt a GHG reduction target of 40% below the 2005 baseline by 2030 and 80% below the 2005 baseline by 2050, which are similar to the state's goals. In subsequent meetings, the Task Force recommended and reviewed measures for each of the City's emissions sectors, emphasized the need for greater community participation and outreach, and helped plan and host a community workshop for Piedmont residents (a list of all Task Force meeting summaries can be found in the appendix). Once the CAP Task Force recommended that the CAP 2.0 be considered by City Council for adoption, a public comment period of 45 days was held, from January 16, 2018 to March 2, 2018. This was an opportunity for the greater Piedmont community to further contribute to the plan, with all comments being compiled and added to the appendix. The CAP 2.0 was considered by City Council for adoption at the March 19, 2018 City Council meeting.

Moving forward after adoption of CAP 2.0 by City Council, the City plans to continue its community engagement and outreach efforts throughout the implementation phase of CAP 2.0. One strategy to do so includes producing and sharing a condensed document that highlights the most effective elements of CAP 2.0 to Piedmont residents. This will essentially provide the community with an easy-to-navigate menu of actions they can take that will be the most impactful in terms of GHG emissions reduction.

As a signatory to the Compact of Mayors, the City is required to produce progress reports on its climate efforts in the form of GHG inventories. This presents an opportunity for the City to similarly produce periodic progress reports for the Piedmont community. This will serve to increase and sustain awareness of CAP 2.0 after adoption, reinforce positive actions taken throughout the city, and identify areas of improvement. Overall, this is an effective way to help the community stay on track to meeting its GHG emissions reduction goals. Outreach efforts will require a significant amount of staff time and resources. To address this, the City will continue participating in the CivicSpark program and continue pursuing any grant funding or staffing opportunities that will ultimately build its capacity. Further future community engagement options are provided in the Implementation chapter.

## Piedmont's GHG Target and Action

As part of the 2010 CAP, Piedmont established a GHG reduction target that aimed to contribute to the stabilization of global GHG emissions and contribute to the goals of AB 32, the California Global Warming Solutions Act of 2006 which calls for a reduction of GHGs to 1990 levels by 2020. Piedmont's adopted target called for reducing community GHG emissions by **15% below 2005 baseline emissions levels by 2020**. In addition to the baseline GHG inventory, the City of Piedmont performed three subsequent GHG inventories to

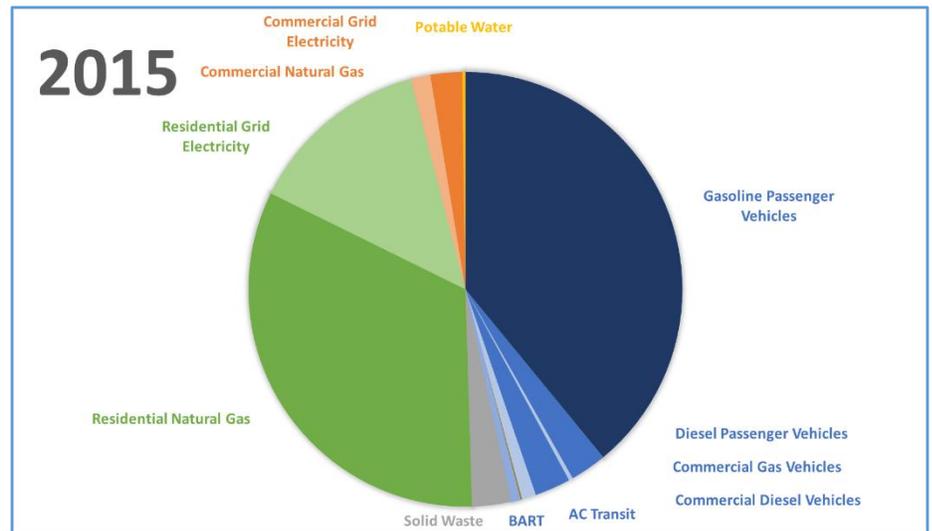


Figure 1.1

measure progress toward achieving the adopted emissions reduction goal. As of 2015, Piedmont was on track to meet its 2020 goal. GHG emissions in 2015 were 21% below baseline.

The emission reduction targets set forth in AB 32 were extended in 2016 with the passage of Senate Bill 32 (SB 32). Under SB 32, California will need to reduce GHGs by 40% below 1990 levels by 2030. Looking forward beyond 2020, Piedmont's CAP 2.0 will similarly aim to reduce emissions by **40% below its 2005 baseline by 2030 and 80% by 2050**. Of the reductions needed, California state policy, projected energy use trends in Piedmont, and the expected launch of a community choice energy program for Alameda County (East Bay Community Energy) will likely provide a majority of the GHG reductions needed to meet 2030 goals.

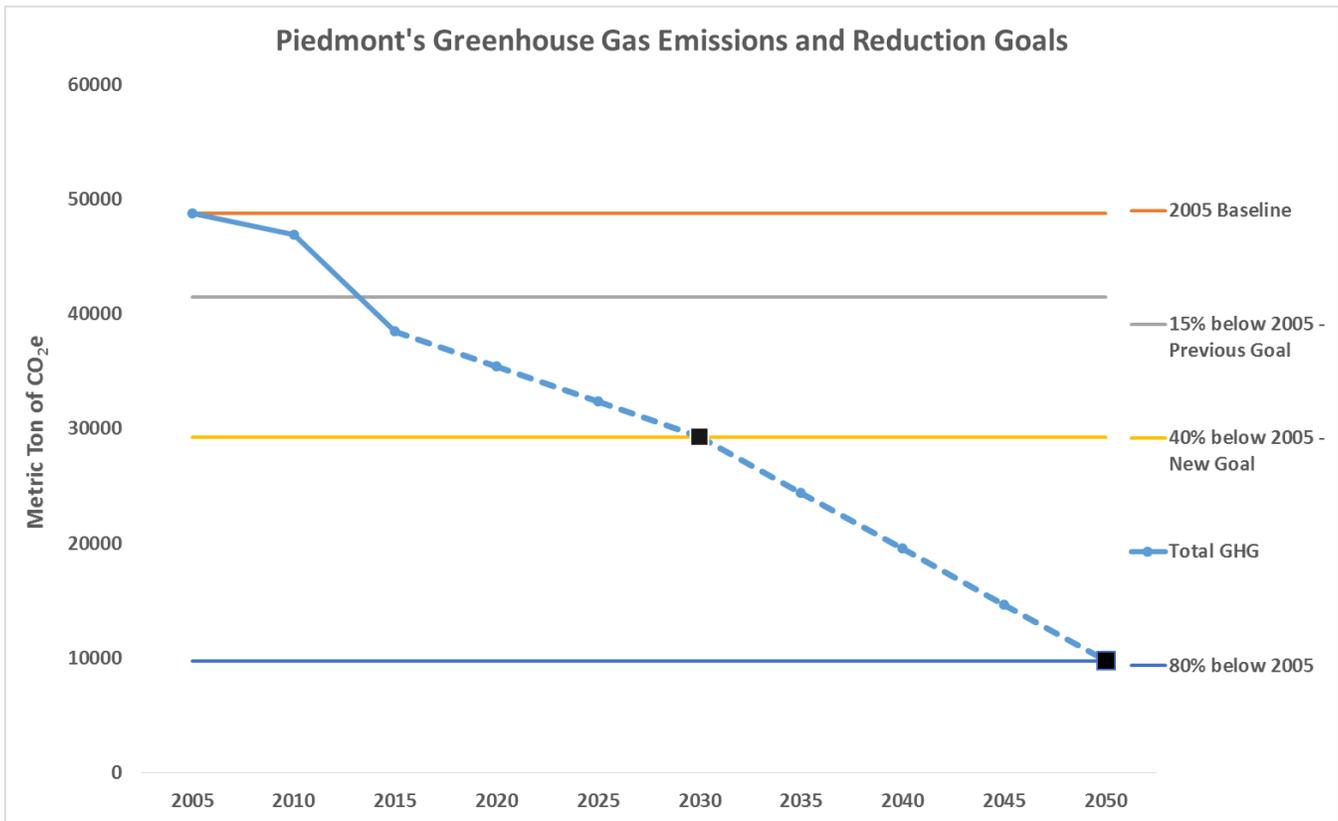


Figure 1.2

California policies are already impacting Piedmont’s emissions. Updated building codes, renewable energy portfolio standards, and fuel efficiency standards for cars have reduced the energy consumption of buildings and vehicles. In fact, forecasts of emissions show that actions by the State of California alone will substantially reduce Piedmont’s emissions. However, without local action Piedmont will not meet its 2030 target. The state will provide an estimated 85% of the reductions needed and Piedmont will need to provide the additional 15%<sup>4</sup>. This CAP 2.0 provides a pathway to build on state action to meet the 2030 target and position Piedmont to meet the 2050 target of 80% below baseline emissions.

### Objectives, Measures, and Actions

CAP Objectives were developed in response to the results of Piedmont’s GHG inventory. Measures were developed to support the objectives of the CAP and include action items the City and community can take to achieve their goals. CAP measures are focused on taking positive actions that are both accessible to all community members and economically beneficial. Actions include providing infrastructure for low carbon transportation and water conservation, incentivizing and requiring efficient building design, providing education on GHG emissions sources, and reducing climate hazards. All objectives, measures, and actions were reviewed by the CAP Task Force.

<sup>4</sup> Calculation based on estimated forecasts of emissions due to current California policies and general trends.

# CLIMATE ACTION PLAN OBJECTIVES

## TRANSPORTATION

Objective: Increase number of trips made by biking and walking

Objective: Reduce transportation emissions from schools

Objective: Increase residents' use of public transit

Objective: Accelerate the adoption of Electric Vehicles (EV) in Piedmont

Objective: Reduce miles traveled in personal gasoline vehicles

Objective: Increase mixed-use development

## SOLID WASTE

Objective: Reduce waste going to the landfill

## MUNICIPAL

Objective: Reduce emissions from City buildings and energy supply

Objective: Reduce City waste

Objective: Reduce Employee Transportation emissions

Objective: Reduce City Water Use

Objective: Use the City's resources to disseminate and collect information on climate change

Objective: Consider adjusting taxes to reflect the social costs of carbon

## BUILDINGS AND ENERGY

Objective: Reduce Residential Building Energy Use

Objective: Reduce Commercial Building Energy Use

Objective: Increase Renewable Energy to 100%

Objective: Partner with Schools to Reduce Energy Use

Objective: Reduce Local Air Pollution and High Global Warming Potential Gases

Objective: Investigate Infrastructure Upgrades and New Technologies

## ADAPTATION

Objective: Reduce damage from storms and flooding

Objective: Reduce risks of extreme heat

Objective: Reduce risks of damage from extreme events

## WATER

Objective: Reduce water use by 20%

Objective: Conserve and Collect water

## CONSUMPTION

Objective: Increase awareness of consumption related GHG emissions

Objective: Reduce emissions associated with food consumption and food waste

Objective: Reduce emissions from the consumption and disposal of goods

## Implementation

The implementation section dives into estimating the costs of implementing each measure, the associated GHG reductions, and the resources needed for implementation. The implementation section also includes a plan to monitor progress on achieving CAP 2.0 goals. In addition to the City government and business owners, successful implementation of the CAP 2.0 will necessitate the active participation of Piedmont residents.

## Adaptation

Finally, the CAP 2.0 concludes with an adaptation section. The adaptation section describes both the climate change-related hazards Piedmont should expect to face and the actions the City can take to minimize damage and disruption. Adaptation measures were adapted from a report developed by Four Twenty Seven, a consulting company focused on climate change, through funds made available by StopWaste (a public agency dedicated to reducing Alameda County's waste stream), which has been tailored to reflect hazards concerning Piedmont.

## Relationship to other City plans

In 2014, Piedmont adopted the Pedestrian and Bicycle Master Plan (PBMP). The PBMP aims to improve conditions for pedestrians and cyclists over the next ten years that will make walking and biking in Piedmont safer, more accessible, and more popular. This directly coincides with one of the main objectives of CAP 2.0's transportation section: increasing the number of trips made by biking or walking.

The City of Piedmont's 2009 General Plan also calls for increasing the number of trips made by biking and walking through improving pedestrian and cycling infrastructure, promoting pedestrian and bicycle education, and increasing safety on Piedmont streets. Furthermore, the General Plan highlights Piedmont's goal of promoting safe, convenient, and reliable alternatives to driving. The City seeks to accomplish this by working with AC Transit to increase service, considering a locally-operated shuttle service to BART, encouraging the use of smaller buses and shuttles, supporting casual carpooling, etc.

Resource conservation is also a major goal laid out in the General Plan, with actions that include promoting solid waste reduction, energy conservation by residents and businesses, and renewable energy adoption by residents. The General Plan hopes to ensure that the municipal buildings of Piedmont follow conservation practices and become a role model for residents and local businesses.

The Environmental Hazards Element of the General Plan includes a proactive set of policies to address exposure to climate-related hazards, particularly wildfires and flooding. This is a subject also discussed in the Adaptation section of this CAP.

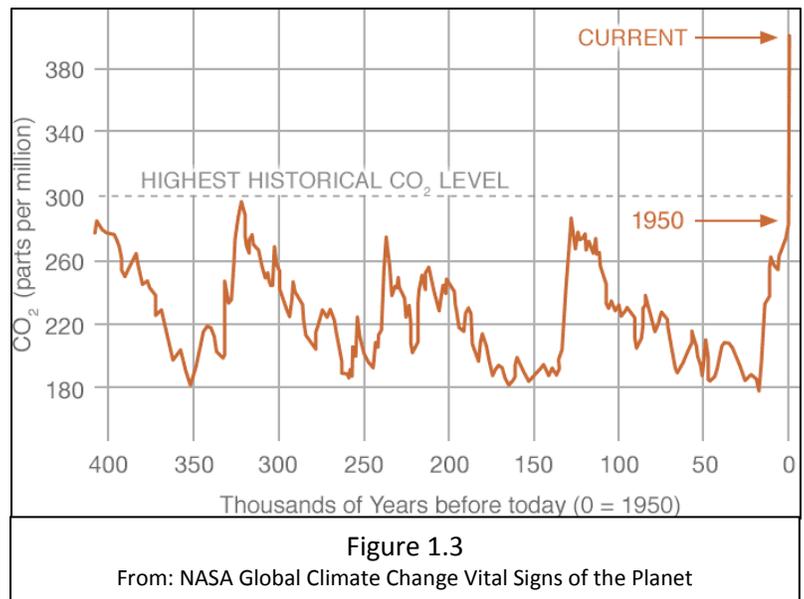
## The Need for Action on Climate Change

Climate change threatens to exacerbate and create new environmental challenges in the Bay Area. Regional climate change impacts may include temperature changes, sea level rise, drought, heavy precipitation, flooding, and wildfire. Piedmont will experience some of these climate hazards within its borders, and the Bay Area will have to address dramatic changes to local resources and geography to be able to maintain our quality of life. Globally, climate change has the potential to irreparably harm environments and threaten people's ability to flourish.

## What is the Greenhouse Effect?

The greenhouse effect is the warming of our climate that results when the atmosphere traps heat radiating from Earth toward space. Certain gases in the atmosphere act like the glass in a greenhouse –allowing sunlight to pass into the greenhouse, but blocking the heat from escaping into space.

The gases that contribute to the greenhouse effect include water vapor, carbon dioxide (CO<sub>2</sub>), methane, nitrous oxides, sulfur hexafluoride, and chlorofluorocarbons. While the greenhouse effect is essential to life on earth, since the Industrial Revolution and accelerating over the past century, emissions from burning fossil fuels, deforestation, and other causes have increased the concentration of GHGs to dangerous levels.<sup>5</sup>



## Global GHG Emissions

Data describing atmospheric GHG concentrations over the past 800,000 years demonstrates that concentrations of CO<sub>2</sub>, the main GHG, have increased since pre-industrial times, from approximately 280 parts per million (ppm) to approximately 354 ppm in 1990 and approximately 404 ppm in 2016.<sup>6</sup> The global surface temperature is likely to rise 0.3°C to 0.7°C over the years 2016-2035.<sup>7</sup> GHG emissions are often expressed in terms of CO<sub>2</sub> equivalents (CO<sub>2</sub>e). This is in an effort to standardize the climate effects of the various GHGs. For example, methane's effect on the climate is about 28 times more severe than CO<sub>2</sub>, so 1 million metric ton (MMT) of methane would equal 28 MMT CO<sub>2</sub>e.

In 2000, the United Nations Intergovernmental Panel on Climate Change (IPCC) described potential global emissions scenarios for the coming century. The scenarios vary from a best-case characterized by low population growth, clean technologies, and low GHG emissions; to a worst-case where high population growth and fossil-fuel dependence result in extreme levels of GHG emissions. While some degree of climate change is inevitable, most climate scientists agree concentrations need to be stabilized at 350-400 ppm.

<sup>5</sup> "What are greenhouse gases?." NOAA. [www.ncdc.noaa.gov/monitoring-references/faq/greenhouse-gases.php](http://www.ncdc.noaa.gov/monitoring-references/faq/greenhouse-gases.php). Accessed 3 July 2017.

<sup>6</sup> "What are greenhouse gases?." NOAA. [www.ncdc.noaa.gov/monitoring-references/faq/greenhouse-gases.php](http://www.ncdc.noaa.gov/monitoring-references/faq/greenhouse-gases.php). Accessed 3 July 2017.

<sup>7</sup> IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

## California GHG Emissions

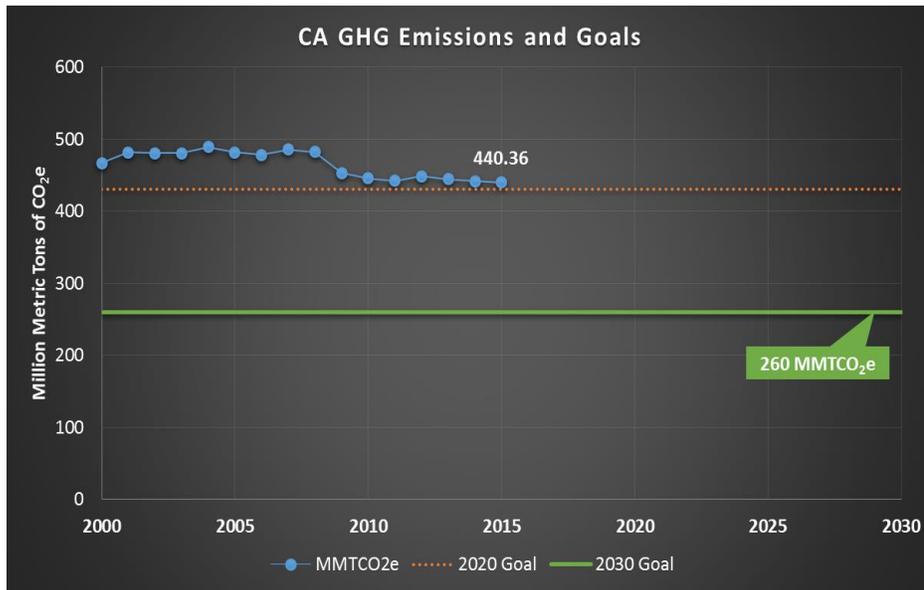


Figure 1.4

California has set aggressive targets to reduce GHG emissions to 1990 levels by 2020 and reduce emissions by 80% below 1990 levels by 2050. Between 1990 and 2004, California's annual GHG emissions increased 11% from 427 MMT to 474 MMT. California is on track to meeting its 2020 target of 431 MMT CO<sub>2</sub>e. However, between 2014 and 2015, California's GHG emissions dropped by only 0.3%. To meet more aggressive 2030 emissions reductions goals, California will have to accelerate its annual emissions reductions.

## Piedmont GHG Emissions

To measure progress toward achieving the adopted goal of reducing emissions by 15% below the 2005 baseline by 2020, the City of Piedmont compiled a baseline and three subsequent GHG inventories. A baseline 2005 GHG inventory was completed by AECOM. Subsequent inventories were completed for the years 2010, 2014, and 2015 by StopWaste and City staff in order to measure progress. In 2014 and 2015, the City of Piedmont met its 15% reduction target. However, in both years this was principally the result of extensive reductions in natural gas use in response to warmer weather. Inventories from all previous years have been updated with methodology from the Global Protocol for Community-Scale Greenhouse Gas Inventories.<sup>8</sup> This was a framework developed by the World Resources Institute (WRI), C40 Cities Climate Leadership Group (C40), and ICLEI—Local

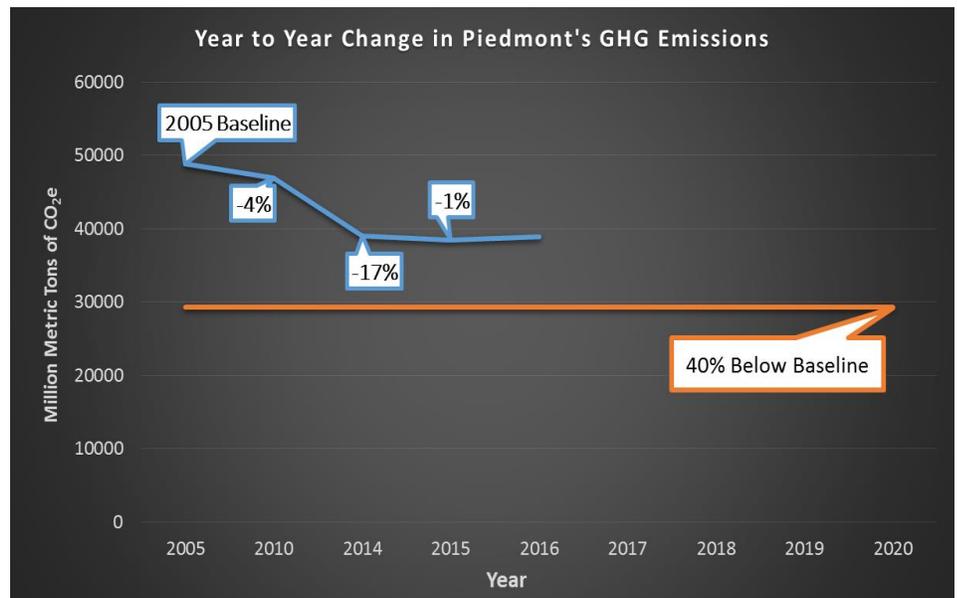


Figure 1.5

governments. <sup>8</sup> This was a framework developed by the World Resources Institute (WRI), C40 Cities Climate Leadership Group (C40), and ICLEI—Local

<sup>8</sup> Wee Kean Fong, et al. "Global Protocol for Community-Scale Greenhouse Gas Emission Inventories." *ICLEI Local Governments for Sustainability*. 2014.

Governments for Sustainability (ICLEI), to help cities measure and disclose a more comprehensive inventory of GHG emissions.<sup>9</sup>

## Effects of Climate Change

Scientific observations from around the world demonstrate that the Earth's global average air and ocean temperatures have steadily increased over the past 100 years. Nine of the ten warmest years on record have occurred since 2000.

Climate change will lead, and is already leading, to extreme storms, threaten agriculture, and destroy habitats locally and internationally.<sup>10</sup> A variety of vital California resources will be impacted by climate change: California's water supply, infrastructure, agriculture, coastal ecosystems, transportation, as well as energy availability and transmission.<sup>11</sup> The harmful effects of climate change will disproportionately impact the most vulnerable populations.<sup>12</sup> These vulnerable populations are often poor, experience higher rates of health issues, and live in conditions that may be at risk of sea level rise, wildfires, etc. These populations often have less capacity to manage extreme weather events and adapt to the harmful effects of climate change. Average temperatures are rising around the state and by the end of the century, annual temperatures in the Bay Area could "...increase between 3.6°F and 10.8°F."<sup>13</sup> Precipitation patterns will change and snowmelts will occur earlier, undermining our ability to manage water availability in the Bay Area. Dramatic swings between droughts and extreme rainfall may become increasingly common.<sup>14</sup> Sea level in the Bay Area has already risen—7 to 8 inches in the twentieth century—and by 2050, sea level could increase by an additional 11 to 19 inches,<sup>15</sup> exacerbating flood risks throughout the Bay Area.

Piedmont will also experience harmful impacts of climate change, such as temperature change, rain pattern change, regional sea level rise, and an increased risk of wildfires and the resultant poor air quality. These changes will alter the demands on Piedmont's infrastructure and buildings. As more days become hotter than recent historical averages, Piedmont's heating demand will be reduced and its cooling demand will grow. High temperatures and shifts in rainfall patterns will cause dry conditions throughout California, elevating the risk of wildfire in Piedmont. These effects will change the experience of living in Piedmont.

Sea level rise will alter the landscape of the Bay Area, as well as Piedmont's access to regional resources. Infrastructure is at risk if there is not climate mitigation. Four Twenty Seven, a climate resiliency consulting firm, identified Piedmont's regional assets at risk if sea levels rise 48 inches. In this scenario, the East Bay Municipal Utility District wastewater treatment plant, access to the Bay Bridge, the Union Pacific railroad, and sections of the I-880 freeway would be impacted.

Climate change will have a negative impact on human health in Piedmont. Globally, climate change is already impacting human health in extreme weather events and in everyday life. The U.S. EPA project, Climate Change

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<sup>9</sup> "Global Protocol for Community-Scale Greenhouse Gas Emission Inventories." *ICLEI Local Governments for Sustainability*. [http://www.iclei.org/fileadmin/user\\_upload/ICLEI\\_WS/Documents/Climate/GPC\\_12-8-14\\_1\\_.pdf](http://www.iclei.org/fileadmin/user_upload/ICLEI_WS/Documents/Climate/GPC_12-8-14_1_.pdf). Accessed 29 November 2017.

<sup>10</sup> "Climate change's effects plunder the planet." *Environmental Defense Fund*. [www.edf.org/climate/climate-changes-effects-plunder-planet](http://www.edf.org/climate/climate-changes-effects-plunder-planet). Accessed 3 July 2017.

<sup>11</sup> Ekstrom, Julia A., and Susanne C. Moser. "Climate Change Impacts, Vulnerabilities, and Adaptation in the San Francisco Bay Area: A Synthesis of PIER Program Reports and Other Relevant Research." *California Energy Commission*. 2012.

<sup>12</sup> "Draft Report Safeguarding California Plan: 2017 Update." *California Natural Resources Agency*. May 2017.

<sup>13</sup> Ekstrom, Julia A. (2012).

<sup>14</sup> "Draft Report Safeguarding California Plan: 2017 Update." *California Natural Resources Agency*. May 2017.

<sup>15</sup> Ekstrom, Julia A. (2012).

Impacts and Risk Analysis (CIRA), estimates that without climate mitigation, health costs associated with climate change will rise dramatically.<sup>16</sup> Warmer temperatures and increased levels of CO<sub>2</sub> have been linked with increased pollen count and longer pollen seasons, which will directly affect those suffering from allergies and asthma.<sup>17</sup> Warm temperatures increase ground level ozone which can damage lungs and lead to asthma.<sup>18</sup> This can be harmful to public health, especially the health of those at risk for respiratory conditions. Climate change is projected to substantially increase human exposure to ozone as soon as 2050.<sup>19</sup> In fact, CIRA estimates that mitigating climate change in the U.S. is estimated to prevent "...13,000 premature deaths in 2050."<sup>20</sup> Local air quality suffers from global climate change and from localized ground level pollutants associated with burning fossil fuels. Alameda County currently receives an "F" on its Air Quality Report Card for High Ozone Days.<sup>21</sup> Climate change could exacerbate existing air pollution issues. A warmer climate also puts the Bay Area at greater risk of extreme weather events, which can have acute, damaging impacts to health.

Carbon dioxide is a negative externality that imposes harm on society but is not reflected in market prices. The U.S. EPA has developed the "Social Cost of Carbon," which estimates the damage done per ton of CO<sub>2</sub> released. Damages include loss of "...agricultural productivity, human health, property damages from increased flood risk, and changes in energy system costs..."<sup>22</sup> The U.S. EPA estimates a range of possible social costs of carbon depending on the year and discount rate applied to the future. These range from \$36 per metric ton CO<sub>2</sub> in 2015 to \$69 per metric ton CO<sub>2</sub> in 2050. Estimates by other agencies and researchers vary. Some recent estimates have determined the social cost of carbon could be as high as \$100-\$200 per metric ton CO<sub>2</sub>.<sup>23</sup> These estimates can inform the cost benefit analysis of climate action policies and demonstrate the high costs of inaction. Carbon pricing is a possible tool that could address the myriad of long-term costs of carbon emissions and reduce risks. There are two main types of carbon pricing: emissions trading systems (ETS), sometimes referred to as a cap-and-trade system, and carbon taxes. However, costs associated with climate change are difficult to quantify, and often excluded from the price of fossil fuels and not factored into policy decisions.

## Climate Change Legislation

Having recognized the threat that climate destabilization poses, much of the world is taking action to avoid the worst potential outcomes. In response, climate policy has been developed at multiple levels of governance, from municipal to international. Substantial global action is being taken to reduce GHG emissions, price carbon, and transition to renewable energy. The following is a brief overview of such actions to address climate change.

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<sup>16</sup> "Climate Change in the United States: Benefits of Global Action." *United States Environmental Protection Agency*. 2015.

<sup>17</sup> "Climate Change Linked to More Pollen, Allergies, and Asthma." *USA Today*. <https://www.usatoday.com/story/news/nation/2013/05/30/climate-change-allergies-asthma/2163893/>. Accessed 16 November 2017.

<sup>18</sup> "Health Effects of Ozone Pollution." *EPA*. [www.epa.gov/ozone-pollution/health-effects-ozone-pollution](http://www.epa.gov/ozone-pollution/health-effects-ozone-pollution). Accessed 3 July 2017.

<sup>19</sup> "Climate Change in the United States: Benefits of Global Action." *United States Environmental Protection Agency*. 2015. (pg 24)

<sup>20</sup> "Climate Change in the United States: Benefits of Global Action." *United States Environmental Protection Agency*. 2015. (pg 25)

<sup>21</sup> "Report Card: California." *American Lung Association*. [www.lung.org/our-initiatives/healthy-air/sota/city-rankings/states/california/#ozonedays](http://www.lung.org/our-initiatives/healthy-air/sota/city-rankings/states/california/#ozonedays). Accessed 3 July 2017.

<sup>22</sup> "The Social Cost of Carbon." *United States Environmental Protection Agency January 19 2017 Snapshot*. [19january2017snapshot.epa.gov/climatechange/social-cost-carbon\\_.html](http://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html). Accessed 3 July 2017.

<sup>23</sup> "Republican Hearing Calls for a Lower Carbon Pollution Price. It Should Be Much Higher." *The Guardian*.

<https://www.theguardian.com/environment/climate-consensus-97-per-cent/2017/mar/01/republican-hearing-calls-for-a-lower-carbon-pollution-price-it-should-be-much-higher>. Accessed 3 July 2017.

## International

The **United Nations Framework Convention on Climate Change** (UNFCCC), was created in March of 1994. The goal of the Convention, signed by 197 countries, is to stabilize GHG concentrations in the atmosphere to a safe level for humans and ecosystems.<sup>24</sup>

The **Kyoto Protocol**, adopted in 1997, is an international climate treaty that commits signatories to binding emissions targets. Since adoption, key signatories have withdrawn. The United States never ratified the treaty.<sup>25</sup>

The **Intergovernmental Panel on Climate Change** (IPCC) is the leading body in assessing climate change internationally and producing reports of its findings. The most recent report, **IPCC's Fifth Assessment Report**, presents the current climate science, mitigation needs, and adaptation strategies. The report states that immediate action to reduce emissions is required in order to avoid undesirable levels of warming.<sup>26</sup>

The **Paris Agreement**, signed by almost 200 countries in 2015, aims to keep global temperature rise below 2 degrees above pre-industrial levels and establish international resources to deal with the impacts of climate change. It calls for action by all countries, especially developed, affluent countries who have the ability and obligation to reduce their emissions.<sup>27</sup> The United States was a key signatory and architect of the Paris Agreement under President Obama. President Trump, on June 1, 2017 announced the U.S. would begin the process of exiting the agreement. In light of President Trump's announcement, cities and states, including Piedmont and California, have rallied to express their ongoing commitment to meet the goals of the Paris agreement.

## Federal

In the case **Massachusetts v. EPA (2007)**, the Supreme Court ruled that the US EPA must regulate GHGs under the Clean Air Act. The designation of GHG emissions as "air pollutants" has allowed the U.S. EPA to create regulations like the Clean Power Plan.<sup>28</sup>

The **Clean Power Plan** created national pollution standards for CO<sub>2</sub>. It committed states to adding renewable energy and reducing emissions from electricity generation.<sup>29</sup> President Trump, on March 28, 2017, signed an executive order calling for review and potential elimination of the Clean Power Plan.<sup>30</sup>

The Obama Administration released a **comprehensive strategy for deep decarbonization** by 2050. It sets out a vision for economic growth and land use that reduces national emissions. The Trump administration has removed the report from the White House website as of early 2017.<sup>31</sup>

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<sup>24</sup> "First steps to a safer future: Introducing The United Nations Framework Convention on Climate Change." *United Nations Framework Convention on Climate Change*. 2014. [http://unfccc.int/essential\\_background/convention/items/6036.php](http://unfccc.int/essential_background/convention/items/6036.php). Accessed 3 July 2017.

<sup>25</sup> "Status of Ratification of the Kyoto Protocol." *United Nations Framework Convention on Climate Change*. [unfccc.int/kyoto\\_protocol/status\\_of\\_ratification/items/2613.php](http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php). Accessed 3 July 2017.

<sup>26</sup> "Organization." *Intergovernmental Panel on Climate Change*. [www.ipcc.ch/organization/organization.shtml](http://www.ipcc.ch/organization/organization.shtml). Accessed 3 July 2017.

<sup>27</sup> "The Paris Agreement." *United Nations Framework Convention on Climate Change*. [http://unfccc.int/paris\\_agreement/items/9485.php](http://unfccc.int/paris_agreement/items/9485.php). Accessed 3 July 2017.

<sup>28</sup> "Massachusetts v. EPA." *The United States Department of Justice*. 14 May 2015. [www.justice.gov/enrd/massachusetts-v-epa](http://www.justice.gov/enrd/massachusetts-v-epa). Accessed 3 July 2017.

<sup>29</sup> "Complying with President Trump's Executive Order on Energy Independence." *United States Environmental Protection Agency*. <https://www.epa.gov/Energy-Independence#developing>. Accessed 3 July 2017.

<sup>30</sup> "Presidential Executive Order on Promoting Energy Independence and Economic Growth." *The White House*. 28 March 2017.

<https://www.whitehouse.gov/the-press-office/2017/03/28/presidential-executive-order-promoting-energy-independence-and-economy-1>. Accessed 3 July 2017.

<sup>31</sup> "The United States Mid-Century Strategy for Deep Decarbonization." *The White House*. November 2016.

## State of California

California has taken a global leadership role on climate change legislation and has rigorous GHG emissions reduction targets. In addition to its Cap and Trade program, California has developed policies to reduce emissions across all economic sectors. The California Air Resources Board (CARB) has developed a scoping plan and scoping plan update outlining how California will meet its 2030 and 2050 targets.<sup>32</sup> Key laws, executive orders, and targets produced by California lawmakers are listed below.

### California's 2030 Pillars of Climate Policy:

- 50% Renewable Electricity
- 50% Reduction in Petroleum Use in Vehicles
- Double Energy Efficiency Savings at Existing Buildings
  - Carbon Sequestration in the Land Base
  - Reduce Short-Lived Climate Pollutants
  - Safeguard California

**Cap-and-Trade** creates a market for GHG emissions to reduce overall state emissions. **AB 32** requires California to reduce GHG emissions, and cap-and-trade was designed to support reduction goals. In 2017, California cap-and-trade was extended for an additional 10 years, through 2030. **SB 375** directed regional governments to develop plans to meet state GHG reduction goals. The **Clean Energy and Pollution Reduction Act (SB 350)** was passed in 2015, with the goals of increasing building efficiency by 50% and increasing power generated from renewable sources to 50% by 2030.

**Executive Order S-3-05** sets a GHG emissions reduction target of 80% below baseline emissions by the year 2050. **Executive Order B-30-15** sets an intermediary target of 40% below the 1990 baseline by 2030. **AB 32** requires California's 2020 GHG emissions to be equal to those of the 1990 baseline. This is approximately a 15% reduction below expected emissions under a 'business as usual' scenario.<sup>33</sup> To meet these goals, CARB is recommending that local governments achieve 6 MMT CO<sub>2</sub>e per capita by 2030 and 2 MMT CO<sub>2</sub>e per capita by 2050.<sup>34</sup>

California's **Low Carbon Fuel Standard Executive Order S-01-07** aims to reduce California's reliance on oil and fight global warming by reducing the carbon intensity of California's passenger vehicle fuels by at least 10% by 2020.<sup>35</sup> In addition, **Advanced Clean Cars Program** sets emissions standards for vehicles through 2025.<sup>36</sup> The emissions rule is intended to reduce GHG emissions by 34%, reduce smog by 75%, and accelerate the adoption of zero emissions vehicles.<sup>37</sup> **Executive Order B-16-2012** aims to encourage the success of zero-emissions vehicles and to have 1.5 million zero-emissions vehicles on the roads by 2025.

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<sup>32</sup> "The 2017 Climate Change Scoping Plan Update: The proposed strategy for achieving California's greenhouse gas target." CARB. 20 January 2017.

<sup>33</sup> "Assembly Bill 32 Overview." *California Air Resources Board*. <https://www.arb.ca.gov/cc/ab32/ab32.htm>. Accessed 3 July 2017.

<sup>34</sup> "The 2017 Climate Change Scoping Plan Update: The proposed strategy for achieving California's greenhouse gas target." CARB. 20 January 2017.

<sup>35</sup> "Highlights of the California Climate Change Program." *California Climate Change*. <http://www.climatechange.ca.gov/state/highlights.html#year2005>. Accessed 3 July 2017.

<sup>36</sup> "Advanced Clean Cars Program." *California Air Resources Board*. <https://www.arb.ca.gov/msprog/acc/acc.htm>. Accessed 3 July 2017.

<sup>37</sup> "California Air Resources Board Approves Advanced Clean Car Rules." *California Air Resources Board*. 27 January 2012. <https://www.arb.ca.gov/newsrel/newsrelease.php?id=282>. Accessed 3 July 2017.

These newer measures build upon **AB 1493**, referred to as the “Pavley regulations” which set GHG reduction targets for passenger vehicles from 2009-2016. The recent AB 1236, adopted in 2015, requires jurisdictions with fewer than 200,000 residents to create an expedited permitting process for electric vehicle charging stations by the end of September 2017. The Association of Bay Area Governments (ABAG) and the Metropolitan Transportation Commission (MTC) developed **Plan Bay Area**. The document outlines a regional land use and transportation plan that is intended to help meet the state’s goals.

In 2011, **SB X 1-2** was signed into law expanding California’s Renewables Portfolio Standard (RPS) by requiring California’s utilities to generate one third of their electricity from renewable energy by the end of 2020.<sup>38</sup> However, the RPS was further expanded in 2015 with the passage of SB 350, which increased the goal to 50% renewable energy by 2030 as already described. In place since 1978, **the Solar Rights Act** provides consumer protection by barring restrictions imposed by homeowners associations on the installation of solar-energy systems.<sup>39</sup>

**Title 24**, California’s Building Standards Code governs the construction of buildings and includes energy efficiency requirements. California’s green building code, **CALGreen**, is ramping up state energy efficiency standards for residential and nonresidential construction.<sup>40</sup> These standards are working towards zero-net energy (ZNE) for all new residential construction in 2020 as put in place by California’s Long-Term Energy Efficiency Strategic Plan in 2008.<sup>41</sup> **AB 758** directs the California Energy Commission to develop energy efficiency programs for existing buildings such as energy assessments and ratings, energy efficiency improvements, and green workforce training.<sup>42</sup> Adopted in 2015, **AB 802** requires utilities to provide energy consumption data to owners of commercial and multi-family properties so that they can benchmark the energy use of their buildings over time.<sup>43</sup>

In California, **Property Assessed Clean Energy (PACE)** financing programs are available that allow property owners to finance energy efficiency, water efficiency, and renewable energy projects. PACE programs were enabled in 2007 with the passage of **AB 811**, which allowed local governments to create districts in which private property owners may finance renewable generation and energy efficiency projects through low-interest loans that are repaid as an additional item on the property owner’s property tax bill. In 2011, **SB 555** was signed into law, which also allows local jurisdictions to create PACE financing districts. SB 555 differs from AB 811 in that it extends funding to projects on public property and to new construction.<sup>44</sup>

Adopted in 2015, **SB 379** helps to ensure that cities and counties are providing for the safety and protection of their communities by including climate adaptation strategies as part of the safety elements of their general plans.<sup>45</sup>

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<sup>38</sup> “Renewables Portfolio Standard (RPS).” *California Energy Commission*. <http://www.energy.ca.gov/portfolio/>. Accessed 29 November 2017.

<sup>39</sup> “Solar Rights Act.” *Department of Energy*. <https://energy.gov/savings/solar-rights-act>. Accessed 2 October 2017.

<sup>40</sup> “2016 Building Energy Efficiency Standards Frequently Asked Questions.” *California Energy Commission*. 2016.

<sup>41</sup> “Energy Efficiency Strategic Plan.” *California Public Utilities Commission*. <http://www.cpuc.ca.gov/General.aspx?id=4125>. Accessed 3 July 2017.

<sup>42</sup> “Comprehensive Energy Efficiency Program for Existing Buildings.” *California Energy Commission*. <http://www.energy.ca.gov/ab758/>. Accessed 3 July 2017.

<sup>43</sup> “Building Energy Use Benchmarking and Public Disclosure Program.” *California Energy Commission*.

<http://www.energy.ca.gov/benchmarking/>. Accessed 2 October 2017.

<sup>44</sup> “Residential and Commercial Property Assessed Clean Energy (PACE) Financing in California Rooftop Solar Challenge Areas.” *Energy Policy Initiatives Center, University of San Diego School of Law*. <http://energycenter.org/sites/default/files/docs/nav/policy/research-and-reports/PACE%20in%20California.pdf>. Accessed 29 September 2017.

<sup>45</sup> “Introducing SB 379: Climate Adaptation and Resiliency Strategies.” *ARCCA Alliance of Regional Collaboratives for Climate Adaptation*. <http://arccacalifornia.org/wp-content/uploads/2016/02/SB-379-Fact-Sheet.pdf>. Accessed 29 September 2017.

In 2009, California passed **SB X7-7** which required water suppliers to increase water use efficiency. The urban water conservation goal is a 20% reduction by 2020. To reduce state water use, California’s Energy Commission adopted the **2015 Water Appliance Standards** which require appliances to consume less water.<sup>46</sup> **The Water Conservation in Landscaping Act of 2006 (AB 1881)** required cities and counties to adopt landscape water conservation ordinances by January 2010. As a result, California prepared a **Model Water Efficient Landscape Ordinance (MWELO)** for use by local agencies that promotes efficient landscapes in new developments and retrofitted landscapes. In 2015, the state updated the MWELO to further increase water efficiency.<sup>47</sup>

**SB 605** and **SB 1383** directed the Air Resources Board to come up with a strategy to reduce three key GHGs: black carbon, fluorinated gases, and methane.<sup>48</sup>

The Bay Area Air Quality Management District (BAAQMD) developed the **2017 Clean Air Plan: Spare the Air, Cool the Climate** to protect public health and stabilize the climate.<sup>49</sup> It lays out a vision for a post-carbon Bay Area by 2050 that addresses equity, public health, and GHG emissions. Some key goals include, switching from natural gas to clean electricity, electrifying the transportation sector, protecting impacted communities, and reducing “super-GHGs” like methane, black carbon, and fluorinated gases. The Clean Air Plan also addresses the emissions associated with consumption.

## Piedmont Climate Action to Date

Piedmont has taken numerous actions to reduce GHG emissions since the first CAP was adopted in 2010. A summary of municipal actions taken includes:

- The **City’s website** has a Climate Action Program page (<http://www.ci.piedmont.ca.us/climate.shtml>).
- In 2008, the City Council established the **Environmental Task Force (ETF)** to work on the establishment of goals to reduce solid waste sent to landfills and community-wide GHG emissions.
- In 2008, the City became a member of **ICLEI – Local Governments for Sustainability**, the leading global network of local governments dedicated to sustainability, resilience, and climate action.
- Initially implemented on July 1, 2008, Piedmont incentivized the installation of **solar energy** systems on private property by changing the building permit fee for such projects to a flat fee of \$300 and expediting these types of permits.
- In 2010, Piedmont began the process of conducting energy audits of all municipal buildings. Staff is currently working to keep pursuing energy efficiency efforts in all city facilities.
- In 2010, Piedmont, along with the cities of Albany, El Cerrito and San Pablo and non-profit partner Strategic Energy Innovations (SEI), formed the **Small Cities Climate Action Partnership (ScCAP)**, which was

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<sup>46</sup> “California Climate Change Regulations.” *California Climate Change*. <http://www.climatechange.ca.gov/state/regulations.html>. Accessed 3 July 2017.

<sup>47</sup> “The Updated Model Water Efficient Landscape Ordinance.” *California Department of Water Resources*. <http://www.water.ca.gov/wateruseefficiency/docs/MOBBrochure.pdf>. Accessed 29 September 2017.

<sup>48</sup> “Reducing Short-Lived Climate Pollutants in California.” *California Air Resources Board*. <https://www.arb.ca.gov/cc/shortlived/shortlived.htm>. Accessed 3 July 2017.

<sup>49</sup> “Clean Air Plan 2017.” *Bay Area Air Quality Management District*. 19 April 2017.

awarded a grant in the amount of \$497,488 from U.S. EPA's extremely competitive Climate Showcase Grant Program.

- In July 2011, the City replaced 85 cobra head streetlight fixtures with **new high-efficiency LED** fixtures that also provide increased visibility.
- In 2015, the City replaced the remaining 458 cobra head streetlight fixtures with **LED** fixtures. Staff is currently looking into replacing decorative post top street lights with LED fixtures.
- On January 4, 2016, the City Council authorized Piedmont to **join the Global Covenant of Mayors**.
- In 2016, the City contracted with Optyon, Inc. to assess the feasibility of **solar PV** on city buildings.
- In January 2017, the City Council approved the establishment of a **Climate Action Plan Task Force** to advise on the development of CAP 2.0 and a target for 2030 GHG emissions reductions.
- On June 19, 2017, the Piedmont City Council approved a resolution to express Piedmont's commitment to the goals of the **Paris Agreement**.<sup>50</sup>
- The City has encouraged financing of renewable energy and sustainable home improvement through **PACE Financing** and **East Bay SunShares**.
- The **Grand Avenue road diet** improves conditions for both pedestrians and cyclists on Grand Avenue and common school routes by making intersections simpler to navigate and creating new bike lanes in an effort to increase trips made by walking and biking.
- The City has been participating in the **CivicSpark program**, an AmeriCorps program dedicated to building capacity for local governments to address climate change and water management issues
- The City actively promoted the **Energy Upgrade California** and **SmartLights** programs and has applied grant funding to effect energy efficiency projects in residences and businesses.
- Piedmont's **Fire Department** has reduced emissions by arranging firefighters' schedules to cut commute frequency in half and also by installing tankless water heaters to reduce natural gas use.
- Piedmont has continued to participate in the San Francisco **Bay Area Regional Energy Network** (BayREN), which supports programs directed to single- and multi-family residential energy efficiency, building codes and standards, and financing of upgrades that continue to be available to the Piedmont community.
- The City has **participated in several events hosted by the local environmental advocacy group**, Piedmont Connect.

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<sup>50</sup> Paul Benoit. "Consideration of a Resolution Indicating a Continued Commitment to Reducing Greenhouse Emissions and Support of the Paris Agreement." *City of Piedmont*. 19 June 2017. <http://www.ci.piedmont.ca.us/html/govern/staffreports/2017-06-19/parisresolution.pdf>

# Community Strategies

Piedmont’s CAP 2.0 strategies have been designed to match the characteristics of Piedmont, to reduce emissions by 40% below 2005 levels by 2030, and to prepare Piedmont to reduce emissions by 80% below 2005 levels by 2050. Objectives, measures, and actions were developed in collaboration with the Climate Action Plan Task Force, which provided feedback throughout the CAP development. A 2015 GHG inventory was completed in January of 2017 to track progress on emissions reductions since 2005. The GHG inventory and associated emissions forecast informed the development of CAP objectives, which are organized by sector. These sectors include: Buildings and Energy Use, Transportation, Solid Waste, Consumption, and Water and Wastewater, Municipal, and Adaptation . This section of CAP 2.0 provides an overview of each emissions sector except for Municipal and Adaptation, which, as mentioned before, have their own sections. Each emissions sector will include (1) an overview of GHG emissions by source; (2) objectives, measures, and actions for reducing emissions; and (3) forecasts on the impact measures will have on emissions through 2030. The Municipal sector, which focuses solely on emissions/actions directly under the City’s control, will have its own separate chapter. Likewise, the Adaptation sector, which doesn’t relate to GHG reduction but rather the City’s response to the impacts of climate change, will have its own chapter.

## Overview of Total In-Boundary GHG Emissions

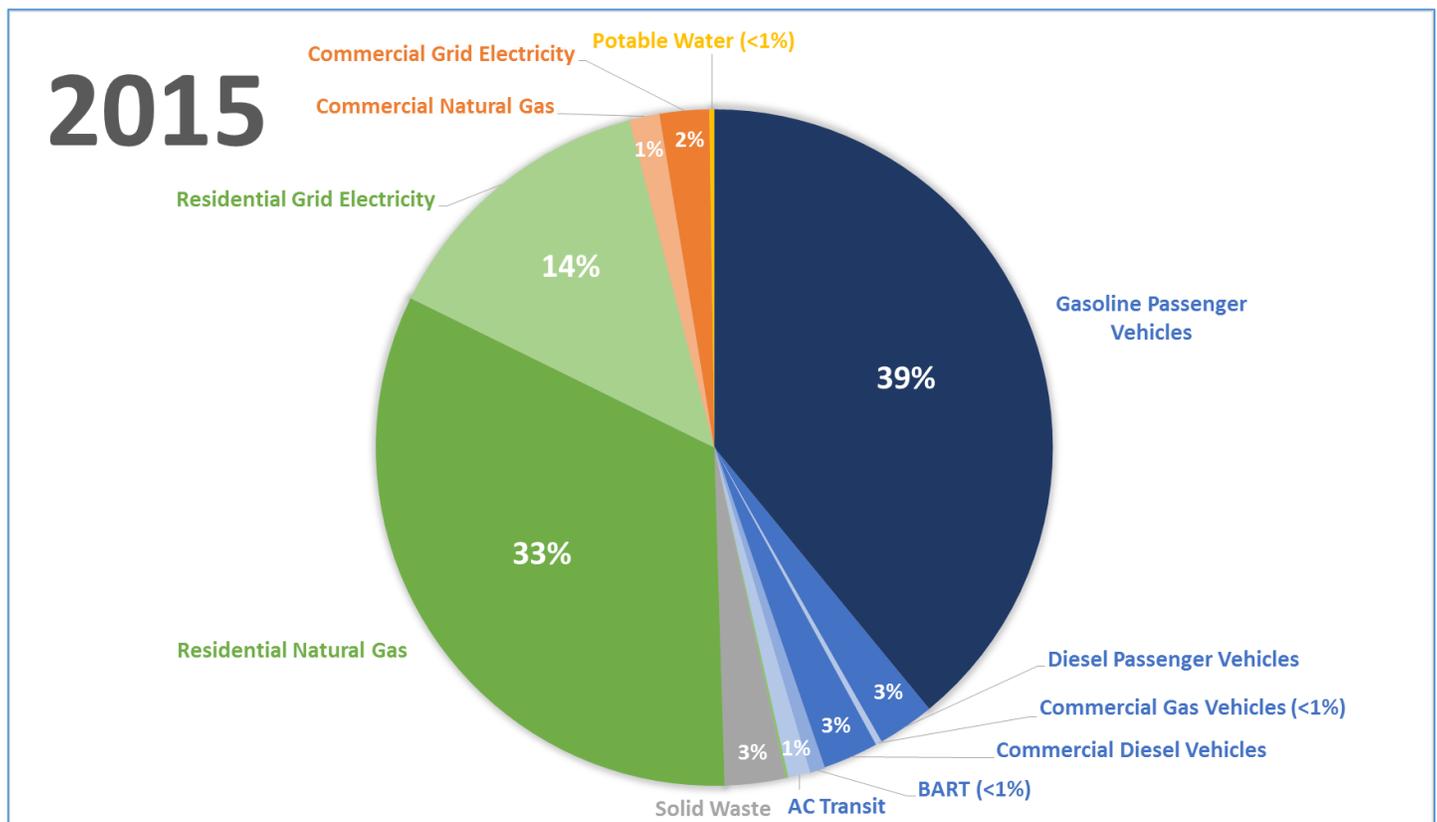


Figure 2.1

Looking at Piedmont’s total GHG emissions and historic trends provides information on how to address climate action going forward. GHG inventories have been completed for the years 2005, 2010, 2014, and most recently, 2015. The 2005 inventory is used as Piedmont’s “baseline” inventory and emissions reduction goals are compared and referred to the 2005 inventory.

City staff utilized ICLEI’s (Local Governments for Sustainability) ClearPath tool, which, based on activity data and emissions factors, generates a metric tons carbon dioxide equivalent (MTCO<sub>2</sub>e) estimate for each sector in Piedmont. ICLEI provides various tools and resources for cities taking action on climate change. CAP 2.0 also uses the Bay Area Air Quality Management District’s (BAAQMD) consumption-based GHG emissions inventory. In contrast to a traditional in-boundary GHG inventory which measures emissions that occur within a defined boundary, a consumption-based GHG inventory estimates the amount of GHGs emitted in the production of goods and services worldwide that are consumed by residents. The consumption-based GHG inventory provides estimates for GHG emissions for households in the Bay Area.<sup>1</sup>

<b>Piedmont GHG Emissions: 2005 - 2015 (metric ton of CO<sub>2</sub>e)</b>			
<b>Sector</b>	<b>2005</b>	<b>2015</b>	<b>% Change</b>
<b>Buildings and Energy Use</b>	<b>25,573</b>	<b>19,177</b>	<b>-25%</b>
<b>Transportation Emissions</b>	<b>20,210</b>	<b>18,102</b>	<b>-10%</b>
<b>Solid Waste<sup>2</sup></b>	<b>2,620</b>	<b>1,128</b>	<b>-57%</b>
<b>Water and Wastewater</b>	<b>415</b>	<b>91</b>	<b>-78%</b>
<b>TOTAL EMISSIONS</b>	<b>48,818</b>	<b>38,498</b>	<b>-21%</b>

Figure 2.2

In 2010, the City of Piedmont set a goal of reducing GHG emissions by 15% below 2005 levels by 2020. Compiling GHG inventories at regular intervals provides a method for tracking the City’s progress in meeting this reduction goal. Regular GHG inventories also support the City’s commitment as a signatory of the Global Covenant of Mayors.<sup>3</sup> Figure 2.2 above shows the reduction below baseline for each GHG inventory sector and the total reduction below the 2005 baseline for the most recent 2015 GHG emissions inventory. Between 2005 and 2015, Piedmont’s GHG emissions dropped 21% below baseline. Ahead of schedule on meeting the 2020 target, Piedmont can start pivoting towards meeting the new target of 40% below baseline by 2030. It should be noted that reductions can be attributed to many factors, including those not under the City’s control such as weather and the economy. Because some of these factors cannot be relied on to persist into the future, it is still important to continue implementing CAP measures.

<sup>1</sup> “Consumption-Based GHG Emissions Inventory.” *Bay Area Air Quality Management District*. <http://www.baaqmd.gov/research-and-data/emission-inventory/consumption-based-ghg-emissions-inventory>. Accessed 3 July 2017.

<sup>2</sup> Solid waste refers only to methane emissions related to waste disposal. For full life-cycle emissions related to materials and waste see “Consumption” section.

<sup>3</sup> Jan 4 2016

## GHG Emissions Forecasting and Target

Emissions forecasts provide a projection of emissions from a baseline inventory. Forecasts use growth trends to estimate future emissions. Factors used to forecast emissions in CAP 2.0 include population growth, housing growth, existing California State policy, and trends in energy consumption and waste diversion. Forecasts can highlight which emissions sectors are being addressed by state action, and which sectors require City action.

This plan includes two different types of emissions forecasts. The first, a Business As Usual (BAU) forecast, provides a prediction of emissions if the state of California implements its policy goals and no intervening actions are undertaken by the City of Piedmont. The second series of forecasts provides estimates of GHG reductions if Piedmont implements its own CAP 2.0 measures.

The emissions forecast shown in Figure 2.3 below shows the percent of total emissions each source is predicted to comprise in the BAU scenario. Certain emissions sources will be reduced through state policy and growth trends alone, without Piedmont-specific intervention. For example, residential electricity emissions are predicted to drop from approximately 15% to 5% of the inventory if the state of California successfully implements its renewable energy policy goals and if Piedmont continues its current energy efficiency trends. In contrast, without additional action, residential natural gas emissions could grow to be 50% of Piedmont's entire inventory, and would require additional action to make meaningful reductions in the use of this high global warming potential fuel source.

### Meeting the 2030 Target

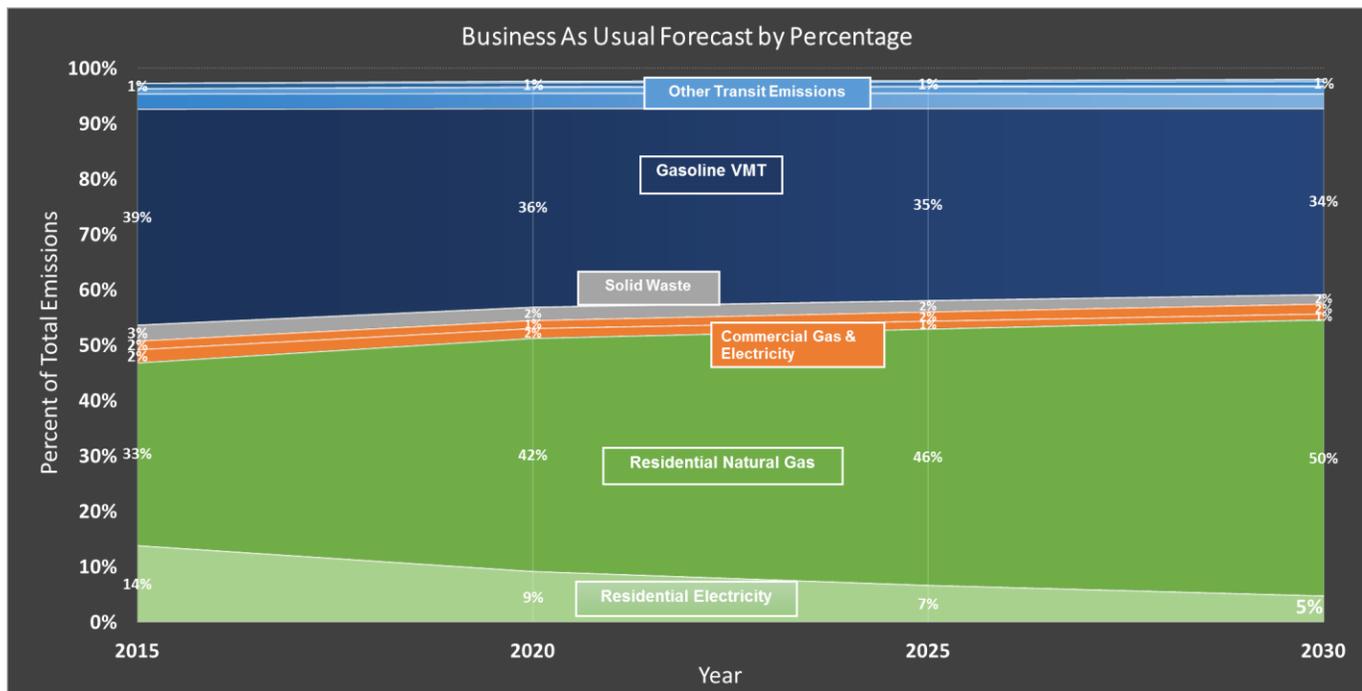


Figure 2.3

Statewide policies such as the Renewables Portfolio Standard (RPS) and the Pavley regulation are already impacting Piedmont's emissions. Updated building codes, renewable energy portfolio standards, and fuel efficiency standards for cars have reduced the energy consumption of buildings and vehicles. However, when modeling the BAU scenario,

it is made evident that outside factors alone will not accomplish Piedmont’s goal of reducing emissions by 40% below baseline by 2030. Figure 2.4 below shows the predicted reductions per sector under BAU, which results in a total reduction of 33% below baseline by 2030. Local action must be taken in order to make up the difference between reductions achieved through outside influencing factors, such as weather or statewide policies, and Piedmont’s goal. The following section of CAP 2.0 outlines ways residents, businesses, and the City can reduce GHG emissions. Forecasts show that with continued action, Piedmont can achieve its GHG reduction target for 2030, and will be on track for meeting its 2050 reduction target.

<b>Business As Usual (BAU) Emissions Forecast: 2005 – 2030 (metric ton of CO<sub>2</sub>e)</b>			
<b>Sector</b>	<b>2005</b>	<b>2030</b>	<b>% Change</b>
<b>Buildings and Energy Use</b>	<b>25,573</b>	<b>18,361</b>	<b>-28%</b>
<b>Transportation Emissions</b>	<b>20,210</b>	<b>12,958</b>	<b>-36%</b>
<b>Solid Waste</b>	<b>2,620</b>	<b>1,145</b>	<b>-56%</b>
<b>Water and Wastewater</b>	<b>415</b>	<b>93</b>	<b>-78%</b>
<b>TOTAL EMISSIONS</b>	<b>48,818</b>	<b>32,557</b>	<b>-33%</b>

Figure 2.4

## Buildings and Energy Use

### 2015 Statistics:

19,177 MTCO<sub>2</sub>e

50% of Community GHG Emissions

21% below baseline

**Source of Emissions:** Electricity use, natural gas consumption for space and water heating, cooking, and drying.

**2030 Goal:** Source 100% of electricity from renewable sources, increase efficiency of electricity use, reduce natural gas consumption by 50% below 2005 baseline.

**2050 Pathway to Success:** Maximize efficiency through appliances and behavior, 100% renewable electricity, maximize building efficiency, eliminate natural gas use by switching to electric appliances.

Nationwide, residential and commercial buildings comprise about 40% of total U.S. energy consumption. In Piedmont, the building sector has consistently accounted for nearly half of community GHG emissions: 53% in 2005, 56% in 2010, 49% in 2014, and 50% in 2015. In 2015, the majority of building energy emissions, 92%, were attributed to Piedmont's 3,830 residential housing units, 2% of these emissions were attributed to municipal use, while the remainder is generated by commercial buildings and schools.

Natural gas usage comprises the majority of the Buildings and Energy Use emissions and 33% of the entire 2015 inventory. Natural gas is mostly methane, a GHG that is approximately 84 times more potent than CO<sub>2</sub>. The use of natural gas for space heating and water heating in particular significantly contribute to a household's GHG emissions. In addition, leaks in the natural gas distribution infrastructure are common, thereby releasing methane directly into the atmosphere. Warmer weather accounts for the visible, dramatic 30% drop in natural gas consumed in Piedmont in 2015. There were 15% fewer heating degree days, the number of days a house requires heating based on the outside temperature, in 2015 than in 2010.<sup>4</sup> This corresponds to a 26% drop in natural gas used in 2015 compared to 2010. Therefore, it is likely that the increase in warmer weather

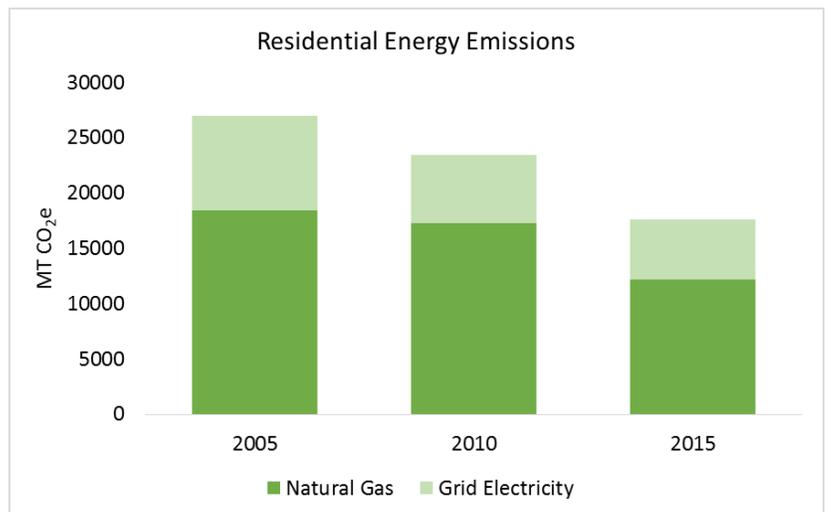


Figure 2.5

<sup>4</sup> Total heating degree days in 2010 were 2,670 while in 2015 there were far fewer, only 2,263.

[https://www.wunderground.com/history/airport/KOAK/2015/1/1/CustomHistory.html?dayend=31&monthend=12&yearend=2015&req\\_city=&req\\_state=&req\\_statename=&reqdb.zip=&reqdb.magic=&reqdb.wmo=](https://www.wunderground.com/history/airport/KOAK/2015/1/1/CustomHistory.html?dayend=31&monthend=12&yearend=2015&req_city=&req_state=&req_statename=&reqdb.zip=&reqdb.magic=&reqdb.wmo=)

and corresponding fewer heating degree days was the predominant factor in Piedmont meeting its 2020 reduction target. Future colder years may result in a spike in natural gas emissions back to levels comparable to 2005 and 2010, which could jeopardize the City’s ability to meet its GHG reduction goals.

Between 2005 and 2015, emissions from residential electricity went from 7,149 MTCO<sub>2</sub>e to 5,314 MTCO<sub>2</sub>e, a 25% reduction. The residential sector’s downward trend in electricity use is steady and substantial. From 2005 to 2015 electricity use declined by 15% due to changes in residential behavior, increased energy efficiency in appliances, and solar photovoltaic (PV) installations. Over the past decade, PG&E has added more renewable electricity to its energy portfolio which also accounts for a portion of Piedmont’s residential emissions reductions.

Forecasted building emissions show a rapid decline in electricity emissions due to the creation of East Bay Community Energy (EBCE) and State Renewable Portfolio Standards. Natural gas consumption is predicted to remain relatively consistent in the BAU forecast if no action is taken to reduce consumption. To address this, Buildings and Energy Use measures should include a focus on reducing residential natural gas consumption. By 2030, the BAU scenario falls short of this sector’s goal of reaching 40% below baseline by 3,017 MTCO<sub>2</sub>e. The Buildings and Energy Use objectives, measures, and actions are formulated to close this gap and meet the 2030 goals.

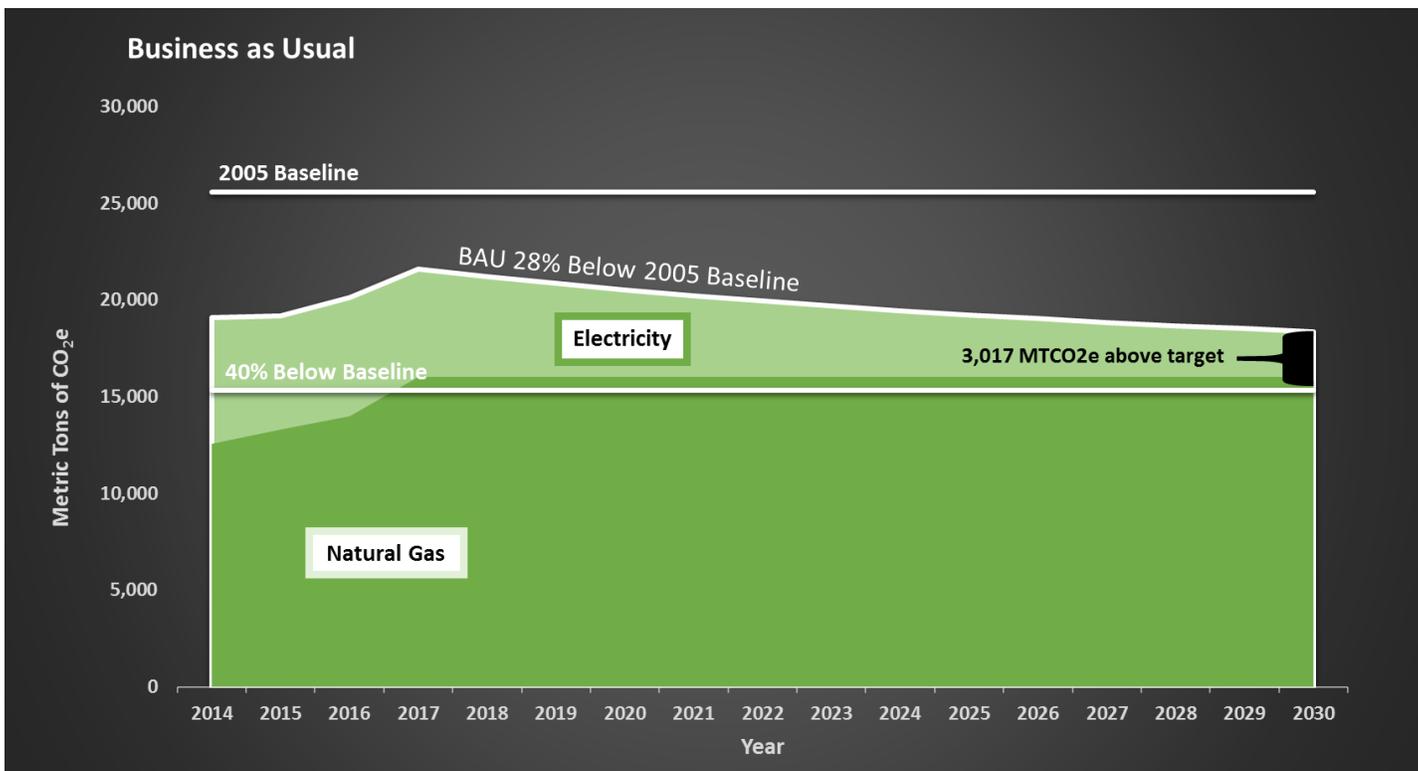


Figure 2.6

## Buildings and Energy Use Objectives and Measures

To reduce emissions in the Buildings and Energy Use sector, Piedmont will strive to advance building energy use disclosure, increase the efficiency of its building stock, construct new buildings efficiently, accelerate fuel-switching from natural gas to electricity, acquire electricity generated by renewable sources, and grow its renewable energy assets. These will serve the 2030 goals of sourcing 100% of electricity from renewable sources and reducing natural gas consumption by 50%.

### Objective BE-1: Reduce Residential Building Energy Use

Piedmont is a built-out city, which means energy efficiency gains will largely need to come from upgrades to existing buildings. While California’s building code is moving towards zero-net energy (ZNE) for new residential construction, this will only apply to the few Piedmont homes either constructed on the City’s remaining empty lots or as a result of the demolition and rebuilding of existing homes. About 70% of Piedmont’s housing stock was built before 1940, a higher percentage of “pre-war” housing than any other city in the Bay Area.<sup>5</sup> Typically, housing of this era is in need of energy efficiency upgrades. Additionally, Piedmont homes are around 1,000 square feet larger than average homes in nearby cities.<sup>6</sup> Large homes frequently use more energy for heating, cooling, and lighting as a result of having more finished area.

For example, Piedmont homes consume three-times as much natural gas compared to the average home served by PG&E. The combination of the age of Piedmont homes, their size, and the low rates of new home construction mean Piedmont will have to aggressively pursue energy efficiency upgrades for existing homes to meet its climate goals. The following measures address building energy consumption through a strategy of first disclosing information, then reducing electricity and natural gas consumption, and ultimately, fuel-switching from natural gas to electricity.

#### MEASURE BE-1.1: DISCLOSE BUILDING ENERGY CONSUMPTION

2030 GHG Reduction Potential: 304 MTCO <sub>2</sub> e	Cost to City: LOW
<b>Action BE-1.1A:</b> Develop a single-family and/or multi-family residential unit energy assessment ordinance requiring disclosure at the time of sale, major remodel, rental, or other trigger point.	
<b>Action BE-1.1B:</b> Partner with home energy audit providers to develop public outreach and community engagement programs on residential energy assessment opportunities and energy efficiency retrofits, with a focus on post-audit follow-through.	
<b>Action BE-1.1C:</b> Increase knowledge of and encourage residents to use PGE's "My Energy" on-line tool to compare and understand electricity and natural gas use.	

Building energy rating or disclosure can be used by homeowners and homebuyers to understand the energy use of an existing residential building. For homeowners, energy disclosure can shed light on opportunities for infrastructure and behavior changes that offer energy savings. For potential homebuyers, building energy disclosure provides insight into monthly utility costs. Most importantly, building energy disclosure is a springboard for targeted energy efficiency upgrades.

<sup>5</sup> City of Piedmont General Plan, Housing Element, December 2014.

<sup>6</sup> AECOM. “City of Piedmont Climate Action Plan.” *City of Piedmont*. March 2010.

**MEASURE BE-1.2: REDUCE ELECTRICITY AND NATURAL GAS CONSUMPTION**

<b>2030 GHG Reduction Potential: 1,602 MTCO<sub>2</sub>e</b>	<b>Cost to City: LOW-MED</b>
<b>Action BE-1.2A:</b> Encourage utilities to develop and implement demand-side management programs.	
<b>Action BE-1.2B:</b> Promote and incentivize residential energy conservation and efficiency retrofits (i.e. insulation, energy-efficient windows, etc.) for existing buildings through competitions, case studies, rebates, and educational/community engagement events on statewide code changes, financing options, and the benefits of GHG reduction methods.	
<b>Action BE-1.2C:</b> Develop an energy roadmap for homeowners - a basic 'how-to' guide on reducing energy consumption and making cost-effective energy efficiency renovations.	
<b>Action BE-1.2D:</b> Promote Property Assessed Clean Energy (PACE) financing and other energy improvement financing programs.	
<b>Action BE-1.2E:</b> At point of replacement, consider requiring the installation of energy conserving appliances and fixtures, such as on-demand tankless water heaters, Energy Star appliances, and LED lightbulbs.	
<b>Action BE-1.2F:</b> Consider following the State’s goal of having all new residential construction be Zero Net Energy (ZNE).	
<b>Action BE-1.2G:</b> Investigate developing an online, GHG reduction tracking platform for Piedmont residents to track their actions that may affect their carbon footprint and to participate in community-wide GHG reduction challenges.	
<b>Action BE-1.2H:</b> Provide case studies/awards/highlights for property owners who set good sustainability examples (i.e. solar, LEED, drought-tolerant landscape, etc.)	

Energy Efficiency upgrades are essential for many of Piedmont’s existing homes. Almost all of Piedmont’s residential housing stock was constructed prior to implementation of Title 24 Standards, which mandates rigorous energy efficiency. Roughly 70% of the homes in Piedmont were constructed prior to 1940. Homes of this vintage frequently have minimal insulation, antiquated furnace systems, single-pane windows, and gaps in the building envelope. While a portion of the City’s housing stock has been retrofitted over time to include energy efficiency improvements, a high level of energy savings can still be achieved in the majority of Piedmont homes.

**MEASURE BE-1.3: SWITCH FROM NATURAL GAS TO ELECTRIC APPLIANCES, COUPLED WITH RENEWABLE ENERGY**

<b>2030 GHG Reduction Potential: 14,083 MTCO<sub>2</sub>e</b>	<b>Cost to City: LOW-MED</b>
<b>Action BE-1.3A:</b> Educate residents on the options and incentives for electric appliances, such as furnaces, water heaters, dryers, stoves, and more, as well the importance of pairing electrification with the installation of renewable energy.	
<b>Action BE-1.3B:</b> Provide incentives to convert existing residences from natural gas to electric appliances.	
<b>Action BE-1.3C:</b> Consider requiring electric appliances for new construction.	

Fuel switching from natural gas to electricity is a viable path towards zero carbon buildings, especially when coupled with on-site renewable energy and/or low-carbon grid power. Water and space heating account for about 90% of the natural gas used in homes. Electric alternatives are available and the City should provide information, help streamline the permitting processes, and incentivize the adoption of fuel switching

## Objective BE-2: Reduce Commercial Building Energy Use

Commercial Buildings, which include businesses, public and private schools, and houses of worship, contribute a small amount to the total community GHG inventory by consuming electricity and natural gas. While the GHG reduction potential in this sector is small, commercial building owners can save money with subsidized energy efficiency programs and demonstrate a commitment to reducing emissions. Building energy disclosure can reduce energy use in commercial properties by about 2% per year of disclosure.<sup>7</sup>

### MEASURE BE-2.1: DISCLOSE BUILDING ENERGY CONSUMPTION

2030 GHG Reduction Potential: 18 MTCO <sub>2</sub> e	Cost to City: LOW
<b>Action BE-2.1A:</b> Develop a commercial energy assessment ordinance requiring disclosure at the time of sale, major remodel, rental, conditional use permit, or other trigger point.	
<b>Action BE-2.1B:</b> Partner with energy audit providers to develop public outreach and engagement programs on commercial energy efficiency retrofits, with a focus on post audit follow-through.	

Building energy rating or disclosure can be used by building and business owners to understand the energy use of an existing commercial building. Likewise, for potential building owners, building energy disclosure provides insight into potential monthly utility costs. Even though the commercial sector is relatively small in Piedmont, energy rating and disclosure is a useful tool to identify opportunities for infrastructure and behavior changes that offer energy savings through targeted energy efficiency upgrades.

### MEASURE BE-2.2: REDUCE ELECTRICITY AND NATURAL GAS CONSUMPTION

2030 GHG Reduction Potential: 134 MTCO <sub>2</sub> e	Cost to City: LOW
<b>Action BE-2.2A:</b> Educate commercial building owners on PG&E's Automated Demand Response and other energy management programs.	
<b>Action BE-2.2B:</b> Provide 100% of commercial building owners with information on Smart Lights, BEST, and other direct-install commercial energy efficiency programs.	
<b>Action BE-2.2C:</b> Promote and incentivize commercial energy conservation and efficiency retrofits (i.e. insulation, energy-efficient windows, etc.) for existing buildings.	
<b>Action BE-2.2D:</b> Promote Property Assessed Clean Energy (PACE) financing and other energy improvement financing programs.	
<b>Action BE-2.2E:</b> At point of replacement, require the installation of energy conserving appliances and fixtures, such as on-demand tankless water heaters, Energy Star appliances, and LED lightbulbs.	
<b>Action BE-2.2F:</b> Consider requiring Zero Net Energy (ZNE) construction for new construction.	

In the same manner as with its housing stock, Piedmont's commercial buildings were constructed prior to implementation of Title 24 Standards, which mandates rigorous energy efficiency. Outdated thermal control building elements and systems, such as poor insulation, outdated furnace systems, single-pane windows, and gaps in the building envelope contribute to a higher energy usage in the commercial sector.

<sup>7</sup> "DataTrends: Benchmarking and Energy Savings." *Energy Star*. 2016. <https://www.energystar.gov/buildings/tools-and-resources/datatrends-benchmarking-and-energy-savings>. Accessed 3 July 2017.

**MEASURE BE-2.3: SWITCH FROM NATURAL GAS TO ELECTRIC APPLIANCES, COUPLED WITH RENEWABLE ENERGY**

<b>2030 GHG Reduction Potential: Not Quantified</b>	<b>Cost to City: LOW</b>
<b>Action BE-2.3A:</b> Educate business owners and tenants on the options for electric appliances, such as furnaces, water heaters, and more, as well the importance of pairing electrification with the installation of renewable energy.	
<b>Action BE-2.3B:</b> Provide incentives to convert existing commercial buildings from natural gas to electric.	
<b>Action BE-2.3C:</b> Consider requiring electrification of appliances for new construction.	

As in the residential sector, fuel switching from natural gas to electricity is a viable path towards zero carbon buildings, especially when paired with renewable energy sources. The City should provide information on incentives and mandates unique to the business sector, help streamline the permitting processes, and incentivize the adoption of fuel switching.

**Objective BE-3: Increase Renewable Energy to 100% by 2030**

Relying on fossil fuels for energy comes with a hefty financial and environmental price. Natural gas and electricity account for roughly 65% of the \$16.7 million the Piedmont community spends on energy.<sup>8</sup> Upfront investments in rooftop solar panels or energy efficiency can provide long term savings and increase property values.

More and more Piedmont residents are choosing to install rooftop solar PV. As of December 2016, 312 permits have been issued for solar energy in Piedmont. This is about 8% of Piedmont homes. Figure 2.7 shows progress on solar and a 2030 goal that represents a conservative estimate based on continuation of current progress.

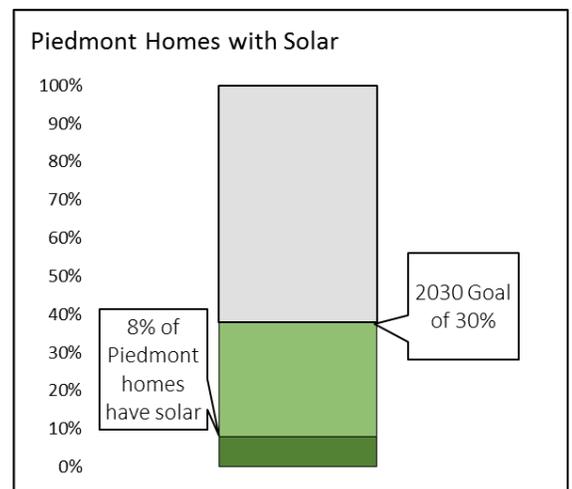


Figure 2.7

Moving forward, it is important that the City continue to enable residents to choose clean energy. The measures below set targets for renewable electricity generation and procurement. East Bay Community Energy (EBCE) is projected to launch in 2018 and will provide Alameda County residents and businesses with the choice of electricity generated by renewable sources, significantly reducing Piedmont’s electricity-based GHG emissions by 2030.

**MEASURE BE-3.1: COMMIT TO BEING A RENEWABLE ENERGY CITY**

<b>2030 GHG Reduction Potential: Not Quantified</b>	<b>Cost to City: LOW</b>
<b>Action BE-3.1A:</b> Pass a resolution to meet 100% of community-wide electricity demand by renewable sources by 2030.	

<sup>8</sup> Estimate based on community energy use, Alameda County average fuel efficiency, and PG&E energy costs.

Pursuing this commitment would help Piedmont achieve significant GHG reductions while also demonstrating its climate leadership.

**MEASURE BE-3.2: INSTALL ON-SITE RENEWABLE ENERGY**

<b>2030 GHG Reduction Potential: 218 MTCO<sub>2</sub>e</b>	<b>Cost to City: LOW</b>
<b>Action BE-3.2A:</b> Require all new construction and/or existing buildings that increase their area by more than 75% to install on-site solar energy systems to off-set at least 75% of their electricity usage.	
<b>Action BE-3.2B:</b> Require buildings that undergo roof replacements to be "solar ready".	
<b>Action BE-3.2C:</b> Target 100% of buildings with solar energy systems to install battery storage.	
<b>Action BE-3.2D:</b> Increase outreach and community engagement for solar energy system installation programs and incentives, including community-based social marketing campaigns, public workshops, and partnering with utilities.	
<b>Action BE-3.2E:</b> Develop a reach code to phase-out electric service panels below a 200-amp capacity at time of upgrade.	

Adoption of on-site renewable energy would help the Piedmont community dramatically reduce its GHG emissions, while also providing residents and business owners with a number of other benefits. Under California’s net metering policy, those who install solar systems could receive bill credits for the excess electricity their panels produce, resulting in long term savings over the lifetime of their systems. The City should continue promoting on-site renewable energy to its residents and business owners.

**MEASURE BE-3.3: INCREASE THE AMOUNT OF RENEWABLE ENERGY DELIVERED THROUGH THE GRID**

<b>2030 GHG Reduction Potential: 1,794 MTCO<sub>2</sub>e</b>	<b>Cost to City: LOW</b>
<b>Action BE-3.3A:</b> Encourage residents to choose East Bay Clean Energy as their electricity provider and support education and community engagement for residents throughout the transition to EBCE.	
<b>Action BE-3.3B:</b> Have 100% renewable be the default option for Piedmont residents through EBCE with an opt-down option.	

East Bay Clean Energy (EBCE) is a Community Choice Aggregation (CCA) program that Piedmont will be participating in with Alameda County. A CCA is a program that allows cities and counties to buy and/or generate electricity for their residents and businesses. The EBCE will be a community-governed power supplier with the goal of providing clean, renewable electricity to residents and businesses in Piedmont and in Alameda County at competitive rates. The City hopes to automatically enroll all of Piedmont’s electricity customers in the EBCE’s 100% renewable option, with the choice to opt-down or opt-out of the program.

**Objective BE-4: Partner with Schools to Reduce Energy Use**

Students attending school in Piedmont learn from both their environment and their teachers. Reducing school energy use through visible, effective projects has the potential to both reduce emissions and provide opportunities for education on energy and climate change. The following measured have been identified by the Piedmont Unified

School District as goals it intends to pursue. The City will support and collaborate with PUSD as it works towards these goals.

**MEASURE BE-4.1: REDUCE ENERGY CONSUMPTION IN SCHOOL BUILDINGS**

<b>2030 GHG Reduction Potential: Not Quantified</b>	<b>Cost to City: LOW</b>
<b>Action BE-4.1A:</b> Encourage the PUSD to achieve goal of requiring zero-net energy (ZNE) construction on new construction.	
<b>Action BE-4.1B:</b> Continue exchanging current lighting fixtures on school property to energy-efficient LED options.	
<b>Action BE-4.1C:</b> Consider replacing boilers and hot water heaters.	
<b>Action BE-4.1D:</b> Consider implementing a district-wide energy management system and the installation of real-time sub meters on school property.	
<b>Action BE-4.1E:</b> Create a building energy performance challenge in schools to both reduce energy use and educate students on energy efficiency.	

**MEASURE BE-4.2: INSTALL ON-SITE RENEWABLE ENERGY ON SCHOOL BUILDINGS**

<b>2030 GHG Reduction Potential: Not Quantified</b>	<b>Cost to City: LOW</b>
<b>Action BE-4.2A:</b> Pursue installing solar PV panels as part of the School District’s Solar Master Plan.	
<b>Action BE-4.2B:</b> Target 100% of buildings with solar energy systems to install battery storage.	

Along with the city government, Piedmont schools hold a special position in the community. Climate actions taken by both entities extend beyond only GHG reductions, but also serve to educate residents and inspire individual action. Both entities have the opportunity to become community leaders in the effort to combat climate change. For example, schools in particular could partner with student environment groups and parent organizations to provide education and community outreach and engagement on GHG reductions both on campus and at student households.

**Objective BE-5: Reduce Local Air Pollution and High Global Warming Potential Gases**

The State of California is addressing short-lived climate pollutants, including black carbon, fluorinated gases, and methane. Fluorinated gases (F-gases) are the fastest growing source of GHG emissions in California and globally.<sup>9</sup> While released in small amounts, F-gases are potent GHGs often used for refrigeration and air conditioning. Throughout the life-cycle of these products, the refrigerant gas escapes and contributes to global warming. Refrigerant management has been named as the most impactful climate action globally.<sup>10</sup> It is vital for community GHG emissions that the refrigerants in air conditioning (AC) units have low Global Warming Potential (GWP).<sup>11</sup> Either not installing AC and instead insulating and sealing a home or installing an AC with low GWP refrigerants is necessary

<sup>9</sup> “Reduced Short-Lived Climate Pollutants in California.” *California Air Resources Board*. <https://www.arb.ca.gov/cc/shortlived/shortlived.htm>. Accessed 3 July 2017.

<sup>10</sup> Hawken, Paul. *Drawdown: The Most Comprehensive Plan Ever Proposed to Reverse Global Warming*. Penguin Books: 18 April 2017.

<sup>11</sup> “Transitioning to Low-GWP Alternatives in Residential & Light Commercial Air Conditioning.” *EPA*. September 2015.

to avoid emissions from F-gases. Other measures in this sector target the health impacts of local air pollutants. Burning wood releases both particulate matter and GHGs, damaging community health. Phasing out wood burning is an incredibly cost effective GHG reduction measure. Gas-powered landscaping equipment also emits pollution, releasing formaldehyde, benzene, and particulate matter that impacts local air quality.<sup>12</sup>

**MEASURE BE-5.1: DECREASE THE IMPACT OF PIEDMONT’S BUILDING STOCK ON POLLUTION AND GHG EMISSIONS**

<b>2030 GHG Reduction Potential: 1,950 MTCO2e</b>	<b>Cost to City: LOW</b>
<b>Action BE-5.1A:</b> Prohibit wood-burning fireplaces in new development and encourage the retrofitting of existing wood-burning fireplaces with natural gas or electric alternatives.	
<b>Action BE-5.1B:</b> Require that new air conditioning and refrigeration units use refrigerants with low global warming potential (e.g. CO2 or ammonia instead of hydrofluorocarbons).	
<b>Action BE-5.1C:</b> Promote and consider requiring the installation of exterior electrical outlets to promote the use of electric landscape maintenance equipment.	

**Objective BE-6: Investigate Infrastructure Upgrades and New Technology**

These measures are focused on long-term infrastructure upgrades that could help decarbonize building emissions. While not immediately implementable due to the limitations of current infrastructure and technology, these measures explore options for long-term emissions reductions and the predicted direction of the market.

**MEASURE BE-6.1: EXPLORE DEEP DECARBONIZATION INFRASTRUCTURE**

<b>2030 GHG Reduction Potential: Not Quantified</b>	<b>Cost to City: HIGH</b>
<b>Action BE-6.1A:</b> Assess the potential for district heating in Piedmont, including a density assessment to evaluate potential costs, mapping the City's heating and cooling demand (including building stock and consumption data).	
<b>Action BE-6.1B:</b> Explore micro-grids as a carbon reduction and resiliency strategy.	
<b>Action BE-6.1C:</b> Reduce the need for new natural gas lines through phasing out natural gas appliances in new construction and existing building replacements.	

Staying up-to-date with the latest best practices and technologies will not only allow Piedmont to reach its 2030 climate goal, but also help ensure that Piedmont achieves its ambitious 80% reduction by 2050 goal.

<sup>12</sup> Gorn, David. “California Weighs Tougher Emissions Rules for Gas-Powered Garden Equipment.” *NPR*. 28 February 2017. <http://www.npr.org/2017/02/28/517576431/california-weighs-tougher-emissions-rules-for-gas-powered-garden-equipment>. Accessed 14 July 2017.

## Building and Energy Use Emissions Forecasting

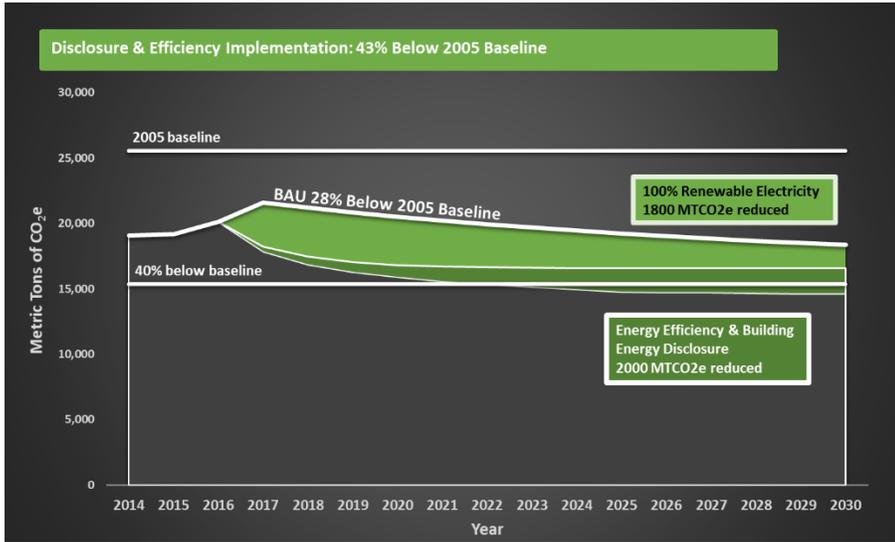


Figure 2.8

Figure 2.8 to the left forecasts Piedmont’s GHG emissions through 2030 if the City achieves its 100% renewable electricity goal and implements the building energy disclosure and efficiency measures outlined in that CAP. Natural gas emissions are reduced by about 12% by 2030 and electricity emissions are eliminated. In this scenario, Piedmont is able to meet its 2030 reduction goal. Building energy disclosure and energy efficiency outreach are low cost ways that the City facilitate substantial reductions.

Figure 2.9 to the right forecasts a more aggressive path towards energy reduction that includes both achieving 100% renewable electricity and fuel-switching measures (e.g., switching from natural gas to electricity for space and water heating). These actions would result in more dramatic GHG reductions, about a 90% reduction below baseline, compared to energy efficiency measures alone. This change in fuel type will be necessary to meet 2050 emissions reductions goals. Therefore, it is important to

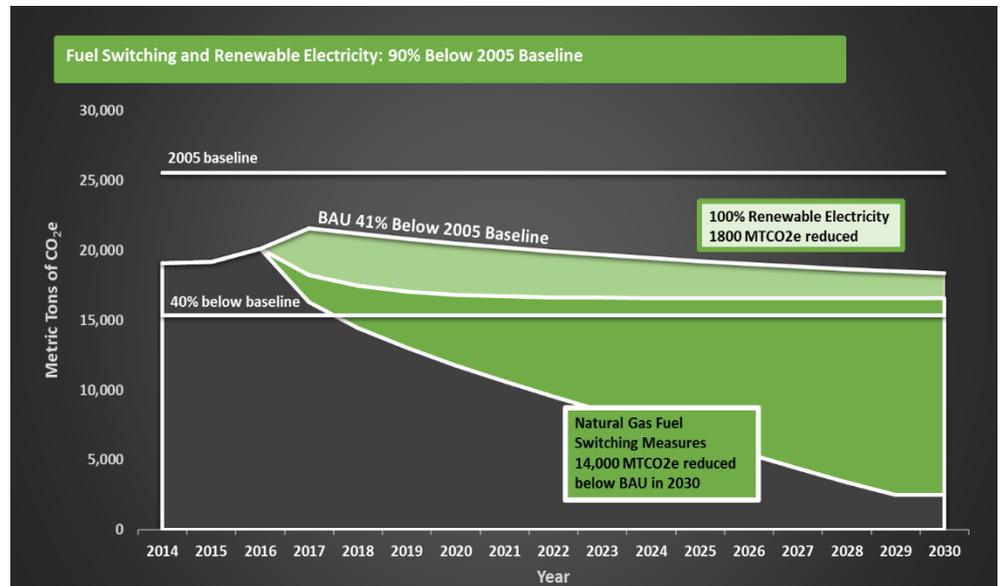


Figure 2.9

begin to phase in fuel-switching measures, such as replacing natural gas appliances at the time of new installation or replacement, in order to meet long term climate action goals.

Despite it being possible to meet a 40% GHG reduction by 2030 without fuel switching, major construction and the installation of equipment between now and 2030 may still be operational by 2050. To meet carbon neutrality by 2050, natural gas infrastructure installed now may need to be retired for electrification before the end of its useful life. This represents an unnecessary cost. Natural gas equipment and infrastructure will become “stranded assets,” so making the switch earlier rather than later is ideal.

## Transportation Sector

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### **2015 Statistics:**

**18,102 MTCO<sub>2</sub>e**

**47% of Community GHG Emissions**

**10% below baseline**

**Source of Emissions:** personal transportation from gasoline and diesel powered passenger vehicles, public transit, and freight transit

**2030 Goal:** 50% ZEV adoption, more trips made by public transit, more trips made by walking and biking

**2050 Pathway to Success:** 100% ZEV ownership, more trips made by fuel efficient public transit, many trips made by walking and biking

## Transportation GHG Emissions

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Transportation emissions consistently make up nearly half of Piedmont's total GHG emissions. Transforming this sector presents a substantial challenge, but the technology and strategies to eliminate emissions from the transportation sector already exist. Transportation-related GHG emissions are the result of travel that begins or ends in the City, or is associated with Piedmont residents' activity. This includes personal vehicle travel, commercial transport within the City, and Piedmont residents' use of public transportation. Vehicle emissions are calculated through vehicle miles traveled (VMT) and on-road emissions factors (grams CO<sub>2</sub>/mile).

Personal vehicle travel is Piedmont's predominant transportation emissions source. While VMT has stayed relatively consistent in the past ten years, the fuel efficiency of vehicles has improved, leading to an overall decline in GHG emissions from personal vehicles. This trend is likely to continue, especially as fuel efficiency and adoption of zero-emissions vehicles (ZEVs) lowers the carbon intensity of personal vehicle travel.

While air travel is not included in the current, in-boundary inventory of Piedmont's GHG emissions, it is nonetheless often a significant portion of a Piedmonter's carbon footprint. Thus, decreasing the number of flights taken and purchasing carbon offsets for trips taken could significantly reduce one's carbon footprint. Air travel is covered in the Consumption section of this chapter.

## Transportation Objectives and Measures

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Personal vehicle travel in gasoline and diesel cars constituted 43% of total community emissions in 2015. Therefore, accelerating the adoption of ZEVs in Piedmont is one of the most effective emissions reduction strategies.

Piedmont is a leader in electric vehicle adoption; an estimated 4% of vehicles in Piedmont are electric vehicles. This data comes from the California Clean Vehicle Rebate Project, which shows nine times more rebates were redeemed by Piedmont residents in 2015 than in 2011. The acceleration in ZEV purchasing will continue as more vehicle models enter the market. The City of Piedmont can encourage the adoption of ZEVs through improving charging infrastructure and encouraging solar so that electric vehicles are powered with renewable energy.

While the fuel efficiency profile of Piedmont’s vehicles is increasing, vehicle miles traveled remains relatively consistent. If we assume this trend continues, the bulk of transportation sector emissions reductions will come from vehicles that emit less carbon rather than from reduced VMT as a result of behavior change. Transportation-related emissions are expected to decrease by 35% by 2030 due to California’s fuel efficiency standards.

As part of the City’s Pedestrian and Bicycle Master Plan (PBMP), a number of policies have already been identified as high priorities for the City that would ideally increase the number of trips made by walking or bicycling. Unsafe conditions at crosswalks were found to be the most common concern expressed by the community during the creation of the PBMP, and as such is a very high priority item. CAP 2.0 aims to support projects laid out in the PBMP such as enhancing street crossings at key locations and creating road diets while also pursuing numerous other measures that further promote pedestrian and cyclist safety and infrastructure.

To summarize, transportation sector objectives focus on: (1) reducing the carbon intensity of personal vehicles, (2) increasing the use of public transit, and (3) increasing the number of trips made by biking and walking.

**Objective T-1: Increase number of trips made by biking and walking**

Taking more trips by active transportation, such as biking and walking, instead of by personal car, is an underutilized but impactful emissions reduction strategy. About 33% of Piedmont’s residential parcels are located within ¼ mile of the community’s two commercial centers on Grand Avenue and Highland Avenue and adjacent centers in Oakland. Although hilly, Piedmont is a dense, walkable city. Increasing the number of miles traveled by walking and biking will require the City to create safe transit pathways and promote a culture of low-carbon transit. To accomplish this, the City has developed and begun to implement its PBMP. The PBMP identified safety as a key obstacle to people walking, including speeding vehicles and aggressive driving.<sup>13</sup> The City has already improved street crossings at some key locations and will continue to implement projects identified in the PBMP. Enhancing the safety of bike infrastructure and running bike promotion programs can embolden more residents to take trips by bicycle. By providing bike safety infrastructure, providing accessible bike racks, and promoting electric bikes, the City can grow the number of trips made on two wheels instead of four. Actions marked with an asterisk (\*) below are aligned with those in the City’s BPMP.

**MEASURE T-1.1: ENCOURAGE PEDESTRIAN SAFETY**

<b>2030 GHG Reduction Potential: Not Quantified</b>	<b>Cost to City: LOW-HIGH</b>
<b>Action T-1.1A: Enhance street crossing at key locations through crosswalks, flashing pedestrian lights, and signage.*</b>	

<sup>13</sup> Piedmont Pedestrian and Bicycle Master Plan. *City of Piedmont*. Pg 40.

<b>Action T-1.1B:</b> Install sidewalk railings on the Oakland Ave Bridge.*
<b>Action T-1.1D:</b> Provide safety education led by the Police or Public Works Departments (traffic safety messages on city buildings and online).*
<b>Action T-1.1E:</b> Consider transitioning streets to one-way traffic to add bike lanes in residential areas.
<b>Action T-1.1F:</b> Implement traffic calming measures.*

The City’s PBMP identified pedestrian and cyclist safety as a top concern among Piedmont residents. By focusing on improving conditions for both pedestrians and bicyclists, Piedmont can address this barrier to action, which will hopefully encourage resident to make more trips by foot or bicycle.

**MEASURE T-1.2: PROVIDE ACCESS TO BICYCLES AND IMPROVE BIKING INFRASTRUCTURE**

<b>2030 GHG Reduction Potential: 1,340 MTCO<sub>2</sub>e</b>	<b>Cost to City: LOW-HIGH</b>
<b>Action T-1.2A:</b> Pursue the installation of a Bay Area Bike Share station in the Grand Ave commercial district.*	
<b>Action T-1.2B:</b> Enhance bike infrastructure along the bikeway network designated in the Pedestrian and Bicycle Master Plan.*	
<b>Action T-1.2C:</b> Implement Road Diet on Highland (restripe lanes to have one car and one bike lane in each direction).*	
<b>Action T-1.2D:</b> Install additional bike racks at key destinations.*	
<b>Action T-1.2E:</b> Coordinate with Oakland on the planning, design, and funding of inter-city bikeways, particularly on Grand, Moraga, and Wildwood Avenues, and on Park Boulevard and the creation of a map that shows these networks.*	
<b>Action T-1.2F:</b> Introduce traffic signal controls that prioritize bicycles.	
<b>Action T-1.2G:</b> Provide bicycle parking at city sponsored events.	
<b>Action T-1.2H:</b> Implement physical bike protection, separation, or warning infrastructure.	
<b>Action T-1.2I:</b> Facilitate Bike to Work Day and other biking promotion and educational/community engagement events.	

Along with safety, the lack of adequate biking infrastructure was determined in the PBMP to be a major obstacle in preventing residents from making trips by bicycle. The City should address this barrier to action and provide Piedmont residents with the resources necessary to significantly improve the safety of trips made by bicycle.

**Objective T-2: Reduce transportation emissions from schools**

Piedmont’s Pedestrian and Bicycle Master Plan identified Piedmont’s five main public schools as a key destination for transportation planning. To reduce emissions from school drop-off, the City can work to provide opportunities for safe bike and pedestrian transport to and from school. Enabling safe ways to walk to school is an important goal of both the Pedestrian and Bicycle Plan and CAP 2.0.

**MEASURE T-2.1: REDUCE PERSONAL VEHICLE USE RELATED TO PIEDMONT SCHOOLS**

<b>2030 GHG Reduction Potential: Not Quantified</b>	<b>Cost to City: LOW-HIGH</b>
<b>Action T-2.1A:</b> Set a goal of reducing car trips to school by 25%.	
<b>Action T-2.1B:</b> Partner with regional transit providers to increase local and regional bus route frequency for students.	
<b>Action T-2.1C:</b> Support PUSD as it considers transitioning its vehicle fleet to ZEVs.	
<b>Action T-2.1D:</b> Work with AC Transit to provide transit passes to all youth.	
<b>Action T-2.1E:</b> Work with schools on a no-idling campaign.	
<b>Action T-2.1F:</b> Increase secure bike parking for students.	
<b>Action T-2.1G:</b> Partner with the PUSD to install EV chargers that are accessible for teachers and school faculty.	
<b>Action T-2.1F:</b> Partner with Safe Routes to School National Partnership to provide education, community engagement, and promotional events on biking and walking safety and options, including a “walking school bus.”	
<b>Action T-2.1H:</b> Partner with PUSD administration and student environmental groups to promote behavior and cultural changes to encourage high school students to bike or walk to school instead of driving.	

A significant amount of the automobile activity in Piedmont is attributed to children being driven (or driving themselves) to and from school. The City should continue to target families of school-aged children and upper class high school students to encourage alternative transportation methods. This has the added benefit of alleviating congestion associated with student drop-offs and pick-ups.

**Objective T-3: Increase residents’ use of public transit**

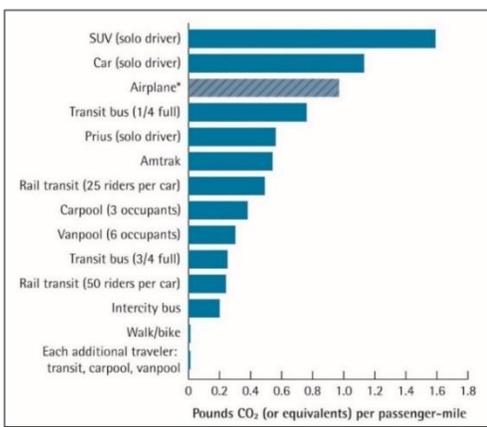


Figure 2.10 From: Sightline Institute, 2017



Nearly all of Piedmont residents, about 96%, are within ¼ mile of a bus stop. Switching from personal vehicle travel to public transportation can reduce transportation emissions dramatically. Figure 2.10 shows the emissions of various travel options. Traveling on a mostly full transit bus produces only one third of the emissions of travelling by car.

### MEASURE T-3.1: INCREASE THE USE OF BUSES AND BART

2030 GHG Reduction Potential: 32 MTCO <sub>2</sub> e	Cost to City: LOW-HIGH
<b>Action T-3.1A:</b> Incentivize public transit use through community-based social marketing campaigns.	
<b>Action T-3.1B:</b> Work with AC transit to improve fuel efficiency and alternative fuel buses.	
<b>Action T-3.1C:</b> Consult with AC transit to ensure Piedmont has bus stops that provide shade, weather protection, seating, lighting, and route information.	
<b>Action T-3.1D:</b> Consider investing in an intra-city shuttle to provide easy transit within the city and to key locations such as schools and casual carpool sites.	

Currently, a large majority of Piedmont residents commute to work by driving alone. By focusing efforts to promote public transit and providing additional transit resources, the City can reduce personal vehicle miles traveled, leading to significant GHG emissions reductions.

### Objective T-4: Accelerate the adoption of Zero Emissions Vehicles (ZEVs) in Piedmont

There are many co-benefits to switching from gasoline to zero emissions vehicles. Vehicles that run on gasoline emit particulate matter and create ground level ozone. Emissions from gasoline and diesel cars can be damaging to health, increasing asthma and compromising lungs. In contrast, electric vehicles do not emit ground level pollutants, contributing to clean and healthy air in Piedmont. The technology to switch from high carbon-intensive fuels to low carbon intensive fuels is available today, and it is cost effective.

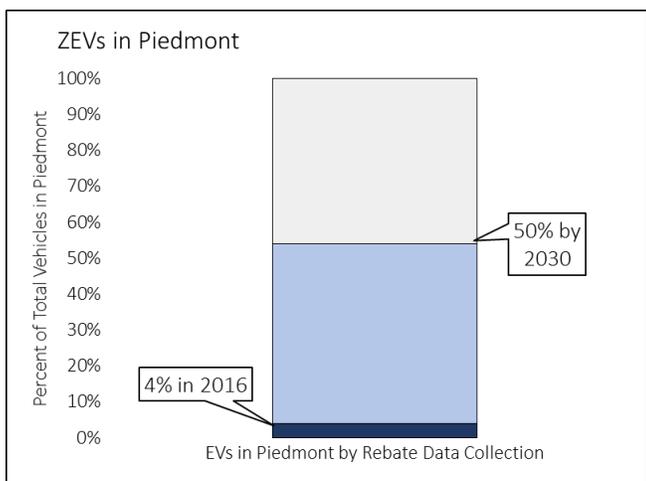


Figure 2.11

The ambitious target of 50% zero emission vehicle (ZEV) ownership by 2030 is possible and cost effective. Piedmont is a leader in electric vehicle adoption; as of 2016, roughly 4% of vehicles in Piedmont are electric vehicles, or roughly 7.5% of households own an electric vehicle. Electric vehicles can be purchased for less than the average car price and will save owners on fuel costs over the car’s lifetime.<sup>14</sup> Data on ZEV ownership in Piedmont comes from rebates which only encompass some of the electric vehicles bought, meaning the actual rate of ZEV ownership in Piedmont is likely higher. Rebates were redeemed nine times more in 2015 than in 2011 demonstrating the accelerating adoption of ZEVs. This acceleration in ZEV purchasing will likely continue as new vehicle models continue to enter the market, residents purchase new cars, travel ranges improve, charging infrastructure improves and the cost of the technology

<sup>14</sup> “New-Car Transaction Prices Grow Nearly 3 Percent Year-Over-year in May 2017, According To Kelley Blue Book.” *Kelley Blue Book*. 1 June 2017. <http://mediaroom.kbb.com/2017-06-01-New-Car-Transaction-Prices-Grow-Nearly-3-Percent-Year-Over-Year-in-May-2017-According-To-Kelley-Blue-Book> Accessed 3 July 2017.

drops. Figure 2.11 shows cumulative ZEV ownership in Piedmont by rebate compared to total vehicles owned.<sup>15</sup> The City will work to enable residents to own ZEVs through building code and infrastructure improvements. In order to truly achieve GHG reductions, ZEVs must be linked with renewable sources of energy such as on-site solar or through Piedmont’s participation in the EBCE at the 100% renewable option.

**MEASURE T-4.1: SUPPORT THE ADOPTION OF ZEVs AND THE GROWTH OF EV CHARGING STATIONS**

<b>2030 GHG Reduction Potential: 5,181 MTCO<sub>2</sub>e</b>	<b>Cost to City: LOW-MEDIUM</b>
<b>Action T-4.1A:</b> Install EV chargers in the Civic Center area, Grand Avenue commercial zone, and other commonly traveled locations in Piedmont.	
<b>Action T-4.1B:</b> Require pre-wiring for EV charging in new construction.	
<b>Action T-4.1C:</b> Develop an ordinance to require EV charger pre-wiring in any garage remodel.	

Piedmont currently benefits from having a relatively high rate of EV adoption. The City has the chance to capitalize on the interest in ZEVs in Piedmont and further promote ZEV adoption. By further developing the EV infrastructure, residents may feel more at ease when making the decision to buy an EV. The installation of public EV charging stations would especially benefit EV drivers who work in Piedmont but live elsewhere. Car-sharing and maximizing gasoline fuel efficiency can provide emissions reductions from personal vehicles over the next decade as fossil fuel powered cars are replaced.

**Objective T-5: Reduce miles traveled in personal gasoline vehicles**

**MEASURE T-5.1: REDUCE FUEL CONSUMPTION OF GASOLINE CARS**

<b>2030 GHG Reduction Potential: Not Quantified</b>	<b>Cost to City: LOW-MEDIUM</b>
<b>Action T-5.1A:</b> Coordinate traffic signals to minimize idling.	
<b>Action T-5.1B:</b> Encourage residents to fully inflate car tires through signage at gas stations.	
<b>Action T-5.1C:</b> Support state and federal fuel economy standards that result in reduced GHG emissions.	

Although statewide fuel efficiency standards are in place and are already impacting Piedmont’s emissions, the City should build on that success to maximize emissions reductions.

**MEASURE T-5.2: FACILITATE RIDE-SHARING OPPORTUNITIES**

<b>2030 GHG Reduction Potential: Not Quantified</b>	<b>Cost to City: LOW</b>
<b>Action T-5.2A:</b> Develop a community-based social marketing campaign to encourage carpooling among Piedmont residents and investigate and consider promoting platforms for connecting commuters.	
<b>Action T-5.2B:</b> Provide shade, weather protection, seating, lighting, and bike racks at casual carpool pick-up areas.	

<sup>15</sup> Data from census and Center for Sustainable Energy (2017). California Air Resources Board Clean Vehicle Rebate Project, Rebate Statistics. Data last updated 1 May 2017 from <https://cleanvehiclerebate.org/eng/rebate-statistics>. Accessed 1 May 2017.

**Action T-5.2C:** Solicit a car share program, such as Zipcar or Get Around, in a central location.

According to the 2000 Census, about 17% of Piedmont residents carpool to work. Piedmont should focus on encouraging various ride-sharing opportunities, as this can significantly reduce total personal vehicle miles traveled.

## Objective T-6: Increase mixed-use development

Mixed-use development blends different zones such as residential and commercial zones in close proximity. In doing so, distances are reduced between housing, workplaces, businesses, etc. which creates a more pedestrian and bicycle-friendly environment.

### MEASURE T-6.1: INCREASE MIXED-USE DEVELOPMENT

2030 GHG Reduction Potential: Not Quantified

Cost to City: LOW

**Action T-6.1A:** Prepare specific plans for the Grand Avenue and Civic Center commercial areas that identify the potential for high-quality, pedestrian-oriented, mixed-use development.

By pursuing mixed-use development, Piedmont can reduce vehicle miles traveled within the city while also further encouraging walking and cycling.

Although not listed as an action or measure in the Transportation section, should an online GHG reduction tracking platform (see Actions BE-1.2G, SW-1.2F, and WW-1.2D) be developed for the community, Piedmont residents will also be able to track their transportation-related actions in addition to other actions that may affect their carbon footprint. With this online platform, residents will also be able to participate in community-wide emissions reduction challenges.

## Transportation Emissions Forecasting

While State action has had a substantial impact on transportation emissions, in order to meet Piedmont’s target of 40% emissions reduction below baseline the Piedmont community and municipal government have to take action that goes beyond state initiatives. Figure 2.12 below forecasts a 40% reduction in GHG emissions below the BAU scenario by 2030 if ZEVS make up 50% of the vehicles in Piedmont and if a 10% reduction in personal vehicle miles traveled is achieved through increased biking, walking, and public transit use.

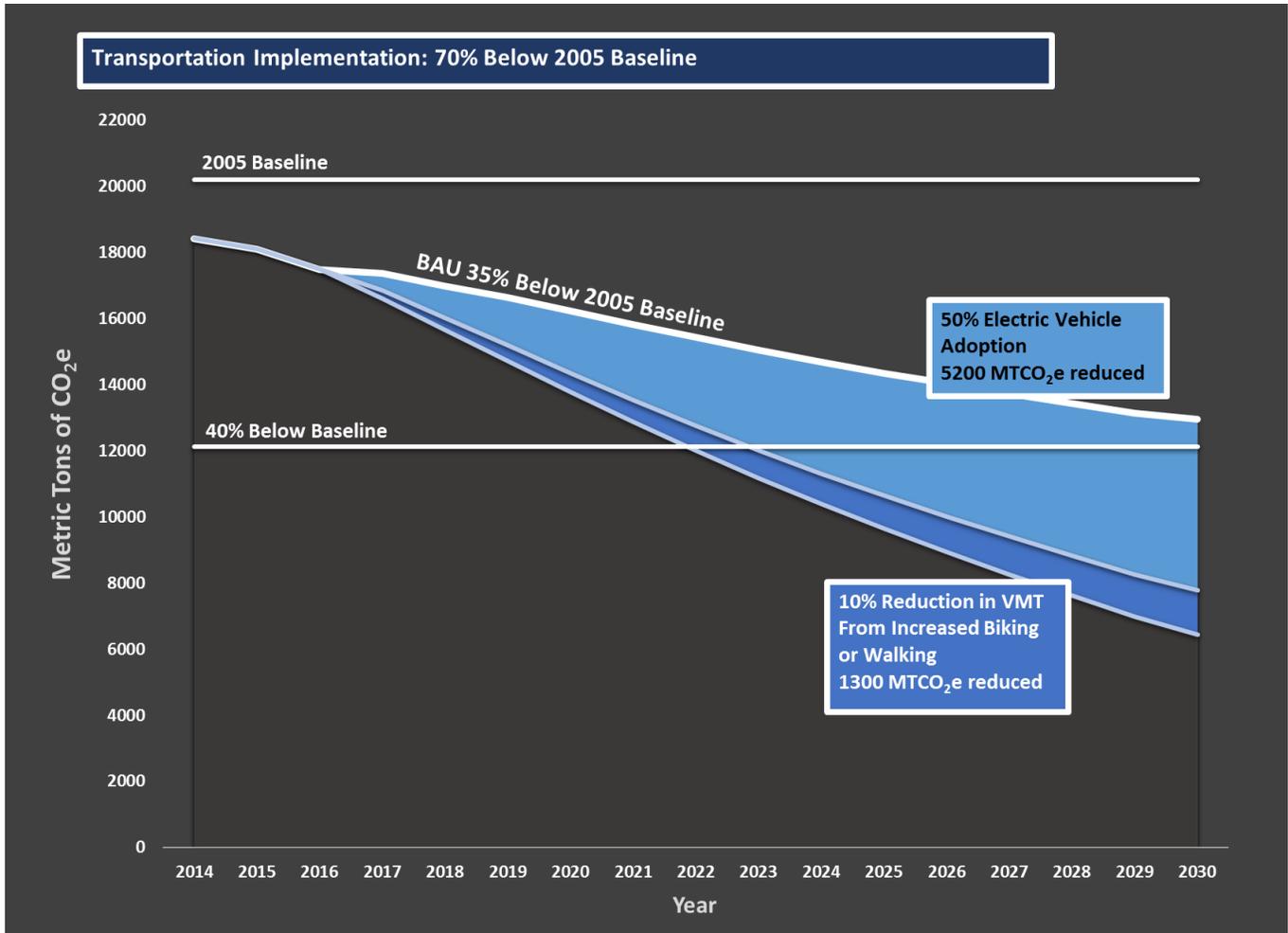


Figure 2.12

## Solid Waste

### 2015 Statistics:

1,128 MTCO<sub>2</sub>e

3% of Community GHG Emissions

57% below baseline

**Source of Emissions:** The breakdown of organic material in a landfill with minimal oxygen generates methane

**2030 Goal:** Divert 85% of waste from landfill

**2050 Pathway to Success:** Divert all organic and recyclable material from the landfill

## Solid Waste Greenhouse Gas Emissions

Solid waste generates methane, a greenhouse gas, when organic material decomposes in anaerobic landfill settings. Diverting organic materials from landfills and directing them to facilities that can process them correctly reduces GHG emissions associated with solid waste. An additional way to decrease the GHG emissions from waste is for a community to generate less waste in the first place. This can happen through conscious decisions by consumers to purchase fewer items and through manufacturers decreasing excess packaging, etc. This aspect of waste reduction will be further explored in the 'Consumption' section.

In 2015, Solid Waste accounted for about 3% of Piedmont's total community GHG emissions, down from being about 5% of the 2005 community inventory. Between 2005 and 2015, the amount of solid waste (measured in tons) being sent to landfills was reduced by about 60%.

According to a report by Republic Services, Piedmont's franchised waste hauler, the City produced 2,319.6 tons of waste in 2015. During the prior seven years, Piedmont consistently diverted a majority of its waste from landfill to recycling and composting facilities. In 2015, Piedmont diverted 74% of its waste, an all-time high. As a result, the emissions associated with solid waste disposal remain low. Piedmont can continue to build upon its success in diverting waste from landfills, sending all organic materials to composting facilities, recycling products, and supporting reuse and extended producer responsibility.

## Solid Waste Objectives and Measures

Solid Waste Objectives focus on encouraging recycling, composting, and reuse when possible. Diverting organic material from the landfill reduces emissions of methane. In addition, the total amount of waste created can be reduced by conscientious consumption and the reuse of materials. The overarching goal is to reduce waste going to the landfill by an additional 10% by 2030, so that the diversion rate is closer to 85%.

## Objective SW-1: Reduce waste going to the landfill

### MEASURE SW-1.1: ESTABLISH A WASTE DIVERSION TARGET FOR 2030

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW
<b>Action SW-1.1A:</b> Adopt a resolution to achieve 85% waste reduction and diversion by 2030.	

Piedmont has dramatically reduced its solid waste emissions since 2005. However, adopting a resolution will help the City continue its success and also demonstrate its climate leadership.

### MEASURE SW-1.2: PROVIDE EDUCATION ON WAYS TO REDUCE CONSUMPTION AND DIVERT WASTE FROM LANDFILL

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW
<b>Action SW-1.2A:</b> Promote educational programs and community engagement and outreach on reducing food waste, recycling, and landfill diversion.	
<b>Action SW-1.2B:</b> Encourage composting within the City through education and community engagement about proper green waste sorting, providing compostable bags and countertop compost bins, and education about backyard composting.	
<b>Action SW-1.2C:</b> Promote “fix-it” clinics to educate residents on how to repair items instead of throwing them away.	
<b>Action SW-1.2D:</b> Provide education and community engagement on items accepted in bulk-pick up programs to ensure proper disposal of appliances and other bulky refuse.	
<b>Action SW-1.2E:</b> Provide education and community engagement on where to drop-off specialized waste, such as paint, fats, grease, oils, and other items that cannot go in curb side or bulk pick-up.	
<b>Action SW-1.2F:</b> Investigate developing an online, GHG reduction tracking platform for Piedmont residents to track their actions related to waste that may affect their carbon footprint and to participate in community-wide GHG reduction challenges. (see BE-1.2G)	
<b>Action SW-1.2G:</b> Provide updated detailed information about which specific materials are currently being recycled by Piedmont’s waste hauler, rather than shipped elsewhere for disposal. Educate residents on the fact that recycling is a market-based program, and that if there is no market for a material, it will not be recycled.	
<b>Action SW-1.2H:</b> Educate residents about the different types of plastic and the limitations of plastic recycling. Create awareness that putting a plastic item in the blue recycling bin does not mean it will actually be recycled. Encourage the decreased consumption of plastics and plastic packaging.	

The City currently produces an Annual Public Education and Outreach Plan on waste diversion. Although the City has already achieved a significant decrease in solid waste going to landfills, the City should continue to build on this success through these proposed measures.

### MEASURE SW-1.3: REDUCE CONSTRUCTION AND DEMOLITION WASTE

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW-MEDIUM
<b>Action SW-1.3A:</b> Promote alternatives to traditional building demolition such as relocation, deconstruction, and salvage.	

**Action SW-1.3B:** Partner with nearby cities to provide contractor training on deconstruction as an alternative to demolition.

The City has already begun the process of reducing construction and demolition waste. In 2007, the City Council passed an ordinance requiring projects having a building permit valuation greater than or equal to \$50,000 to divert at least 50% of generated debris from going to landfills. These measures will help the City build on this success.

**Objective SW-2: Encourage sustainable practices of the City’s waste hauler**

**MEASURE SW-2.1: INCLUDE GHG REDUCTION STRATEGIES IN WASTE HAULER CONTRACTS**

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW-MEDIUM
<b>Action SW-2.1A:</b> Prioritize high diversion rates when selecting a waste hauler and/or renegotiation contracts.	
<b>Action SW-2.1B:</b> Include a provision in the City’s solid waste services agreement for periodic waste characterization studies.	
<b>Action SW-2.1C:</b> Encourage the waste hauler to use fuel efficient vehicles.	
<b>Action SW-2.1D:</b> Have the waste hauler hold an annual compost giveaway.	

## Solid Waste Forecasting

Solid waste emissions decreased substantially between 2005 and 2015. The City can further reduce emissions by minimizing the material sent to the landfill and by reducing consumption. Implementation of CAP 2.0 would ideally result in a 10% reduction in waste going to landfills. This correlates to a reduction of 125 MTCO<sub>2</sub>e.

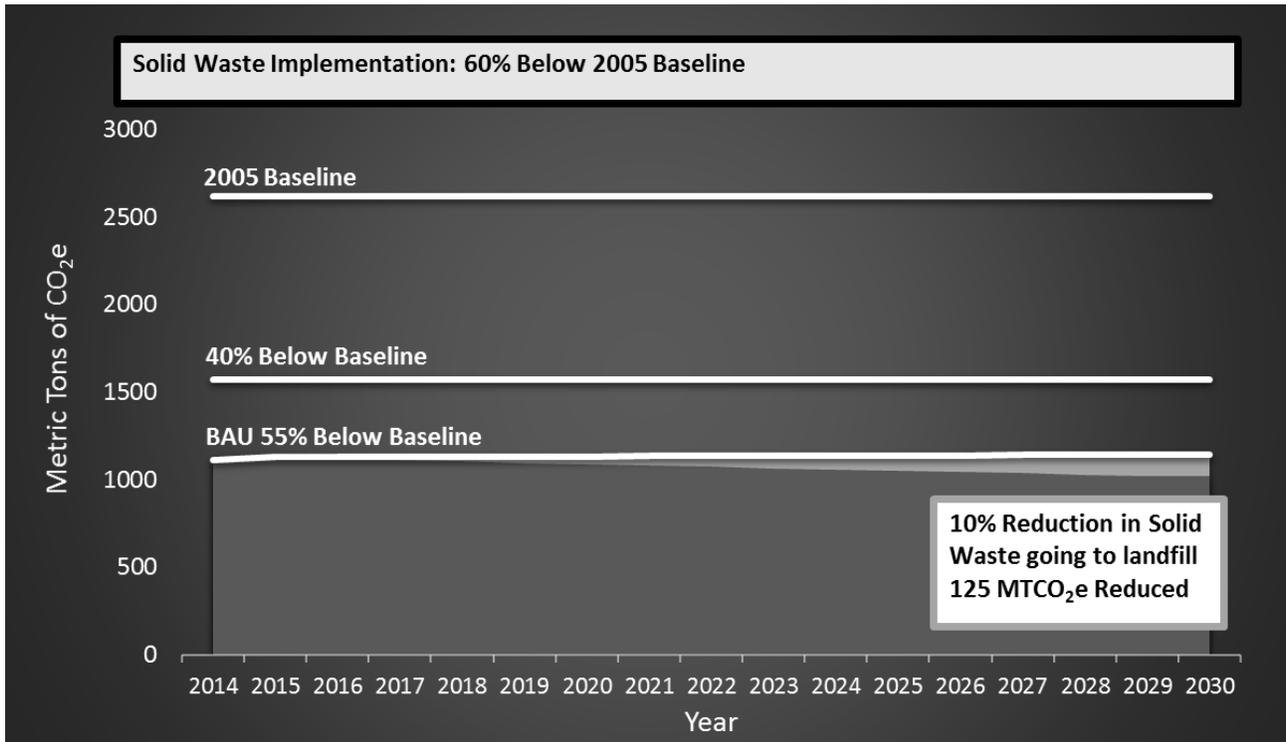


Figure 2.13

## Consumption

### 2013 Statistics:

Food: 36,000 MTCO<sub>2</sub>e

Goods: 58,000 MTCO<sub>2</sub>e

Services: 59,000 MTCO<sub>2</sub>e

**Source of Emissions:** The emissions associated with the production of foods, goods, and services consumed in Piedmont

**2050 Pathway to Success:** Reduce consumption of high emissions foods, goods, and services to sustainable levels

In 2016, the Bay Area Air Quality Management District (BAAQMD) and the University of California, Berkeley released a consumption-based GHG emissions inventory for households in the Bay Area. The results are estimates, with modelling based on actual consumption data, regional modelling, and household size and income. Their study showed that Piedmont had the second highest carbon footprint per household in the Bay Area. Figure 2.14 represents total emissions in CO<sub>2</sub>e per household in the San Francisco Bay Area.<sup>16</sup>

The study used a life-cycle analysis of GHG emissions embodied in goods and services. Due to global economic changes, the United States imports many of the products it consumes. As a result, the U.S. has essentially *exported* its manufacturing-based GHG emissions to other countries, predominantly China. A consumption-based inventory attributes GHG emissions produced across the world to the location of the consumer of the product. This allows accountability for emissions to be placed with the source of the demand rather than the supplier.

The consumption-based emissions inventory study accounted for the following sectors: housing, transportation, food, goods, and services. However, housing and transportation are already accounted for in our in-boundary emissions inventory. The elements of the consumption-based emissions inventory that contribute further information to Piedmont's Community GHG Inventory are food, goods, and services. The estimates for these sectors are:

1. Food: 36,000 MTCO<sub>2</sub>e
  2. Goods: 58,000 MTCO<sub>2</sub>e
  3. Services: 59,000 MTCO<sub>2</sub>e
- TOTAL: 153,000 MTCO<sub>2</sub>e

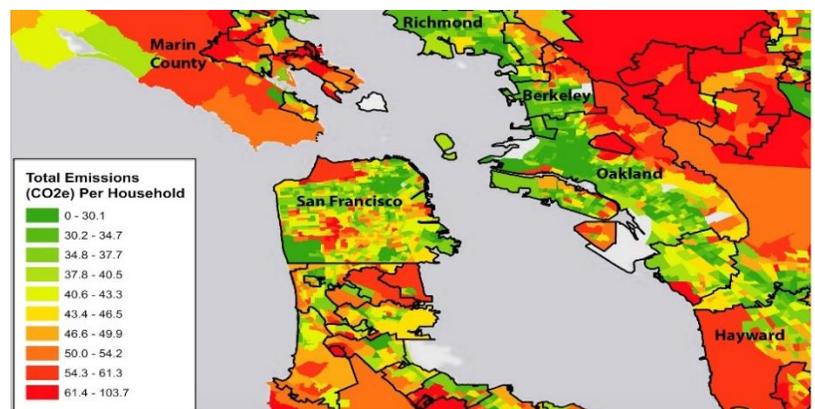


Figure 2.14

<sup>16</sup> Jones, Wheeler, Kammen (2017) *Journal of the American Planning Association* (in review at time of publishing this document)

## Consumption Greenhouse Gas Emissions

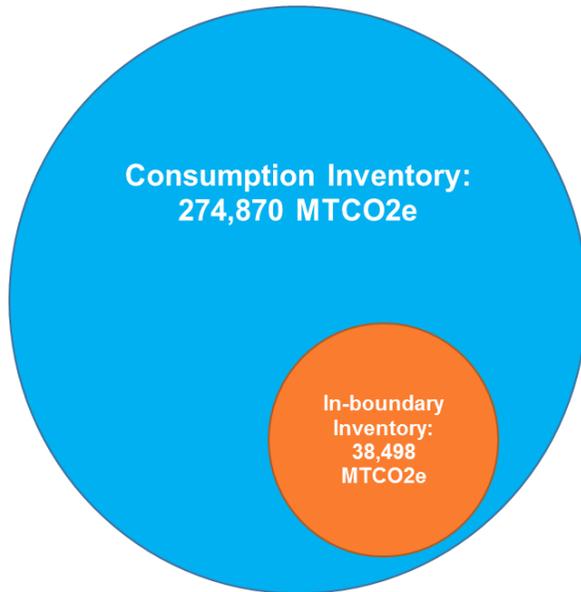


Figure 2.15

Reducing GHG emissions released within Piedmont's boundaries is the primary focus of CAP 2.0, but it is important to avoid reallocating emissions to other jurisdictions. While Piedmont's in-boundary GHG emissions are very low, Piedmont's rates of consumption corresponds to a significant quantity of GHGs released globally. Figure 2.15 shows that Piedmont's total consumption-based emissions are seven times the amount of Piedmont's in-boundary emissions (the emissions that have been addressed so far in this CAP and accounted for in previous GHG inventories). However, the consumption inventory total in figure 2.15 accounts for transportation and housing, which are already accounted for in the in-boundary inventory. If we adjust for this overlap and focus on the consumption sectors not accounted for in the in-boundary inventory (food, goods, and services), Piedmont's total consumption-based GHG emissions are 153,000 MT CO<sub>2</sub>e. These consumption sectors alone are four times the amount of Piedmont's entire in-boundary emissions. While initially disheartening, Piedmont's high consumption-based emissions serve to demonstrate the power Piedmont residents yield

globally with their purchasing decisions. For example, if Piedmont residents reduced both the carbon intensity of food and the consumption of goods by only 10%, it would on a global scale result in greater GHG reductions than the challenging goal of reducing residential natural gas consumption by 50% by 2030.

When purchases are made in Piedmont, the environmental harm and GHG emissions associated with that product's production and end life are not located within the City and not accounted for in a traditional GHG inventory. Thinking about the environmental harm associated with purchases can incentivize green practices. Therefore, while manufacturing of goods does not occur within Piedmont's borders, residents have the opportunity to address issues of equity and environmental justice by taking action to reduce consumption based emissions. Along the same lines, actions such as air travel, which contribute significantly to GHG emissions but seem difficult to address individually, can still be addressed through strategies such as purchasing carbon offsets for trips taken.

Consumption based emissions inventories are still new. There is minimal understanding about what consumption emissions are and education is a vital first step. Objectives for reducing consumption emissions include reducing the carbon intensity of food, reducing food waste, and enabling local food. Lastly, the consumption measures included in this plan are intended to reduce the emissions associated with purchasing new goods and building with new materials. Reducing consumption-based emissions is possibly the most significant sector in which Piedmonters' behavior and choices can impact GHG emissions.

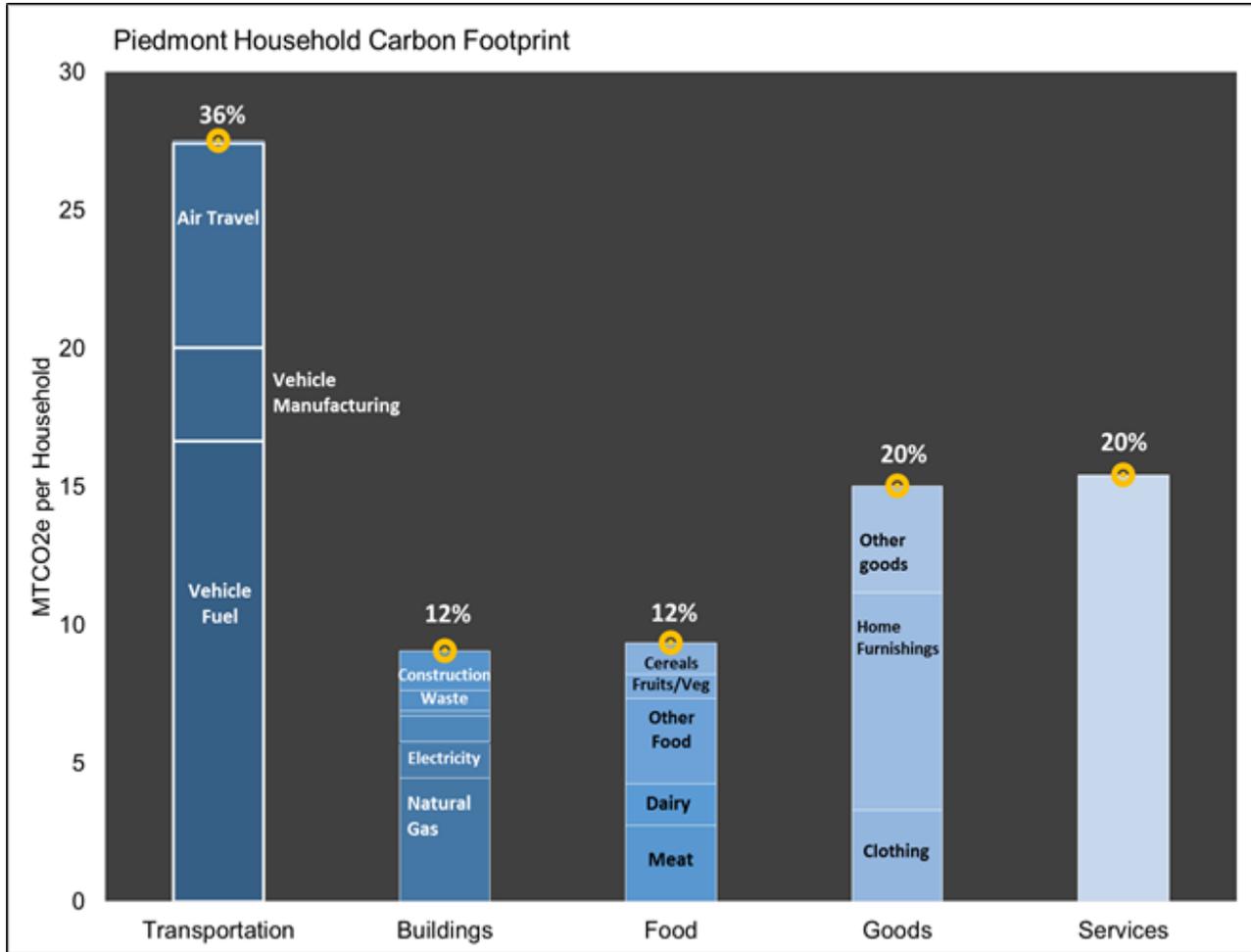


Figure 2.16 From: UC Berkeley, 2015

### Objective C-1: Increase awareness of consumption related GHG emissions

Piedmont’s municipal government has a very limited ability to influence the purchasing decisions of Piedmont residents, but it can provide information and education on how consumption relates to GHG emissions. The proposed measures listed below address consumption-based emissions from food, goods, and services only. The key target of the Consumption Sector included in this plan involves education on reducing consumption and on sustainable purchasing and decision-making.

#### MEASURE C-1.1: PROVIDE EDUCATION ON CONSUMPTION-RELATED GHG EMISSIONS

2030 GHG Reduction Potential: Not Quantified

Cost to City: LOW

**Action C-1.1A:** Increase awareness of consumption-based GHG emissions through CAP 2.0.

**Action C-1.1B:** Promote education on personal and household carbon footprints.

**Action C-1.1C:** Host a decarbonization workshop to promote awareness of the climate change impacts of consumption.

**MEASURE C-1.2: SUPPORT OTHER AGENCIES' INITIATIVES FOR EMISSIONS TRANSPARENCY AND ACCOUNTABILITY**

2030 GHG Reduction Potential: Not Quantified

Cost to City: LOW

**Action C-1.2A:** Encourage BAAQMD's efforts to create and promote consumption-based GHG emission inventories.

**Action C-1.2B:** Support state legislation that requires producers to be involved in end-of-life product management.

**Action C-1.2C:** Support a regional plastic water bottle ban.

**Action C-1.2D:** Support product labeling that includes information about GHG emissions associated with the lifecycle of products.

**Objective C-2: Reduce emissions associated with food consumption and food waste**

**MEASURE C-2.1: REDUCE FOOD WASTE**

2030 GHG Reduction Potential: Not Quantified

Cost to City: LOW

**Action C-2.1A:** Educate residents on how to reduce waste of edible foods through proper storage, meal planning, and purchasing of "imperfect food."

**MEASURE C-2.2: REDUCE CARBON INTENSITY OF FOOD CONSUMPTION**

2030 GHG Reduction Potential: Not Quantified

Cost to City: LOW

**Action C-2.2A:** Begin a community campaign to educate the public about food choice as part of a climate-friendly lifestyle.

**Action C-2.2B:** Educate residents and business on low-carbon food options, such as minimally processed foods, fruits, grains, and vegetables.

**Action C-2.2C:** Educate residents on the benefits of collecting and recycling fats, oils, and grease from food products and use.

**MEASURE C-2.3: ENABLE FOOD TO BE GROWN LOCALLY**

2030 GHG Reduction Potential: Not Quantified

Cost to City: LOW

**Action C-2.3A:** Encourage the creation of community gardens.

**Action C-2.3B:** Support and promote farmers markets.

**Action C-2.3C:** Host a gardening clinic.

**Action C-2.3D:** Promote the City's Harvest Festival as a community engagement and educational opportunity to learn about and celebrate locally grown produce, home gardening, and home preserving.

## Objective C-3: Reduce emissions from consumption and disposal of goods

### MEASURE C-3.1: REDUCE EMISSIONS FROM THE CONSUMPTION OF GOODS

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW
<b>Action C-3.1A:</b> Promote durable, reusable, pre-owned, recycled content, and locally-made goods, which reduce excessive manufacturing and transportation emissions.	
<b>Action C-3.1B:</b> Promote and support local tool-lending libraries and consider creating one in Piedmont.	
<b>Action C-3.1C:</b> Launch a “Be Resourceful Campaign” to connect residents to information and resources to share, reuse, borrow, or resell items.	
<b>Action C-3.1D:</b> Promote local arts, entertainment, recreation, and local businesses which have a lower GHG footprint than buying goods.	

### MEASURE C-3.2: REDUCE EMISSIONS FROM THE CONSTRUCTION AND DEMOLITION OF BUILDINGS

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW
<b>Action C-3.2A:</b> Promote alternatives to traditional building demolition such as relocation, deconstruction, and salvage.	
<b>Action C-3.2B:</b> Encourage the preservation of Piedmont’s existing stock of small and historic homes and discourage the granting of variances for floor area ratio.	
<b>Action C-3.2C:</b> Create “Climate-Friendly” purchasing suggestions on sustainable materials, energy efficient, appliances, and other building products and materials.	

## Objective C-4: Reduce emissions from the consumption of goods and food within schools

### MEASURE C-4.1: REDUCE EMISSIONS FROM FOOD CONSUMED IN SCHOOLS

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW
<b>Action C-4.1A:</b> Begin a “meatless Monday” campaign that educates students about low-carbon food choices.	

### MEASURE C-4.2: REDUCE EMISSIONS FROM SCHOOL PURCHASES

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW
<b>Action C-4.2A:</b> Support PUSD as it continues to implement its environmentally preferable purchasing policy for schools that covers supplies, furniture, food, and other items.	

## Water and Wastewater

### **2015 Statistics:**

**91 MTCO<sub>2</sub>e**

**<1% of Community GHG Emissions**

**78% below baseline**

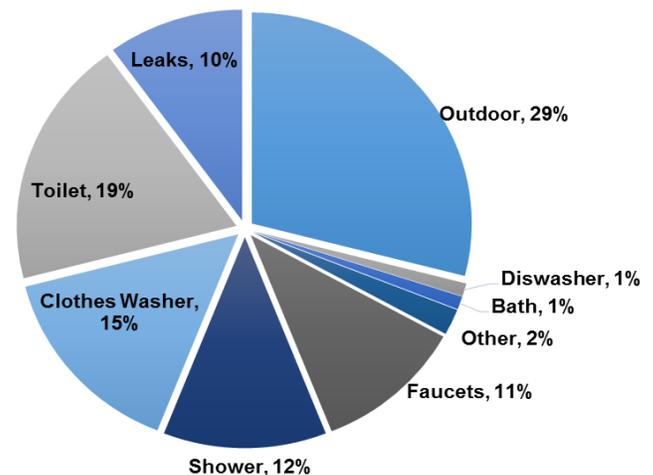
**Source of Emissions:** Extraction, transportation, and treatment of potable water

**2030 Goal:** Reduce water use by 20%

**2050 Pathway to Success:** Reduce water use as much as possible

## Water and Wastewater Greenhouse Gas Emissions

The treatment and delivery of potable water requires substantial energy input. So too does the transportation and treatment of wastewater. Piedmont consumed roughly 370 million gallons of potable water in 2015. This contributed roughly 90 MTCO<sub>2</sub>e to Piedmont's GHG emissions inventory, less than 1% of total community emissions. The minimal emissions related to water is largely because the East Bay Municipal Utility District (EBMUD) is a highly energy efficient water distributor. They estimate they use 1,250 kWh of energy per one million gallons of water delivered, roughly 82% less than the state average.<sup>17</sup> The treatment of wastewater generates GHG emissions and requires energy to process. Rather than releasing the methane generated during the anaerobic digestion of wastewater and releasing it into the atmosphere, EBMUD captures the methane and uses it to generate the electricity needed to power the treatment facility. As a result, the emissions associated with Piedmont's wastewater are minimal; they come from fugitive methane and nitrous oxide.<sup>18</sup> However, there are steps that can be taken to further reduce emissions related to water use.



From: "The Water Short List: The Most Effective Actions U.S. Households Can Take to Curb Water Use."

Figure 2.17

<sup>17</sup> "EBMUD Energy Fact Sheet." *East Bay Municipal Utility District*. 2012. Downloaded 3 July 2017.

<sup>18</sup> "Recycling water and energy." *East Bay Municipal Utility District*. <http://www.ebmud.com/wastewater/recycling-water-and-energy/>. Accessed 3 July 2017.

## Water and Wastewater Objectives and Measures

Water conservation measures protect the region’s limited water resources, conserve energy, and reduce GHG emissions. A considerable amount of energy is used every day to pump, treat, transport, heat, and cool the water we consume. Treating wastewater requires energy and the breakdown of waste emits GHGs. Key objectives in the Water and Wastewater sector relate to consuming less water, increasing water efficiency, and capturing and reusing storm water and greywater. Replacing key appliances like toilets and shower heads with high efficiency appliances and plumbing fixtures can reduce total water consumption and the wastewater produced.<sup>19</sup> Drought-tolerant landscaping reduces the use of potable water for irrigation. As climate change results in more frequent droughts in California, water conservation will be a necessary adaptation measure.

Water conservation and storm water management are important to both CAP 2.0 and to Piedmont’s Green Infrastructure plan, which mandates storm water practices such as bioswales and rain gardens in certain development projects. Capturing and treating storm water runoff on-site through green infrastructure helps to reduce flow volumes and pollutant loads to downstream surface waters. By 2040, Piedmont will need to have 25% of the City’s surface area drain to Green Infrastructure features.<sup>20</sup>

### Objective WW-1: Reduce water use by 20%

#### MEASURE WW-1.1: ENCOURAGE RESIDENTIAL AND COMMERCIAL USERS TO RECEIVE WATER AUDITS

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW
<b>Action WW-1.1A:</b> Partner with EBMUD and StopWaste to provide water conservation outreach and community engagement programs and encourage residential and commercial users to participate in free water efficiency audits.	
<b>Action WW-1.1B:</b> Promote rebates for water efficiency projects, including low-flow fixtures.	
<b>Action WW-1.1C:</b> Require a water efficiency audit at point of sale.	

#### MEASURE WW-1.2: REDUCE RESIDENTIAL WATER USE

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW
<b>Action WW-1.2A:</b> Adopt a residential retrofit program to encourage the installation of water conservation measures.	
<b>Action WW-1.2B:</b> Consider requiring the installation of water conserving fixtures at the point of sale or rental.	
<b>Action WW-1.2C:</b> Consider requiring pool covers in order to reduce evaporation.	

<sup>19</sup> Inskip, Benjamin and Shahzeen Attari. “The Water Short List: The Most Effective Actions U.S. Households Can Take to Curb Water Use.” *Environment Magazine*. July 2014. [http://www.environmentmagazine.org/archives/back%20issues/2014/july-august%202014/water\\_full.html](http://www.environmentmagazine.org/archives/back%20issues/2014/july-august%202014/water_full.html). Accessed 3 July 2017.

<sup>20</sup> NCE. “Framework for Green Infrastructure Plan Development.” *City of Piedmont*. June 2017.

**Action WW-1.2D:** Investigate developing an online, GHG reduction tracking platform for Piedmont residents to track their actions related to water use that may affect their carbon footprint and to participate in community-wide GHG reduction challenges. (see BE-1.2G)

**MEASURE WW-1.3: PROMOTE LANDSCAPING THAT MINIMIZES WATER USE**

2030 GHG Reduction Potential: Not Quantified

Cost to City: LOW

**Action WW-1.3A:** Encourage the replacement of high water use landscapes in residential and commercial uses.

**Action WW-1.3B:** Enforce and consider expanding the California Water Efficient Landscape Ordinance.

**MEASURE WW-1.4: REDUCE WATER USE IN SCHOOLS**

2030 GHG Reduction Potential: Not Quantified

Cost to City: LOW

**Action WW-1.4A:** Support PUSD as it continues installing motion sensor fixtures or other water efficiency technology in school buildings

**Action WW-1.4B:** Support PUSD as it installs drought-tolerant landscaping on school properties.

**Objective WW-2: Conserve and Collect water**

**MEASURE WW-2.1: PROMOTE INFRASTRUCTURE IMPROVEMENTS**

2030 GHG Reduction Potential: Not Quantified

Cost to City: HIGH

**Action WW-2.1A:** Work with EBMUD to repair and maintain existing water lines to prevent leaks.

**MEASURE WW-2.2: ENCOURAGE USE OF GREYWATER AND RAINWATER COLLECTION**

2030 GHG Reduction Potential: Not Quantified

Cost to City: MEDIUM

**Action WW-2.2A:** Consider requiring greywater or water collection systems in new construction.

**Action WW-2.2B:** Create an outreach or community engagement program that encourages businesses and residents to construct greywater and rainwater collection systems that can be used for irrigation and other non-potable uses.

Greywater and rainwater collection can be beneficial to residents in a number of ways. Both can help residents lower their water bill. Rainwater is not only a free source of water, it is also relatively clean, making it suitable for many uses including irrigation and watering gardens. Uses for greywater also include irrigation, in addition to laundry and toilet flushing.

## Water and Wastewater Forecasting

Figure 2.18 below forecasts Piedmont's GHG emissions associated with water use through 2030 if the City implements the outlined measures to achieve a 20% reduction in water use. Current GHG emissions associated with water use are already well below its 2005 baseline. However, a majority of the measures are of little cost to the City and would result in helping conserve the State's stressed water supply. While water conservation measures may create relatively small GHG emission reductions, they are a central part of adapting to the effects of climate change and should be actively pursued by residents, businesses, the City, and schools.

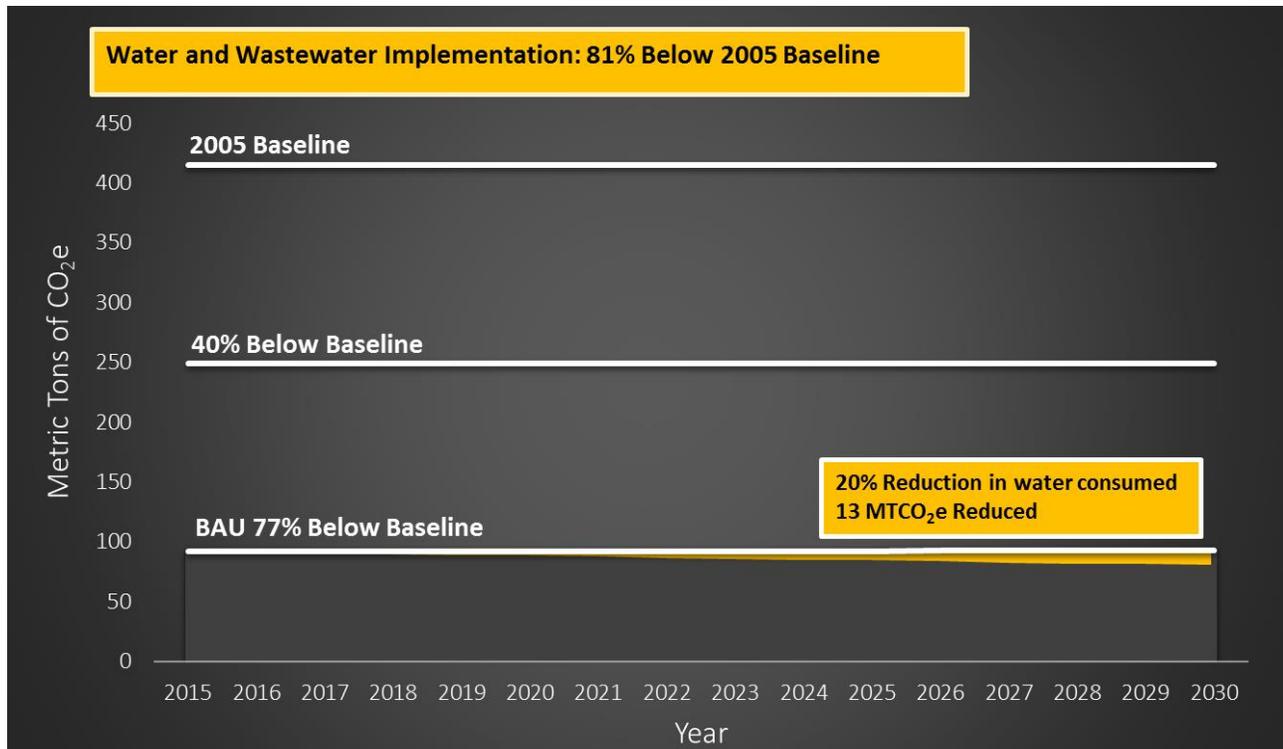


Figure 2.18

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# Municipal Strategies

## Municipal GHG Inventory and Climate Action Measures

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### Striving toward Zero-Carbon Municipal Operations

Envisioning a zero-carbon Piedmont requires leadership on the part of the municipal government. Setting a zero-carbon goal and creating a plan to eliminate GHG emissions will enable Piedmont to maximize its climate protection strategies.

Zero-carbon will require retrofitting buildings to maximize efficiency, purchasing and producing renewable electricity, using electric and other alternative fuel vehicles, and reducing solid waste. The City Council has committed to installing a solar energy system at the City’s corporation yard and staff is exploring options for installing solar panels at other facilities. In addition, the City has completed energy efficiency audits for municipal buildings, installed energy efficient lighting throughout its facilities, and has converted cobra-head streetlights to LEDs.

### Objective MUN-1: Commit to being a zero-carbon municipal government

#### MEASURE MUN-1.1: SET A ZERO-CARBON GOAL FOR THE CITY GOVERNMENT

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW
<b>Action MUN-1.1A:</b> Pass a resolution committing Piedmont's municipal facilities and activities to be zero-carbon by 2050 and develop interim milestones.	

#### 2030 Goals

- Acquire 100% renewable electricity and install rooftop solar PV and other types of solar energy systems
- Maximize energy efficient building heating and cooling systems
- Reduce employee commute emissions by providing facilities for zero-carbon commute options

#### 2050 Goals

- Switch from natural gas to electricity for heating fuel
- Replace the gasoline and diesel fleet with an electric or zero-emissions vehicle (ZEV) vehicle fleet
- Create near-zero waste from city operations

## Municipal GHG Inventory

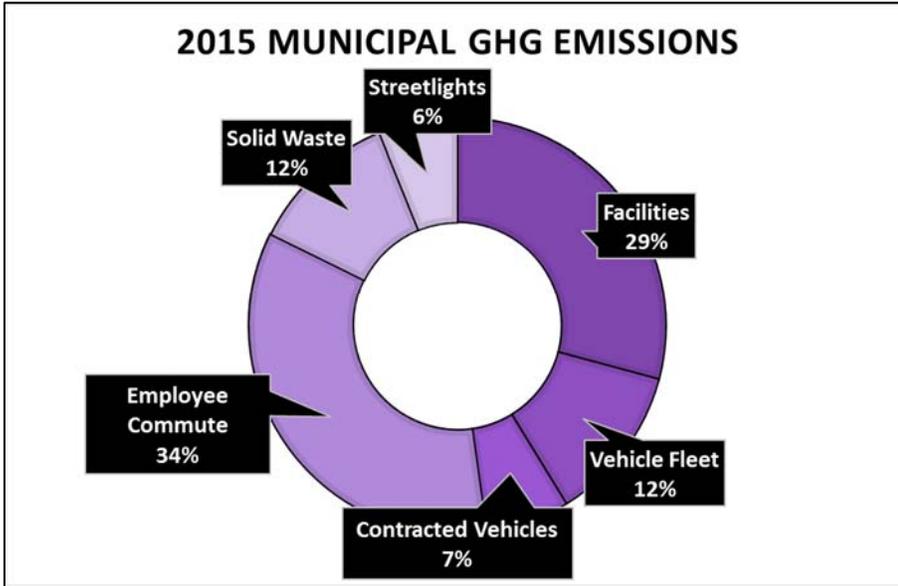


Figure 3.1

The municipal GHG inventory is a subset of the community GHG inventory. It is an inventory within an inventory, completed so the City can take action to reduce emissions associated with City activity. In 2015, municipal facilities, transportation, and waste accounted for approximately 960 metric tons of CO<sub>2</sub>e. While not a major source of emissions within Piedmont, reducing emissions from municipal actions can decrease the City's environmental impact while providing leadership by example for Piedmont residents and business owners.

## Municipal Climate Action Measures

### Energy consumption: Buildings and Lights

Municipal building energy use increased from 2005 to 2015. This increase is almost exclusively driven by the addition of the aquatic facilities at 777 Magnolia Avenue into the municipal building portfolio in 2010. However the building portfolio was relatively consistent between 2014 and 2015, and emissions from City buildings decreased despite a cooler winter requiring increased heating. By enhancing the energy efficiency of existing buildings and building highly efficient new buildings, the City can reduce the energy use of its facilities. Streetlight energy use declined by 13% in 2015 as the result of City efforts to convert to LEDs streetlights.

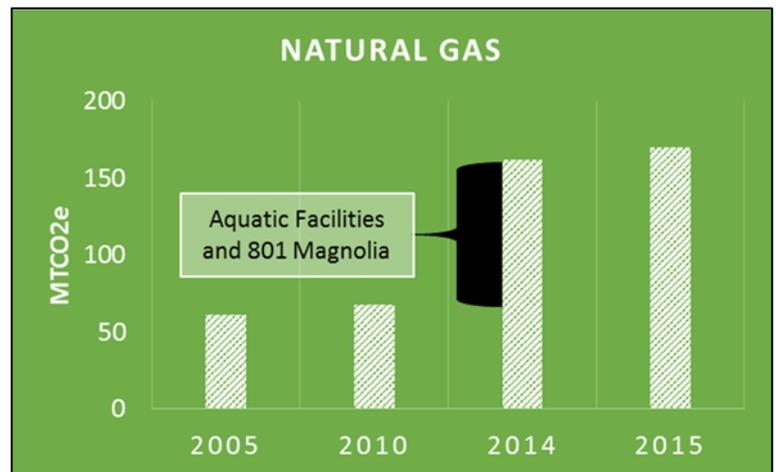


Figure 3.2

## Objective MUN-2: Reduce emissions from City buildings and energy supply

### MEASURE MUN-2.1: REDUCE ENERGY USE IN CITY BUILDINGS

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW-HIGH
<b>Action MUN-2.1A:</b> When remodeling or repairing City buildings, include opportunities for energy efficiency retrofits or green building certification.	
<b>Action MUN-2.1B:</b> Construct new City buildings to ZNE and green building certification standards.	
<b>Action MUN-2.1C:</b> Increase the energy efficiency of lighting and appliances in City buildings as opportunities arise.	
<b>Action MUN-2.1D:</b> Switch from natural gas to electric appliances once the electricity supply nears 100% renewable and the technology becomes affordable.	
<b>Action MUN-2.1E:</b> Investigate strategies for reducing energy use at the City aquatic facilities	

### MEASURE MUN-2.2: MONITOR BUILDING PERFORMANCE

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW-MEDIUM
<b>Action MUN-2.2A:</b> Consider installing electronic building performance displays in all publicly accessible buildings.	
<b>Action MUN-2.2B:</b> Conduct energy audits of all buildings every 10 years.	

### MEASURE MUN-2.3: INCREASE THE AMOUNT OF RENEWABLE ENERGY ON-SITE AND THROUGH THE GRID

2030 GHG Reduction Potential: Not Quantified	Cost to City: MEDIUM-HIGH
<b>Action MUN-2.3A:</b> Evaluate the potential for and install cost-effective renewable energy systems on City properties.	
<b>Action MUN-2.3B:</b> When constructing new buildings or replacing and structurally upgrading roofs, build them to be solar-ready or include the installation of solar energy systems in the bid process.	
<b>Action MUN-2.3C:</b> Commit to 100% renewable energy through EBCE.	

### MEASURE MUN-2.4: REDUCE EMISSIONS FROM HIGH GLOBAL WARMING POTENTIAL GASES

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW-HIGH
<b>Action MUN-2.4A:</b> Enforce the ban on petroleum powered leaf blowers and maintenance equipment.	
<b>Action MUN-2.4B:</b> Replace high global warming potential (GWP) refrigerant air conditioners and dispose of them properly.	
<b>Action MUN-2.4C:</b> Continue to maintain Piedmont's urban forest and plant new trees where possible to sequester carbon emissions, improve air quality, and help reduce the heat island effect.	

## Vehicle Fleet & Employee Commute

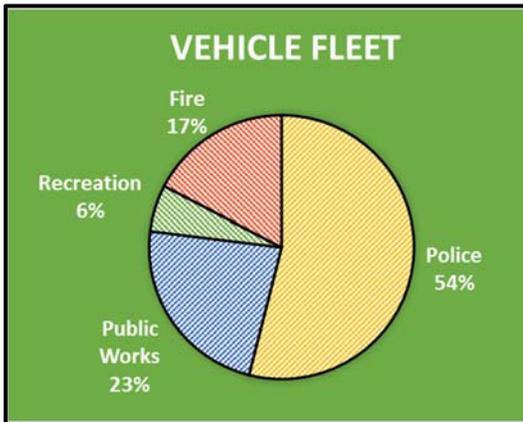


Figure 3.3

The vehicle fleet is comprised of police, fire, public works, and recreation vehicles, and does not include employee commutes. The City's vehicle fleet continues to contribute a substantial portion of the City's GHG emissions. Combined, the vehicle fleet accounts for 19% of total municipal emissions. While there are not currently many options for transitioning the City's vehicle fleet to ZEVs, bigger cities and states are starting to investigate using electric vehicles in public fleets. Once available, the City should prioritize purchasing electric vehicles. To reduce commute emissions of City employees, the City should provide amenities that enable biking and walking to work and the use of electric vehicles for commutes.<sup>1</sup>

## Objective MUN-3: Reduce municipal transportation emissions

### MEASURE MUN-3.1: REDUCE EMPLOYEE TRANSPORTATION

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW-HIGH
<b>Action MUN-3.1A:</b> Promote employee ride-shares, walking, biking, and public transportation as commuting alternatives.	
<b>Action MUN-3.1B:</b> Provide a shower and changing area for City employees to facilitate biking to work.	
<b>Action MUN-3.1C:</b> Install EV chargers accessible to City employees.	

### MEASURE MUN-3.2: REDUCE MUNICIPAL VEHICLE FLEET EMISSIONS

2030 GHG Reduction Potential: Not Quantified	Cost to City: LOW-HIGH
<b>Action MUN-3.2A:</b> Develop a fleet purchasing policy that prioritizes fuel efficiency and ZEVs.	

## Solid Waste Facilities

The municipal government generated an estimated 261 tons of solid waste in the year 2015, which is 11% of the solid waste generated by the larger Piedmont community. This tonnage is an estimate based on the size of trash receptacles and rates of pick-up which probably over-represents the quantity of waste generated. The Piedmont community as a whole continued to achieve a high diversion rate of 74% in 2015, and the City can encourage this trend by continuing to reduce waste in its own operations and at public and private events held at City facilities. Reducing solid waste going to landfills by such means as using reusable or compostable dinnerware, going paperless and purchasing environmentally-preferable

<sup>1</sup> Barnum, Alex. "New Initiative Accelerates West Coast's Drive for Electric Vehicle Fleet Purchases." *CalEPA*. 30 June 2015. <https://calepa.ca.gov/2015/07/30/evehicle/>. Accessed 14 July 2017.

products, and continuing to practice waste diversion best practices in its operations and facilities are steps the City can continue taking to meet its goals.

**Objective MUN-4: Reduce solid waste generated by City services**

**MEASURE MUN-4.1: REDUCE SOLID WASTE GENERATED BY THE CITY OR CITY-RELATED EVENTS**

<b>2030 GHG Reduction Potential: Not Quantified</b>	<b>Cost to City: LOW</b>
<b>Action MUN-4.1A:</b> Implement zero-waste City events, including compostable dinnerware, water refilling stations, and banning plastic water bottles.	
<b>Action MUN-4.1B:</b> Institute paperless practices for City Council, Commissions, and community meetings.	
<b>Action MUN-4.1C:</b> Enforce and expand the City's environmentally preferable purchasing policy.	
<b>Action MUN-4.1D:</b> Conduct a solid waste audit for City facilities.	
<b>Action MUN-4.1E:</b> Consider meat-free options for City events.	
<b>Action MUN-4.1F:</b> Educate City employees and the public on recycling and composting at city events and facilities.	
<b>Action MUN-4.1G:</b> Replace paper towels with electric hand dryers in City bathrooms.	

**Water Use**

Conserving water has a measurable but minimal GHG reduction impact within Piedmont’s city limits, but it does contribute to state drought mitigation goals. On City-owned land, water-efficient landscaping and irrigation practices can be implemented. Within municipal buildings, water-efficient appliances should be considered.

**Objective MUN-5: Reduce City water use**

**MEASURE MUN-5.1: REDUCE WATER USE IN CITY BUILDINGS**

<b>2030 GHG Reduction Potential: Not Quantified</b>	<b>Cost to City: LOW</b>
<b>Action MUN-5.1A:</b> Install water-efficient plumbing fixtures in City buildings, including motion sensor faucets in bathrooms.	
<b>Action MUN-5.1B:</b> Install water-efficient appliances, such as dishwashers and hot water heaters.	

**MEASURE MUN-5.2: REDUCE AND CAPTURE WATER USE IN CITY LANDSCAPES**

<b>2030 GHG Reduction Potential: Not Quantified</b>	<b>Cost to City: LOW-MEDIUM</b>
<b>Action MUN-5.2A:</b> Transition current water-intensive landscaping to drought-tolerant landscaping, limiting areas requiring intensive irrigation.	

**Action MUN-5.2B:** Facilitate the installation of weather-based evapotranspiration (ET) controller irrigation systems in City landscapes.

**Action MUN-5.2C:** Implement the City's Green Infrastructure Plan.

### Use City resources to collect and spread information on climate change

The City government has a platform, including the City website, from which it can provide information to residents and business owners on actions that can be taken to reduce GHG emissions. As a trusted government organization, the City can serve as an influential educator on climate change issues. Many of the community measures in CAP 2.0 rely on the dissemination of information about climate protection and related programs and incentives.

### Objective MUN-6: Use the City's resources to disseminate and collect information on climate change

#### MEASURE MUN-6.1: ENHANCE AND UPDATE THE CITY'S CLIMATE ACTION PROGRAM OUTREACH EFFORTS

2030 GHG Reduction Potential: Not Quantified

Cost to City: LOW-MEDIUM

**Action MUN-6.1A:** Develop a user-friendly web page and/or build the City's social media presence to provide information on energy and water efficiency programs, renewable energy, waste reduction best practices, electric vehicles, and other resources. Investigate ways to include the GHG emissions reduction potential of each action

**Action MUN-6.1B:** Distribute information to residents and commercial business owners on energy and water audit programs, rebates, waste reduction best practices, and environmental stewardship.

**Action MUN-6.1C:** Host educational events promoting the reduction of GHG emissions in residences and businesses.

#### MEASURE MUN-6.2: COLLECT INFORMATION TO TRACK PROGRESS ON THE CLIMATE ACTION PLAN

2030 GHG Reduction Potential: Not Quantified

Cost to City: LOW

**Action MUN-6.2A:** On application forms for building and design review permits, include a questionnaire regarding energy efficiency improvements included in the construction that also heightens awareness of other energy efficiency options not considered.

### Leverage City Tax Policy to reflect social costs of carbon

A few Alameda County cities are exploring the option of changing City taxes to act as carbon prices. The City of Berkeley recently passed a resolution calling for PG&E to allow Utility User Tax rates to reflect GHG pollution.<sup>2</sup> Pricing utility taxes to reflect climate impacts would promote fuel switching from natural gas to electricity. Electrification coupled with on-site renewables or low-carbon grid power under the upcoming EBCE would result in significant GHG emission reductions. There are numerous options for pricing fossil fuels and pricing mechanisms could be revenue neutral, or used to generate money for the City to provide energy efficiency incentives.

<sup>2</sup> Ryan Bell. "Resolution requesting that PG&E's Billing System Allow the Utility User Tax (UUT) to Reflect Greenhouse Gas Pollution." *City of Berkeley*. 25 July 2017.

## Objective MUN-7: Consider adjusting taxes to reflect the social costs of carbon

### MEASURE MUN-7.1: REDUCE THE CITY'S CARBON FOOTPRINT THROUGH CARBON PRICING

2030 GHG Reduction Potential: Not Quantified	Cost to City: HIGH
<b>Action MUN-7.1A:</b> Consider adjusting the utility tax to act as a revenue neutral carbon tax on natural gas while reallocating money to reduce electricity and/or communication taxes through 2030.	
<b>Action MUN-7.1B:</b> Through a City vote, establish a carbon tax on natural gas that dedicates its revenue to energy efficiency, renewable energy, and fuel switching incentives for residents.	
<b>Action MUN-7.1C:</b> Support State and Federal efforts to establish a tax or fee on carbon.	

### Forecasting Emissions

Municipal GHG emissions are expected to decline slightly due to increased vehicle fuel efficiency and additional renewable energy provided through the grid. Meeting the City's target of 40% below the 2005 baseline by 2030 will require additional actions to reduce emissions. Municipal CAP 2.0 measures are focused on reducing both emissions directly under municipal control (vehicle fleet, buildings, and streetlights) as well as indirect emissions (employee commute, contracted vehicles, solid waste). Meeting 2030 goals should set the municipal government on track to meeting 2050 goals of 80% below BAU.

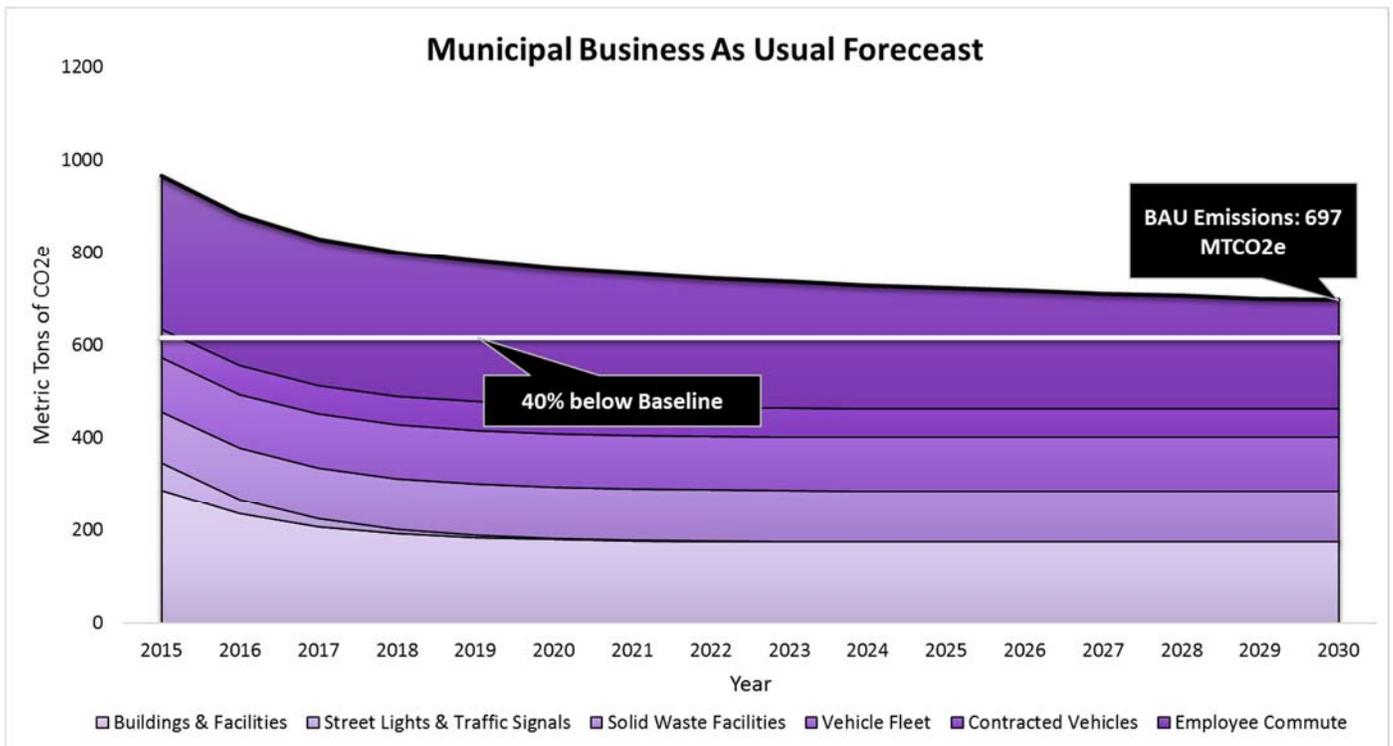


Figure 3.4

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# Adaptation

The adaptation section describes both the climate change-related hazards Piedmont will face and actions that the City can take to minimize damage. This section was adapted from a report created by Four Twenty Seven, a consultant hired by StopWaste to perform an adaptation report for Piedmont. It provides an overview of Piedmont's assets at risk due to climate change and climate change impacts on the Bay Area region, including temperature changes, sea level rise and flooding drought, heavy precipitation, and wildfire.

## Global Temperature Change

Climate change has already resulted in about 0.8° Celsius (1.4° Fahrenheit) of warming globally since 1880.<sup>1</sup> According to the IPCC, warming will likely continue at a rate of "...about 0.2°C per decade..."<sup>2</sup> Estimates range dramatically depending on what action is taken now. Even in scenarios in which we curb GHG emissions, "increases in average global temperatures are expected to be within the range of 0.5°F to 8.6°F by 2100, with a likely increase of at least 2.7°F..."<sup>3</sup> Change in global temperatures will alter both the geography of California and the quality of life in Piedmont. Figure 4.1 shows sea level rise under a 3°C warming scenario and demonstrates how substantial the impacts of a few degrees of warming can be on California's shoreline.

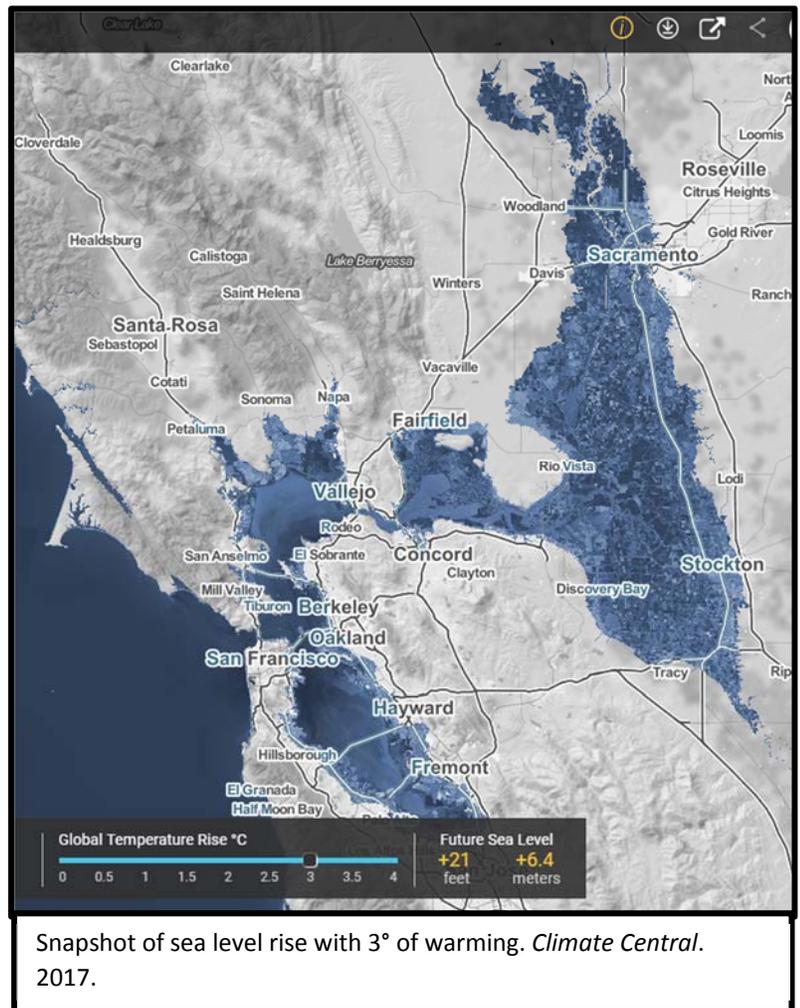


Figure 4.1

<sup>1</sup> Michael Carlowicz. "Global Temperatures." NASA. <https://earthobservatory.nasa.gov/Features/WorldOfChange/decadaltmp.php>. Accessed 3 July 2017.

<sup>2</sup> "Climate Change 2007: Working Group I: The Physical Science Basis." IPCC. [https://www.ipcc.ch/publications\\_and\\_data/ar4/wg1/en/spmsspmpm-projections-of.html](https://www.ipcc.ch/publications_and_data/ar4/wg1/en/spmsspmpm-projections-of.html). Accessed 3 July 2017.

<sup>3</sup> "Future of Climate Change." *United States Environmental Protection Agency January 19 2017 Snapshot*. [https://19january2017snapshot.epa.gov/climate-change-science/future-climate-change\\_.html](https://19january2017snapshot.epa.gov/climate-change-science/future-climate-change_.html). Accessed 3 July 2017.

## Temperature Change in Piedmont

Average temperatures in Piedmont are projected to increase 2° to 4° by mid-century as a result of global warming. By 2100, average temperatures could increase between 4.1 and 8.7°F if no action is taken to mitigate climate change. This means that Piedmont's average maximum temperature would be comparable to current levels in Hayward, California.<sup>4</sup> On average, Piedmont has experienced temperatures exceeding 90°F once every five years. By century's end, the number of days per year above the 90°F mark could be up to 46 days per year in a business-as-usual scenario. Figure 4.2 shows the growth in days with a maximum temperature above 95°F.<sup>5</sup>

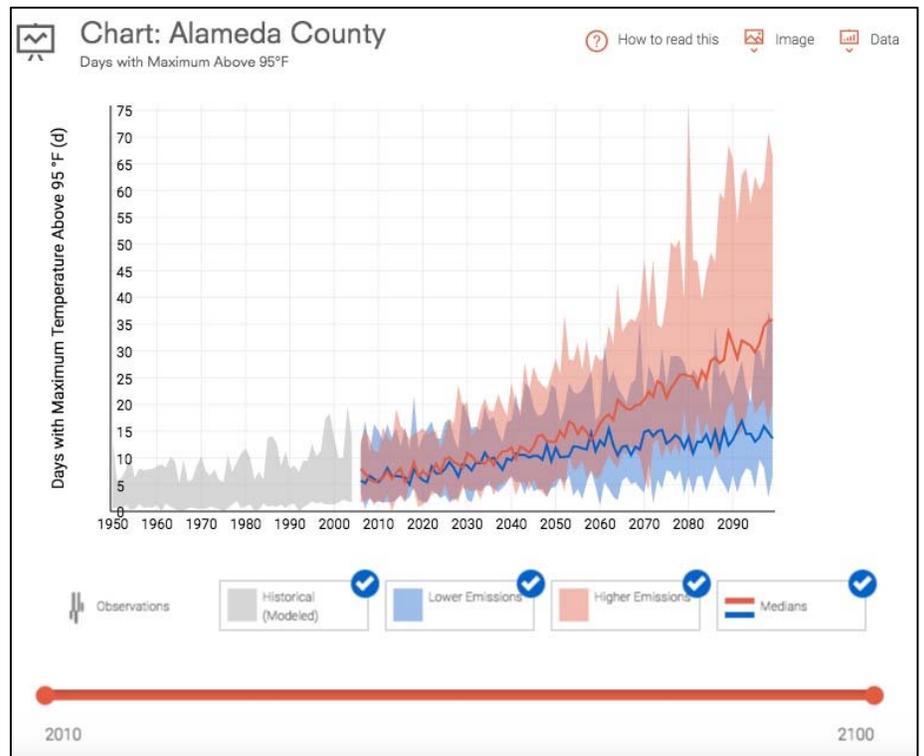


Figure 4.2

The frequency of very hot days will rise substantially, changing the experience of living in Piedmont as well as increasing the necessity of insulation and cooling.<sup>6</sup> Higher temperatures increase heat hazards. Local residents, workers, and visitors could experience heat stroke or exhaustion. A greater reliance on air conditioners would raise demand for power during peak periods, which could affect the frequency of outages. To reduce the negative impacts of extreme heat, the City can increase vegetative cover and preserve existing trees.

## Sea Level Rise & Flooding

Sea levels are rising as a result of higher atmospheric and oceanic temperatures across the globe. Seas have been rising in the San Francisco Bay 0.9 inches per decade since the 1930s and extreme tides have increased 20-fold.<sup>7</sup> The rate of sea level rise is expected to accelerate throughout the century, but projections are complicated by the potential for a substantial acceleration of glacial ice melt resulting in rapid sea level rise, which is not currently accounted for in many global scenarios.<sup>8</sup> While sea level will not reach the Piedmont's city limits in the near-term, sea level rise will impact the Bay Area economy, resources, and infrastructure. The Bay Area is particularly exposed to the impacts of sea level rise because of the large number of assets located along the coast. For Piedmont, the

<sup>4</sup> "Piedmont Climate Change Chapter." *Four Twenty Seven Climate Solutions*. 10 February 2017.

<sup>5</sup> "The Climate Explorer." *National Oceanic and Atmospheric Administration*. 2017. <https://toolkit.climate.gov/climate-explorer2/location.php?county=Alameda+County&city=Piedmont,%20CA&fips=06001&lat=37.83&lon=-122.25>. Accessed: 16 August 2017.

<sup>6</sup> "Piedmont Climate Change Chapter." *Four Twenty Seven Climate Solutions*. 10 February 2017.

<sup>7</sup> Ekstrom, 2012.

<sup>8</sup> M. K. Buchanan, R. E. Kopp, M. Oppenheimer, and C. Tebaldi. "Allowances for evolving coastal flood risk under uncertain local sea-level rise." *Climatic Change* 137, 347-362. doi:10.1007/s10584-016-1664-7. August 2016.

assets most at risk from sea level rise are those outside the city, including the East Bay Municipal Utility District (EBMUD) Wastewater Treatment Plant, the Bay Bridge, and the I-880 freeway.

Four Twenty Seven estimated sea level rise in the Bay Area and how it will affect Piedmont’s resources. Sea level rise is already occurring and is expected to accelerate throughout the 21<sup>st</sup> century, but it is uncertain how much and how quickly sea levels will rise in the Bay Area. The National Research Council (NRC) identified likely sea level rise estimates for the west coast of the United States. The values shown in Figure 4.3 are accompanied by ranges of possible sea levels based on low and high emissions scenarios and ice melt scenarios.<sup>9</sup>

Year	Projections	Ranges
2030	6 ± 2 in	2 to 12 in
2050	11 ± 4 in <sup>*</sup>	5 to 24 in
2100	36 ± 10 in	17 to 66 in

Figure 4.3

These projections characterize the estimated timeline for permanent increases in water levels. However, the conditions may occur sooner on a temporary basis under a number of different circumstances given the combination of sea level rise and extreme tides resulting from the additive impact of high tides and storm surge. For example, water levels could reach the equivalent of 49 inches of inundation by 2050 in the event of a 50-year storm – a storm that has a two percent chance of occurring in any given year – even though that level of sea level rise is not projected to occur by the end of the century.<sup>10</sup>

At 48 inches, a rise likely by the end of the century when combined with average yearly storm surge, water is projected to threaten westbound access to the Bay Bridge. In the worst-case scenario, with predicted end-of-century sea level rise compounded by glacial melting and/or King Tides and storm surge, there is the possibility that the Bay Area may experience sea level rise related flooding of up to 72 inches or more.



Figure 4.4

<sup>9</sup> National Research Council. “Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future.” *The National Academies Press*. DOI: 10.17226/13389. 2012.

<sup>10</sup> AECOM and Brian Fulfroost & Associates. “Adapting to Rising Tides: Alameda County Shoreline Vulnerability Assessment Final Report.” *San Francisco Bay Conservation and Development Commission & the Alameda County Flood Control and Water Conservation District*. 2015.

At this level, flooding could begin to impact numerous critical assets: including the **EBMUD wastewater treatment plant, access to the Bay Bridge and the Union Pacific railroad, which would threaten water quality, sewer service, transportation, and cargo shipment throughout the area.**

Flooded areas may also include sections of the I-880 freeway between Albany and Milpitas, with the highest levels of inundation occurring in Oakland and San Leandro. This includes projected flooding of the I-880/I-580 interchange.



Figure 4.5

how we will adapt to sea level rise and what can be considered “safe” levels of warming.<sup>13</sup>

At 3°C of warming, the East Bay landscape would change dramatically. Figure 4.5 is a model of 3°C of warming that corresponds to a 21-foot increase in sea level. While this level of warming is likely decades away, it illustrates the need for aggressive climate change mitigation now, rather than adaptation later.

### Precipitation & Drought

Models indicate there will be little to no change in Piedmont’s total annual average precipitation. However, while there may be a similar quantity of annual average rainfall, the characteristics of rainfall events will differ. Projections indicate that while extreme rainfall events will occur less frequently, rainfall events may be more intense, resulting in a greater volume of rain within a shorter timeframe. Although the frequency of days per year with more than one inch of rainfall in Piedmont is not projected to change drastically by the end of the century, there is some indication that two-inch rainfall events may occur once a year by 2075 under a high warming scenario.

<sup>11</sup> Hansen et al. “Ice melt, sea level rise and superstorms: Evidence from paleoclimate data, climate modeling, and modern observations that 2°C global warming could be dangerous. *Atmos. Chem. Phys.* 16, 3761-3812, doi:10.5194/acp-16-3761-2016. 2016.

<sup>12</sup> Hansen et al., 2016.

<sup>13</sup> Hansen et al., 2016.

### Acceleration and Uncertainty

There is uncertainty regarding how quickly sea level is rising. Since the publication of the Intergovernmental Panel on Climate Change’s (IPCC’s) most recent report on climate science, many scientists have noted sea level rise may occur more quickly than previously thought. James Hansen, a leading climate scientist, has published a peer reviewed article estimating sea level rise with 2°C of warming has been underestimated. Historical climate data indicates that “...sea level rose to 6-9m with evidence of extreme storms while Earth was less than 1°C warmer than today.”<sup>11</sup> This would happen on timescales of 50 to 150 years.<sup>12</sup> Recent studies call into question both

As high-intensity rainfall events increase in frequency the risk of inland flooding increases. Impacts associated with flooding include landslides, subsidence, slippage, creep, or sinkholes. Cities with hilly terrain such as Piedmont can experience increased risk of these events, and both landslides and liquefaction during earthquakes are more likely and more severe if the ground is wet or saturated when the shaking occurs. The entire city of Piedmont is in a zone identified as experiencing “few landslides” and therefore is at a mid-level risk for landslides. However, during extreme rainfall events, the City has already experienced small landslides in its hilly, residential zones.

### Wildfire

Extreme temperatures and increased variability in rainfall will likely cause dry conditions in California, exacerbating the risk of wildfire throughout the state. Piedmont has large areas that are at risk of high hazard severity in the event of a wildfire, with increased exposure in the southeast where part of the city is in a very high hazard severity zone.

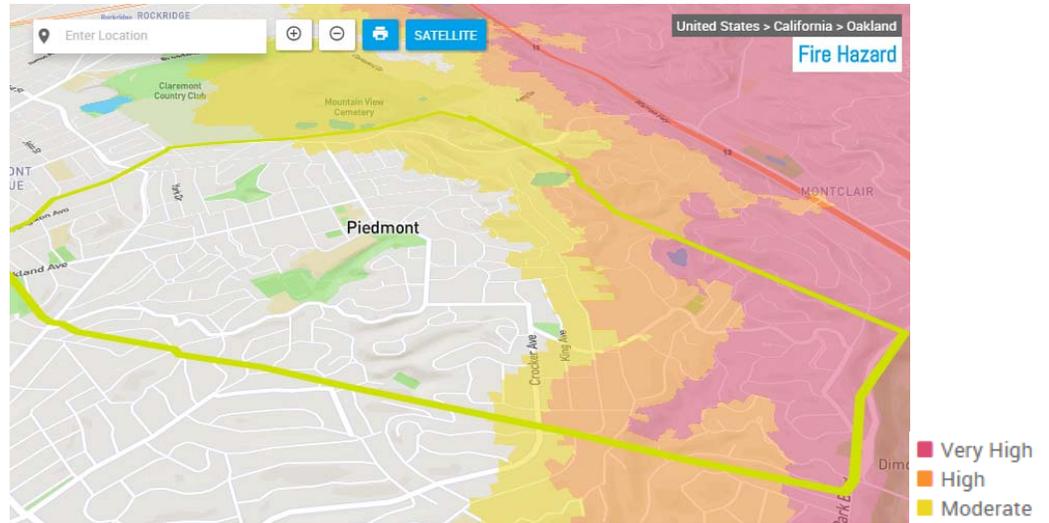


Figure 4.6

The most significant implication of fire hazard severity levels in Piedmont is the exposure of the City’s residential housing stock. Over a third of the residential area in the city is located in a moderate to very high hazard severity zone. In addition, community assets at risk of wildfire damage include Zion Lutheran Church, the Renaissance International School, and Corpus Christi School and Church. Figure 4.6 highlights key areas at risk of wildfire.

### Climate Hazard Summary

Throughout the remainder of the 21<sup>st</sup> century, Piedmont’s climate is projected to grow substantially hotter and will experience fluctuations in precipitation patterns characterized by less consistent rainfall patterns and more intense rainfall events. Figure 4.7 summarizes the City’s exposure to each of the hazards examined in this assessment.

Figure 4.7. Climate Hazards and Exposure

Climate Hazard	Exposure	Summary
Rainfall-Induced Landslides	High	All city property at mid-level risk for landslide
Wildfire	High	Significant residential property located in moderate to very high fire severity zones
Temperature Change	Medium	Increase in the number of extreme heat days
Inland Flooding	Low	No city property in a designated floodplain

Sea Level Rise	Low	No exposure to city assets likely by end of century
Precipitation Change	Low	Likely increase in intensity of events, limited change in overall rainfall

## Migration & Refugees

Climate change will displace many people from their homes, and Piedmont may have to consider how to address climate migrants and refugees. An estimated 13.1 million people could be displaced by sea level rise in the United States.<sup>14</sup> As coastal zones in other parts of the Bay Area flood, there will be substantial impacts on the Bay Area’s population and economy. Disasters, like extreme flooding, could generate a massive shift in Bay Area cities’ populations.

## Costs of Adaptation

Adaptation to climate change will likely be exceedingly expensive in the coming years. In California, under a scenario in which there is a 1.4 meter sea level rise in 2100, 480,000 people and \$100 billion worth of property would be affected.<sup>15</sup> Critical infrastructure would require protection or relocation. The local economy could be impacted by migration, extreme weather events, and the costs of adaptation. Avoiding the worst hazards and costs of climate change requires taking action now to both reduce emissions and mitigate the impacts.

## Adaptation Measures

Adaptation measures were adapted from Four Twenty Seven’s report and tailored to reflect hazards relevant to Piedmont. The objectives of adaptation measures are to reduce the harmful effects of climate change in Piedmont.

### Objective A-1: Reduce damage from storms and flooding

#### MEASURE A-1.1: Minimize flood risk for existing development

<b>Action A-1.1A:</b> Develop a "maintain-a-drain" campaign to encourage individuals to keep storm drains in their neighborhood free of debris
<b>Action A-1.1B:</b> Work with the building industry to establish protocols and standards for reducing damages by designing or retrofitting structures to accommodate periodic flooding
<b>Action A-1.1C:</b> Require on-site storm water runoff management for new development
<b>Action A-1.1D:</b> Identify or build landscapes in open spaces and parks that could detain runoff during heavy storm events

<sup>14</sup> Alan Flurry. "Migration from sea-level rise could reshape cities inland." *ScienceDaily*. 17 April 2017. <https://www.sciencedaily.com/releases/2017/04/170417115236.htm>. Accessed 3 July 2017.

<sup>15</sup> Heberger, M., et al. "Potential impacts of increased coastal flooding in California due to sea-level rise." *Climate Change*. December 2011. <https://link.springer.com/article/10.1007/s10584-011-0308-1>. Accessed 3 July 2017.

**MEASURE A-1.2: Encourage green infrastructure for natural management of storm water and storm induced flooding, and for preserving and restoring natural features to the watershed for both new and existing development, rather than using engineered structures**

<b>Action A-1.2A:</b> Conduct a watershed analysis to determine areas of insufficient capacity in storm drain and natural creek systems. Develop predictions of abnormally high rainfall and sea level rise and the resulting impacts. Determine suitable locations for green infrastructure
<b>Action A-1.2B:</b> Ensure that projects to reduce flooding are compatible with and advance local conservation policies, including restoration and protection of riparian habitat. Protect wildlife through planting and restoration of native habitat
<b>Action A-1.2C:</b> To prevent erosion and contamination of watersheds from heavy rains, maximize use of compost berms, as well as socks and blankets for erosion and sediment control.
<b>Action A-1.2D:</b> Incorporate compost requirements into City standards for contractors and departmental policies (Public Works, Parks, Fire Department, etc.)
<b>Action A-1.2E:</b> Protect bare soil with local recycled compost and mulch
<b>Action A-1.2F:</b> Plant trees to intercept rain and build rain gardens, green roofs, and other vegetative storm water treatment features. Grade surfaces and direct downspouts so that storm water flows toward vegetated areas
<b>Action A-1.2G:</b> Encourage the use of pervious pavement in new and existing development. Install rain gardens, bioswales, porous pavement, and disconnected downspouts to reduce runoff

**MEASURE A-1.3: Protect and restore soil health**

<b>Action A-1.3A:</b> Enhance the drought and flood resistance of soils in publicly managed lands, including open spaces, and city owned facilities with compost and mulch
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**Objective A-2: Reduce Risks of Extreme Heat**

**Measure A-2.1: Decrease urban heat islands through increased tree and vegetation planting and maintenance**

<b>Action A-2.1A:</b> Assess the existing vegetative cover and plant health throughout the city
<b>Action A-2.1B:</b> Identify priority areas to expand urban tree and vegetation planting
<b>Action A-2.1C:</b> Establish a minimum rootable soil volume for trees to support a healthy urban forest. Retrofit tree wells accordingly. Use compost and maintain layer of mulch to create healthy soils for trees and other vegetation
<b>Action A-2.1D:</b> Plant vegetation and shade trees with substantial canopies and require, where feasible, site design that uses trees and vegetation to shade parking lots, driveways, streets, and other facilities

<b>Action A-2.1E:</b> Encourage the preservation of mature trees and vegetation. When preservation is not feasible require replacement trees and vegetation and ongoing maintenance measures to avoid net loss of plant coverage
<b>Action A-2.1F:</b> Provide services, education, and incentives to encourage the planting and preservation of trees and vegetation on private property. Consider a tree protection ordinance
<b>Action A-2.1G:</b> Implement invasive species control
<b>Action A-2.1H:</b> Protect and connect habitats
<b>Action A-2.1I:</b> Monitor and maintain biodiversity

### Objective A-3: Reduce Risks of Damage from Extreme Events

**Measure A-3.1:** Integrate energy assurance actions into citywide planning processes to decrease vulnerability to grid outages during extreme events.

<b>Action A-3.1A:</b> Conduct an assessment to identify the key facilities that support emergency operations, estimate those facilities' energy supply and demand during emergencies to assess vulnerabilities to power loss, and identify potential actions to mitigate those vulnerabilities and supply alternative power sources
<b>Action A-3.1B:</b> Develop an action plan or integrate considerations into an existing plan to install a reliable energy resource in the form of renewable energy generation, battery storage systems, smart inverters, and energy visualization and control systems
<b>Action A-3.1C:</b> Diversify fuel sources

**Measure A-3.2:** Reduce Urban Wildland Fire Risk

<b>Action A-3.2A:</b> Manage the risk of urban wildland fires by assessing high priority wildfire risk areas, increasing vegetated corridors and buffer zones, and considering an ordinance in fire-prone areas that encourages low-fuel landscapes and fire-resistant plants.
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# Implementation

Climate change is a global issue; therefore it is not a problem that the City of Piedmont can solve on its own. However, climate solutions are dependent on the cumulative efforts of all cities and their residents. Forming networks of collaboration within Piedmont will be essential to both minimize global warming and adapt to a changing climate. Since the majority of Piedmont's GHG emissions come from the residential sector, community outreach and engagement will be a key component in the implementation of this plan. The City of Piedmont will continue to leverage existing resources, partnerships with other jurisdictions, and financing opportunities to implement CAP 2.0 as well as work with residents, schools, businesses, and the State of California. CAP 2.0 represents a toolbox of measures that the City may draw upon to mitigate emissions within its borders and meet its GHG reduction commitments. Figure 5.1 shows the 2030 reduction potential of each sector, with 50% GHG reduction below 2005 levels possible if reductions occur in all sectors. The following section will detail resources and strategies for implementing CAP 2.0.

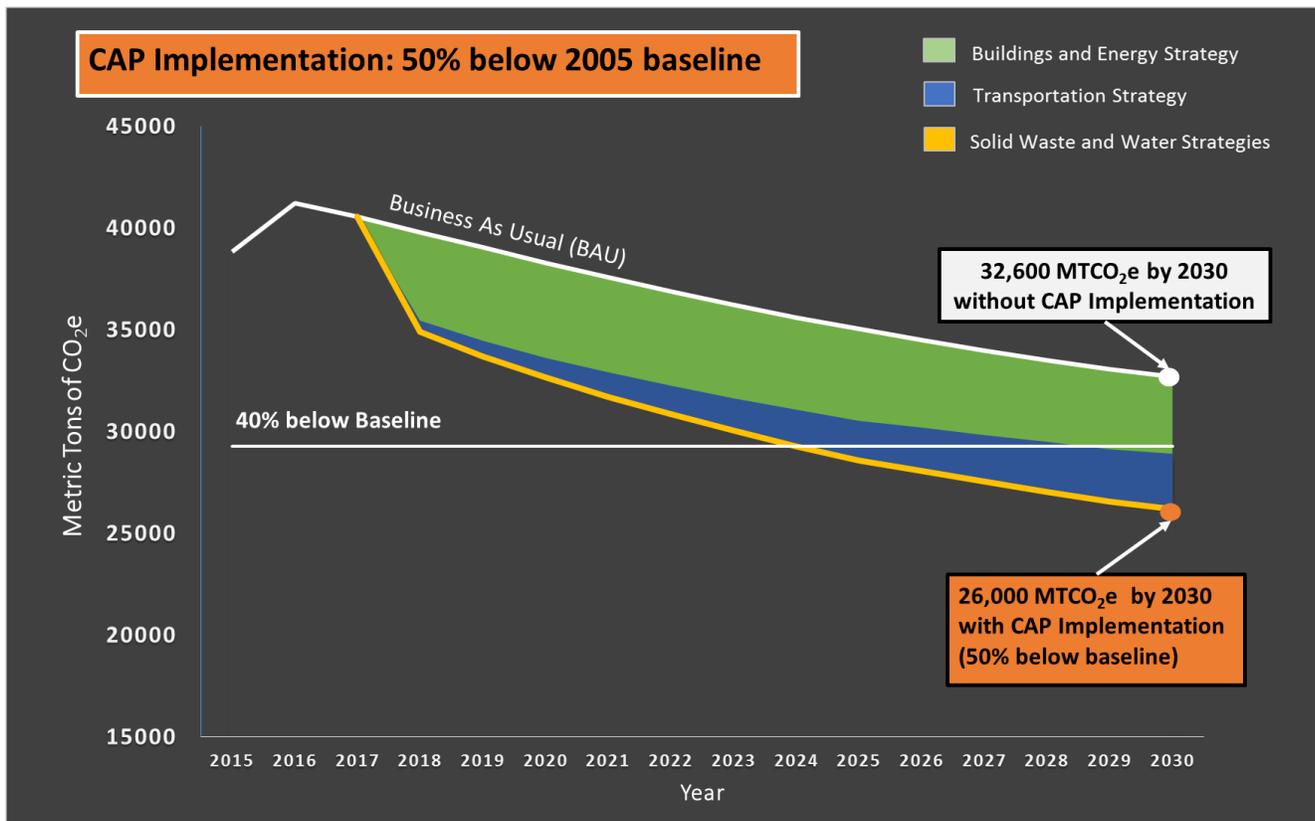


Figure 5.1

The key components of this section include:

1. Monitoring Plan
2. Implementation Matrices
3. Existing Piedmont Resources
4. Ideas for Individual Action

## Monitoring Plan

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CAP 2.0's measures will be tracked, and progress updates will be provided to City Council annually. Monitoring CAP 2.0 progress enables the City to assess the success of measures and its progress towards meeting its 2030 target. Effective monitoring of CAP 2.0 measures may necessitate the regular collection of data, such as the number of homes with solar PV, the number of electric vehicles, and the number of home energy audits completed. GHG inventories need to be completed regularly, ideally every year.

On January 4, 2016, the City Council approved joining the Global Covenant of Mayors (previously known as the Compact of Mayors), a global coalition of mayors and city officials resulting from the Conference of Parties (COP) 21 in Paris. The Covenant's mission is to reduce local GHG emissions, enhance resilience to climate change, and track progress publicly. By participating in this process, the City of Piedmont is joining over 7,000 cities in committing to climate leadership. The three-year commitment is broken down into four phases, including commitment, annual GHG inventories, assessing potential climate hazards and planning for adaptation, and the creation of an updated CAP and emissions reduction target. The City of Piedmont has now completed the first two phases of the commitment: 1) Commitment and 2) Inventory. GHG inventories will be submitted each year to track progress on reductions. The next two phases of the commitment will require setting a GHG reduction target, completing a vulnerability assessment on climate hazards, and submitting a strategic CAP.

## Progress Indicators

There are few methods currently used by the City to collecting data on the progress of CAP measures. The City can take action and develop new methods to better track data relating to the implementation of CAP 2.0. For example, tracking the number of building permit applications for air conditioning units could provide useful data to track GHG emissions. Listed below are several metrics the City can monitor between CAP updates to better inform progress.

### **GHG Emissions**

- Community and Municipal GHG Emissions

### **Buildings Metrics**

- Number of new homes built
- Housing turnover
- Added conditioned square footage
- Number of homes with solar PV
- Number of air conditioning units installed
- Number of homes using natural gas for heating
- Number of homes using electric heating
- Number of homes completing energy audits
- Number of homes with solar thermal
- Number of homes with an EV charger
- Energy use breakdown by address

### **Transportation Metrics**

- Proportion of trips made by personal vehicle
- Proportion of trips made by biking, walking, public transit, carpool
- Number of ZEVs
- Trends in VMT

### **Solid Waste**

- Waste characterization annually
- Diversion rate

### **Water**

- Water use by household
- Water use by business
- Number of properties implementing storm water runoff measures

## Implementation Tables

Implementation tables included in this section provide quantitative information on CAP objectives and measures for City staff seeking to implement the CAP. Cost estimates provide information to help prioritize actions and provide guidance on which measures are most impactful. The potential GHG reductions are not exact measurements. Instead, they are based on current best estimates and rely on a range of assumptions. As additional information is made available, the City should re-evaluate the size and cost of GHG reductions for each objective and measure. The implementation tables include:

- All Objectives, Measures, and Actions
- Estimated 2030 GHG reduction potential for the measure or objective
- Classification and description of the kind of cost to implement
- A designated “lead actor” for implementation
- Cost delineation of either LOW, MEDIUM, or HIGH
- Any relevant sources

### Cost Delineations

The cost brackets for the Planning and Public Works departments were designed to fit within the brackets of the City’s purchasing policy. A few CAP 2.0 measures rely heavily on private costs. Some private costs would be very low, like a building energy disclosure ordinance, which would cost at least \$300 at the time of home sale. CAP measures that would require MED or HIGH private costs could be designed to be triggered only for large building projects. For example, if a \$250,000 building project is undertaken, a CAP 2.0 measure that requires \$5,000 would only add an additional 2% to the overall project cost. All CAP 2.0 measures that suggest private costs also result in private savings on energy bills. Many CAP 2.0 measures address actions the Piedmont Unified School District (PUSD) can take to contribute to CAP 2.0 implementation, and its cost brackets are delineated the same way as the Planning and Public Works Department’s cost brackets.

Cost Categories	Planning	Public Works	Private	PUSD
LOW	<\$5,000	<\$75,000	<\$500	<\$5,000
MED	<\$75,000	<\$300,000	<\$5,000	<\$75,000
HIGH	>\$75,000	>\$300,000	>\$5,000	>\$75,000

Figure 5.2

### Types of Costs

**Marketing & Outreach Campaigns** typically cost upwards of \$75,000, a “HIGH” cost action. However, bundling together multiple CAP 2.0 measures and running one marketing campaign could reduce the *cost per measure* to “LOW” or “MED.” Marketing & Outreach campaigns can be grouped by topic to focus messaging and use resources

effectively. For example, an outreach campaign could address both solid waste and consumption measures. Combined, there are about 20 measures in the solid waste and consumption sectors that require marketing and outreach, which would reduce the cost per measure to \$5,000 within a \$100,000 campaign.

**Staff Time** costs include hiring a staff member dedicated to sustainability. This would be a “HIGH” cost action, but it is assumed that such expenditures could contribute to multiple measures, resulting in “LOW” cost estimates per action. Currently, the City of Piedmont participates in the Local Government Commission’s CivicSpark program, which provides a full-time sustainability AmeriCorps fellow to Piedmont for \$5,000 per year.

**Incentive** programs, administered through the Planning Department, are highly flexible and can be adjusted depending on funds available. For example, providing a small incentive for local businesses to improve energy efficiency may be a very low cost measure. In contrast, capital improvement project costs vary greatly. Installing bike racks would be “LOW” cost, but large complete street projects could be considered “HIGH” cost. For each measure, there is also a brief description of the kind of cost, such as staff time, incentives, and marketing. Figure 5.2 shows cost breakdowns by responsible party.

**Infrastructure** projects are typically far more expensive than any other kind of CAP 2.0 implementation, with a few exceptions. However, including CAP 2.0 infrastructure projects in larger City initiatives could minimize the cost of CAP 2.0 implementation. Note that infrastructure project costs would likely fall to the Public Works Department, rather than the Planning Department.

**Private** costs would be incurred by residents or businesses, and would be little to no cost for the City. Only a few CAP 2.0 measures rely on substantial private costs.

The implementation costs presented in the following implementation tables are estimates based off of previous comparable projects, other cities’ implementation costs for similar measures, and estimated staff time.

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
	<b>Buildings and Energy</b>						
	<b>Objective: Reduce Residential Building Energy Use</b>						
<b>BE-1.1</b>	<b>Measure: Disclose building energy consumption</b>	<b>304</b>					
	Develop a single-family and/or multi-family residential unit energy assessment ordinance requiring disclosure at the time of sale, major remodel, rental, or other trigger point		Staff Time, Private	Residents	LOW	Berkeley estimates their new administrative costs of implementing BESO will be recovered by filing fees (which range from \$79-\$240). Estimated 55 hours of staff time annually for Piedmont.	Berkeley City Council Feb 24 2015: "Replace the Residential and Commercial Energy Conservation Ordinances with the Building Energy Savings Ordinance" & City of Piedmont Staff
	Partner with home energy audit providers to develop public outreach and community engagement programs on residential energy assessment opportunities and energy efficiency retrofits, with a focus on post audit follow-through		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Increase knowledge of and encourage residents to use PGE's "My Energy" online tool to compare and understand energy and natural gas use		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
<b>BE-1.2</b>	<b>Measure: Reduce electricity and natural gas consumption</b>	<b>1602</b>					
	Encourage utilities' to develop and implement demand-side management programs		Staff Time	Planning	LOW	This would involve reaching out to utilities to partner with them on demand-side management campaigns	
	Promote and incentivize residential energy conservation and efficiency retrofits (i.e. insulation, energy-efficient windows, etc.) for existing buildings through competitions, case studies, rebates, and educational/community engagement events on statewide code changes, financing options, and the benefits of GHG reduction methods.		Marketing & Outreach, Incentive	Planning	MED-HIGH	This would require roughly \$11,700 a year in rebate money; Marketing bundled into a broader campaign; and staff time	Estimates based on results from the City of Palo Alto. "FY2013 City of Palo Alto Utilities Demand Side Management Achievements for Fiscal Year 2013." 4 August 2014.
	At point of replacement, consider requiring the installation of energy conserving appliances and fixtures, such as on-demand tank-less water heaters, Energy Star appliances, and LED lightbulbs		Staff Time, Private	Residents	LOW-HIGH	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures; Private cost range from \$10-\$3,000	Estimates from Clearpath Planning Module
	Promote Property Assessed Clean Energy (PACE) financing and other energy improvement financing programs		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	-
	Consider following the State's goal of having all new residential construction be Zero Net Energy (ZNE).		Staff Time, Private	Residents	HIGH	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures; Additional \$15,000-\$50,000 for private cost	Emerging Products Southern California Edison. "Zero Net Energy New Home." Southern California Edison. May 2014. & "Incremental Costs of Zero Net Energy Buildings." <i>New Buildings Institute</i> . 16 April 2014.

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
	Investigate developing an online, GHG reduction tracking platform for Piedmont residents to track their actions that may affect their carbon footprint and to participate in community-wide GHG reduction challenges		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Provide case studies/awards/highlights for property owners who set good sustainability examples (i.e. solar, LEED, drought-tolerant landscape, etc.)		None	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
<b>BE-1.3</b>	<b>Measure: Switch from natural gas to electric appliances, paired with renewable energy</b>	<b>14083</b>					
	Educate residents on the options and incentives for electric appliances, such as furnaces, water heaters, dryers, stoves, and more, as well the importance of pairing electrification with the installation of renewable energy		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	City of Piedmont Staff
	Consider requiring electric appliances for new construction		Staff Time, Private	Residents	MED	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time; between measures; Electric Heat Pumps for Space and Water Heating would add an estimated additional \$4800 to cost of standard gas installations	Pierre Delforge & Christina Swanson. "Very Cool: Heat Pump Water Heaters Save Energy and Money." <i>NRDC</i> . 30 November 2016. & Emerging Products Southern California Edison. "Zero Net Energy New Home." Southern California Edison. May 2014. & "Heat Pump Water Heaters." <i>Energy.gov</i> . & Home Depot
	Provide incentives to convert existing residences from natural gas to electric appliances		Incentive	Planning	MED	Assume 2% of Piedmont homes using annually	City of Piedmont Staff
	<b>Objective: Reduce Commercial Building Energy Use</b>						
<b>BE-2.1</b>	<b>Measure: Disclose building energy consumption</b>	<b>18</b>					
	Develop a commercial energy assessment ordinance requiring disclosure at the time of sale, major remodel, rental, or other trigger point		Staff Time, Private	Businesses	LOW	Berkeley estimates their new administrative costs of implementing BESO will be recovered by filing fees (which range from \$79-\$240)	Berkeley City Council Feb 24 2015: "Replace the Residential and Commercial Energy Conservation Ordinances with the Building Energy Savings Ordinance"
	Partner with energy audit providers to develop public outreach and engagement programs on commercial energy efficiency retrofits, with a focus on post audit follow-through		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
<b>BE-2.2</b>	<b>Measure: Reduce electricity and natural gas consumption</b>	<b>134</b>					
	Educate commercial building owners on PG&E's Automated Demand Response and other energy management programs		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Provide 100% of commercial building owners with information on Smart Lights, BEST, and other commercial energy efficiency programs		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures; leverage resources of existing programs EBEW and PG&E programs	
	Promote and incentivize commercial energy conservation and efficiency retrofits (i.e. insulation, energy-efficient windows, etc.) for existing buildings		Marketing & Outreach, Incentive	Planning	LOW	Varies depending on incentive offered, likely LOW due to small number of Piedmont businesses	
	At point of replacement, require the installation of energy conserving appliances and fixtures, such as on-demand tank-less water heaters, Energy Star appliances, and LED lightbulbs		Staff Time, Private	Businesses	LOW-HIGH	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures; Cost of appliance premium ranges from 0-\$3,000	Estimates from Clearpath Planning Module
	Promote Property Assessed Clean Energy (PACE) financing and other energy improvement financing programs		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Require Zero Net Energy (ZNE) construction for new construction		Staff Time, Private	Businesses	HIGH	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures; ZNE adds 1-12% of project cost	New Buildings Institute: "Incremental Costs of Zero Net Energy Buildings." 2014.
<b>BE-2.3</b>	<b>Measure: Switch from natural gas to electric appliances, paired with renewable energy</b>						
	Educate business owners on the options for electric appliances, such as furnaces, water heaters, and more, as well the importance of pairing electrification with the installation of renewable energy		Marketing and Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Consider requiring electrification of appliances for new construction		Staff Time, Private	Businesses	HIGH	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures; Price premium of all electric appliances \$5,000 or more	Pierre Delforge & Christina Swanson. "Very Cool: Heat Pump Water Heaters Save Energy and Money." NRDC. 30 November 2016. & Emerging Products Southern California Edison. "Zero Net Energy New Home." Southern California Edison. May 2014. & "Heat Pump Water Heaters." Energy.gov. & Home Depot
	Provide incentives to convert existing commercial buildings from natural gas to electric		Incentive	Planning	LOW	Varies depending on incentive offered, likely LOW due to small number of Piedmont businesses	

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
	<b>Objective: Increase Renewable Energy to 100%</b>						
<b>BE-3.1</b>	<b>Measure: Commit to being a renewable energy city</b>						
	Pass a resolution to meet 100% of community-wide electricity demand by renewable sources by 2030		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures. Staff time needed to draft and pass resolution	
<b>BE-3.2</b>	<b>Measure: Install on-site renewable energy</b>	<b>218</b>					
	Require all new construction or existing buildings that substantially increase their floor area to install on-site solar to off-set at least 75% of their electricity usage		Staff Time, Private	Residents	HIGH	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures; Private cost of solar installation likely >\$15,000	Google Project Sunroof: <a href="https://www.google.com/get/sunroof#p=0">https://www.google.com/get/sunroof#p=0</a> (assumptions 5.5 kW system on an average Piedmont house)
	Target 100% of buildings with solar to install battery storage		Marketing and Outreach, Private	Residents	HIGH	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW; Private cost of battery storage is \$6,000 or more	TESLA Powerwall: <a href="https://www.tesla.com/powerwall">https://www.tesla.com/powerwall</a>
	Require buildings that undergo roof replacements to be "solar ready"		Staff Time, Private	Residents	HIGH	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures; Private cost of "solar ready" additional construction is \$1,000	TRC Energy Services. "City of Palo Alto 2013 Building Energy Efficiency Reach Code Cost Effectiveness Study." 5 March 2015.
	Increase outreach and community engagement for solar installation programs and incentives, including community-based social marketing campaigns, public workshops, and partnering with utilities		Marketing and Outreach, Incentive	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW; Incentive from participation in SunShares	
	Develop a reach code to phase-out electric service panels below a 200-amp capacity at time of upgrade		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures; Price premium is \$50-\$100	Home Depot for price comparison: <a href="http://www.homedepot.com/b/Electrical-Power-Distribution-Breaker-Boxes/100/200/400/N-5yc1vZbm2wZ25ecodZ1z0rrpzZ1z0u04sZ1z0u1st?NCNI-5">http://www.homedepot.com/b/Electrical-Power-Distribution-Breaker-Boxes/100/200/400/N-5yc1vZbm2wZ25ecodZ1z0rrpzZ1z0u04sZ1z0u1st?NCNI-5</a>
<b>BE-3.3</b>	<b>Measure: Increase the amount of renewable energy delivered through the grid</b>	<b>1794</b>					
	Encourage residents to choose East Bay Clean Energy as their electricity provider and support education and community engagement for residents throughout the transition to EBCE		None	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Have 100% renewable be the default option for Piedmont residents through EBCE with an opt-down option		Staff Time, Marketing & Outreach	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	City of Piedmont Staff, EBCE.org shows no additional costs above PG&E, predicts cost competitive deep green option in the near future

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
	<b>Objective: Partner with Schools to Reduce Energy Use</b>						
<b>BE-4.1</b>	<b>Measure: Reduce energy consumption in school buildings</b>						
	Encourage school district to achieve goal of requiring zero-net energy (ZNE) construction on new construction		Staff Time	PUSD	LOW	PUSD would manage and run program	
	Continue exchanging current lighting fixtures on school property to energy-efficient LED options		Staff Time	PUSD	LOW	PUSD would manage and run program	
	Consider replacing boilers and hot water heaters		Staff Time	PUSD	LOW	PUSD would manage and run program	
	Consider implementing a district-wide energy management system and the installation of real-time sub meters on school property		Staff Time	PUSD	LOW	PUSD would manage and run program	
	Create a building energy performance challenge in schools to both reduce energy use and educate students on energy efficiency		Staff Time	PUSD	LOW	PUSD would manage and run program	
<b>BE-4.2</b>	<b>Measure: Install on-site renewable energy on school buildings</b>						
	Pursue installing solar PV panels as part of the District's Solar Master Plan		Staff Time	PUSD	LOW	PUSD would manage and run program	
	Target 100% of buildings with solar energy systems to install battery storage		Staff Time	PUSD	LOW	PUSD would manage and run program	
	<b>Objective: Reduce Local Air Pollution and High Global Warming Potential Gases</b>						
<b>BE-5.1</b>	<b>Measure: Decrease the impact of Piedmont's building stock on pollution and GHG emissions</b>	1950*					
	Prohibit wood-burning fireplaces in new development and encourage retrofitting existing wood-burning fireplaces with natural gas or electric alternatives		Staff Time, Private	Residents	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW; Incentives from BAAQMD	Cost Comparison of fireplaces: <a href="https://www.houselogic.com/organize-maintain/home-maintenance-tips/fireplace-addition-costs/">https://www.houselogic.com/organize-maintain/home-maintenance-tips/fireplace-addition-costs/</a>
	Require that new air conditioning and refrigeration units use refrigerants with low global warming potential (e.g. CO2 or ammonia instead of hydrofluorocarbons)		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	"Transitioning to Low-GWP Alternatives in Residential & Light Commercial Air Conditioning
	Promote and consider requiring the installation of exterior electrical outlets to promote the use of electric landscape maintenance equipment		Staff Time, Private	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	Angie's List: <a href="https://www.angieslist.com/articles/how-much-does-it-cost-install-outdoor-outlet.htm">https://www.angieslist.com/articles/how-much-does-it-cost-install-outdoor-outlet.htm</a>

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
	<b>Objective: Investigate Infrastructure Upgrades and New Technologies</b>						
<b>BE-6.1</b>	<b>Measure: Explore deep decarbonization infrastructure changes</b>						
	Assess the potential for district heating in Piedmont, including a density assessment to evaluate potential costs, mapping the City's heating and cooling demand (including building stock and consumption data)			Planning	High	Cost of hiring a consultant to do energy mapping and district heating assessment	Based on costs of PBMP and CAP, this would be a MED-HIGH cost project for Planning
	Explore micro-grids as a carbon reduction and resiliency strategy			Planning	High	Cost of hiring a consultant to do energy hazard assessment	See San Francisco's Solar+Storage for Resiliency project (Solar Resilient)
	Reduce the need for new natural gas lines through phasing out natural gas appliances in new construction and existing building replacements		Staff Time, Private	Residents	Unknown	Unknown	

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
	<b>Transportation</b>						
	<b>Objective: Increase number of trips made by biking and walking</b>						
T-1.1	<b>Measure: Encourage walking and biking safety</b>						
	Install sidewalk railings on the Oakland Avenue bridge*		Infrastructure	Public Works	LOW	PBMP	PBMP
	Enhance street crossing safety through crosswalks, flashing pedestrian lights, and signage*		Infrastructure	Public Works	MED-HIGH	PBMP, estimates 26 locations in total	PBMP
	Provide safety education led by the Police or Public Works Department (traffic safety messages on city buildings and online)		Staff Time	Public Works	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	PBMP
	Consider transitioning streets to one-way traffic to add bike lanes in residential areas		Infrastructure	Public Works	MED-HIGH	PBMP	PBMP
	Implement traffic calming measures*		Infrastructure	Public Works		Speed table or traffic circle would cost \$3,000-\$15,000 each	"Town of San Anselmo Traffic Calming Guidebook." <i>Town of San Anselmo</i> . 2003.
T-1.2	<b>Measure: Provide access to bicycles and bicycle paths</b>	1340					
	Pursue the installation of a Bay Area Bike Share station in the Grand Ave commercial district*		Staff Time	Planning		Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Enhance bike infrastructure along bikeway network designated in Piedmont's Pedestrian and Bicycle Master Plan (PBMP)*		Infrastructure	Public Works	HIGH	"Designated bikeway network (\$400,000 for bike lanes, sharrows and signage, at \$40,000 per mile" PBMP	PBMP
	Install additional bike parking racks at key destinations		Infrastructure	Public Works	LOW	Estimate \$540 each, install 10	PBMP
	Implement Highland road diet (restripe the lanes to have one car and one bike lane in each direction)*		Infrastructure	Public Works	LOW	"Road diets on Grand and Highland Avenues...\$50,000 each" PBMP	PBMP
	Coordinate with Oakland on the planning, design and funding of inter-city bikeways, particularly on Grand, Moraga and Wildwood Avenues and on Park Boulevard and the creation of a map that shows these networks*		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	PBMP
	Introduce traffic signal controls that prioritize bicycles		Infrastructure	Public Works	LOW	Depending on how many installed, \$5,000 per signal head	Weignard, Lynn., et al. "Cost Analysis of Bicycle Facilities: Cases from cities in the Portland, OR region." <i>Portland State University</i> . June 2013.
	Provide bicycle parking at city sponsored events		Infrastructure	Public Works	LOW		
	Implement physical bike protection, separation, or warning infrastructure like Botts' dots, 5in concrete dome curb extensions, or pop ups		Infrastructure	Public Works	LOW	Each button cost Austin \$11.75 before paint or installation. Including installation, Austin engineer Nathan Wilkes said, the cost per button is \$20. Assuming 10-foot spacing (which Wilkes said "seems to work well") that's \$10,000 per mile of bike lane protection. Adding bike protection along Highland would be approximately \$10,000	Anderson, Michael. "Has the ideal low-cost bike lane separator finally been found?." <i>People for Bikes</i> . 2 November 2016.
	Facilitate Bike to Work Day and other bike promotion and educational/community engagement events		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
	<b>Objective: Reduce transportation emissions from schools</b>						
T-2.1	<b>Measure: Reduce personal vehicle use related to Piedmont schools</b>						
	Set a goal of reducing car trips to school by 25%		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Partner with regional transit providers to increase local and regional bus route frequency for students		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Partner with Safe Routes to School National Partnership to provide education, community engagement, and promotional events on biking and walking safety and options, including a “walking school bus”		Staff Time	PUSD		PUSD would manage and run program	
	Work with schools on a no-idling campaign		Staff Time	PUSD		PUSD would manage and run program	
	Work with AC Transit to provide transit passes to all youth		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Partner with PUSD administration and student environmental groups to promote behavioral and cultural changes to encourage high school students to bike or walk to school instead of driving		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Partner with the PUSD to install EV chargers that are accessible for teachers and school faculty			Planning	LOW	PUSD would manage and run program	
	Increase secure bike parking for students		Staff Time	PUSD		PUSD would manage and run program	
	Support PUSD as it considers transitioning the PUSD vehicle fleet to ZEVs		Staff Time	PUSD			
	<b>Objective: Increase residents' use of public transit</b>						
T-3.1	<b>Measure: Increase use of buses and BART</b>	32					
	Incentivize public transit use through community-based social marketing campaigns		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Work with AC transit to improve fuel efficiency and alternative fuel buses		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Consult with AC transit to ensure Piedmont has bus stops that provide shade, weather protection, seating, lighting, and route information.		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Consider investing in an intra-city shuttle to provide convenient transit within the city and to key locations like schools, casual carpool sites, and BART		Infrastructure	Public Works, Planning	HIGH	Estimate of \$300,000 per purchased bus, \$100 per hour operated	
	<b>Objective: Support the adoption of ZEVs and the growth of EV charging stations</b>						
T-4.1	<b>Measure: Support the growth of EV charging infrastructure</b>	5181					

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
	Install EV chargers in the Civic Center area, Grand Avenue commercial zone, and other commonly traveled locations in Piedmont		Infrastructure	Public Works	LOW	\$7,000 Per Charger including installation and unit cost of Level 2 Charger, assume 3 chargers	Josh Agenbroad. "Pulling Back the Veil on EV Charging Station Costs." <i>RMI Outlet</i> . 29 April 2014.
	Develop an ordinance to require EV charger pre-wiring in any garage remodel		Staff Time, Private	Residents	HIGH	Roughly \$1,200 for installation and purchase of level 2 home charger	Josh Agenbroad. "Pulling Back the Veil on EV Charging Station Costs." <i>RMI Outlet</i> . 29 April 2014.
	Require pre-wiring for EV charging in new construction		Staff Time, Private	Residents	HIGH	Roughly \$1,200 for installation and purchase of level 2 home charger	Josh Agenbroad. "Pulling Back the Veil on EV Charging Station Costs." <i>RMI Outlet</i> . 29 April 2014.
	<b>Objective: Reduce miles traveled in personal gasoline vehicles</b>						
T-5.1	<b>Measure: Reduce fuel consumption of gasoline cars</b>						
	Coordinate traffic signals to minimize idling		Infrastructure	Public Works, Police	LOW-MED	\$3,500 or more per signal	"Signal Operation & Management." <i>Texas A&amp;M Transportation Institute</i> . 2017.
	Encourage residents to fully inflate car tires through signage at gas stations		Staff Time	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Support state and federal fuel economy standards that result in reduced GHG emissions		Staff Time	Planning	LOW	Little to no additional cost	
T-5.2	<b>Measure: Facilitate ride-sharing opportunities</b>						
	Provide shade, weather protection, seating, lighting, and bike racks at casual carpool pick-up areas		Infrastructure	Public Works	MED	Providing a shelter and bike racks would likely cost upwards of \$10,000	Wesoff, Eric. "Solar Bus Shelters From GoGreenSolar." <i>Greentech Media</i> . 10 January 2011.
	Develop a community-based social marketing campaign to encourage carpooling among Piedmont residents and investigate and consider promoting platforms for connecting commuters.		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Solicit a car share program, such as Zipcar or Get Around, to provide cars in a central location		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures; Cost of running car share is private	
	<b>Objective: Increase mixed-use development</b>						
T-6.1	<b>Measure: Evaluate the potential for mixed-use development within Piedmont's existing commercial areas</b>						
	Prepare specific plans for the Grand Avenue and Civic Center commercial areas that identify the potential for high-quality, pedestrian-oriented, mixed-use development*		Staff Time	Planning	MED	Preparing plans for Grand Avenue and Civic Center commercial areas would take a substantial amount of a Piedmont Planner's time, or require a consultant to complete the plan, which would be MED-HIGH cost	
	*from Piedmont's Pedestrian and Bicycle Master Plan						

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
	<b>Solid waste</b>						
	<b>Objective: Reduce waste going to the landfill</b>	125					
SW-1.1	<b>Measure: Establish a waste diversion target for 2030</b>						
	Adopt a resolution to achieve 85% waste reduction and diversion by 2030		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures. Staff time needed to draft and pass resolution	
SW-1.2	<b>Measure: Provide education on ways to reduce consumption and divert waste from landfill</b>						
	Encourage composting within the City through education and community engagement about proper green waste sorting, backyard composting, and providing compostable bags and countertop compost bins		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Promote educational programs and community engagement and outreach on reducing food waste, recycling, and landfill diversion.		Staff Time	Planning	LOW	Stopwaste carries cost of program; Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Promote "fix-it" clinics to educate residents on how to repair items instead of throwing them away (see <a href="http://fixitclinic.blogspot.com/">http://fixitclinic.blogspot.com/</a> )		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Provide education and community engagement on items accepted in bulk-pick up program to ensure proper disposal of appliances and other bulky refuse		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Provide education and community engagement on where to drop-off specialized waste, such as paint, fats, grease, oils, and other items that cannot go in curb side or bulk pick-up		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Investigate developing an online, GHG reduction tracking platform for Piedmont residents to track their actions related to waste that may affect their carbon footprint and to participate in community-wide GHG reduction challenges. (see BE-1.2G)		Staff Time	Planning	TBD	TBD	
	Provide updated detailed information about which specific materials are currently being recycled by Piedmont's waste hauler, rather than shipped elsewhere for disposal. Educate residents on the fact that recycling is a market-based program, and that if there is no market for a material, it will not be recycled.		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
	Educate residents about the different types of plastic and the limitations of plastic recycling. Create awareness that putting a plastic item in the blue recycling bin does not mean it will actually be recycled. Encourage the decreased consumption of plastics and plastic packaging.		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
<b>SW-1.3</b>	<b>Measure: Reduce construction and demolition waste</b>						
	Promote alternatives to traditional building demolition such as relocation, deconstruction and salvage		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Provide incentives to builders for using deconstruction instead of demolition		Incentive	Planning	MED-HIGH	Cost of incentive program varies depending on incentive offered.	
	Partner with nearby cities to provide contractor training on deconstruction as an alternative to demolition		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	<b>Objective: Encourage sustainable practices of the City's waste hauler</b>						
<b>SW-2.1</b>	<b>Measure: Include GHG reduction strategies in waste hauler contracts</b>						
	Prioritize high diversion rates when selecting a waste hauler and/or renegotiating waste contracts		Staff Time	Planning	LOW	Little to no additional cost if included in initial contract negotiation	
	Include a provision in the City's solid waste services agreement for periodic waste characterization studies		Staff Time	Planning	LOW	Little to no additional cost	
	Encourage the waste hauler to use fuel efficient vehicles		Staff Time	Planning	LOW	Little to no additional cost	
	Have waste hauler host an annual compost giveaway		Staff Time	Planning	LOW	Little to no additional cost	

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
	<b>Consumption</b>						
	<b>Objective: Increase awareness of consumption related GHG emissions</b>						
<b>C-1.1</b>	<b>Measure: Provide education on consumption related GHG emissions</b>						
	Increase awareness of consumption-based GHG emissions through the Climate Action Plan		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Promote education on personal and household carbon footprints		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Host a decarbonization workshop to promote awareness of the climate change impacts of consumption		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
<b>C-1.2</b>	<b>Measure: Support other agencies' initiatives for emissions transparency and accountability</b>						
	Encourage BAAQMD's efforts to create and promote consumption based emissions inventories		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Support State legislation that requires producers to be involved in end-of-life product management		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Support a regional plastic water bottle ban		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Support product labeling that includes information about GHG emissions associated with the lifecycle of products		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	<b>Objective: Reduce emissions associated with food consumption and food waste</b>						
<b>C-2.1</b>	<b>Measure: Reduce Food Waste</b>						
	Educate residents on how to reduce waste of edible foods through proper food storage, meal planning, and purchasing of 'imperfect food'		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
<b>C-2.2</b>	<b>Measure: Reduce carbon intensity of food consumption</b>						
	Begin a community campaign to educate the public about food choice as part of a climate-friendly lifestyle		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Educate residents and businesses on low-carbon food options, such as minimally processed foods, fruits, grains and vegetables		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Educate residents on the benefits of collecting and recycling fats, oils, and grease from food products and use.		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
<b>C-2.3</b>	<b>Measure: Enable food to be grown locally</b>						
	Encourage the creation of community gardens		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Support and promote farmers markets		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Host a gardening clinic to promote growing food in gardens		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Promote the City's Harvest Festival as a community engagement and educational opportunity to learn about and celebrate locally grown produce, home gardening, and home preserving		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	<b>Objective: Reduce emissions from the consumption and disposal of goods</b>						
<b>C-3.1</b>	<b>Measure: Reduce emissions from the consumption of goods</b>						
	Promote durable, reusable, pre-owned, recycled content, and locally-made goods, which reduce excessive manufacturing and transportation emissions		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Promote and support tool lending libraries, convene interested community stakeholders, develop a plan to start a lending library, own or operate a lending library as part of local government		Staff Time, Marketing & Outreach	Planning	LOW-MED	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW-MED including staff time	
	Launch a "Be Resourceful Campaign" to connect residents to information and resources to get the things they need. Key strategies include a) buy smart (plan before purchasing, buy local, purchase durable goods) b) reuse c) borrow, share, and rent items d) fix and maintain		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Promote local arts, entertainment, recreation and local businesses which have a lower GHG footprint than buying goods		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
<b>C-3.2</b>	<b>Measure: Reduce emissions from the construction and destruction of buildings</b>						
	Promote alternatives to traditional building demolition such as relocation, deconstruction, and salvage		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
	Encourage the preservation of Piedmont's existing stock of small and historic homes and discourage the granting of variances for floor area ratio		None	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Create "Climate-Friendly" purchasing suggestions on sustainable materials, energy efficient, appliances, and other building products and materials		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	<b>Objective: Reduce emissions from the consumption of goods and food within schools</b>						
<b>C-4.1</b>	<b>Measure: Reduce emissions from food consumed in schools</b>						
	Begin a "meatless Monday" campaign that educates students about low-carbon food choices		None	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
<b>C-4.1</b>	<b>Measure: Reduce emissions from school purchases</b>						
	Continue PUSD's environmentally preferable purchasing policy for schools that covers supplies, furniture, food, and other items		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
	<b>Water and Wastewater</b>						
	<b>Objective: Reduce water use by 20%</b>	<b>13</b>					
<b>WW-1.1</b>	<b>Measure: Encourage residential and commercial users to participate in EBMUD's free water audit program</b>						
	Partner with EBMUD and StopWaste to provide water conservation outreach and community engagement programs and encourage residential and commercial users to participate in free water efficiency audits		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
	Promote rebates for water efficiency projects, including low-flow fixtures		Staff Time	Planning	LOW	At the Planning Department counter, offer materials provided by EBMUD for water efficiency audits and low flow fixtures to residents	
	Require a water efficiency audit at point of sale		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	
<b>WW-1.2</b>	<b>Measure: Reduce residential water use</b>						
	Adopt a residential retrofit program to encourage the installation of water conservation measures		Staff Time, Private	Private	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures; EBMUD offers free water conservation tests and supplies	
	Consider requiring the installation of water conserving fixtures at the point of sale or rental		Staff Time, Private	Private	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Consider requiring pool covers in order to reduce evaporation		Staff Time, Private	Private	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Investigate developing an online, GHG reduction tracking platform for Piedmont residents to track their actions related to water use that may affect their carbon footprint and to participate in community-wide GHG reduction challenges. (see BE-1.2G)		Staff Time	Planning	TBD	TBD	
<b>WW-1.3</b>	<b>Measure: Promote landscaping that minimizes water use</b>						
	Encourage the replacement of high water use landscapes in residential and commercial uses		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
	Enforce and consider expanding the California Water Efficient Landscape Ordinance (WELO)		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
WW-1.4	<b>Measure: Reduce water use in schools</b>						
	Support PUSD as it continues installing motion sensor fixtures or other water efficiency technology in school buildings		Staff Time	PUSD		PUSD would manage and run program	
	Support PUSD as it installs drought-tolerant landscaping on school properties		Staff Time	PUSD		PUSD would manage and run program	
	<b>Objective: Conserve and Collect water</b>						
WW-2.1	<b>Measure: Promote infrastructure improvements</b>						
	Work with EBMUD to repair and maintain existing water lines to prevent leaks		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures	
WW-2.2	<b>Measure: Encourage use of greywater and rainwater collection</b>						
	Consider requiring graywater or rainwater collection systems in new construction		Staff Time, Private	Private	MED	Estimated cost varies depending on size of rainwater collection system, but would likely cost \$1,000-\$5,000	
	Create an outreach or community engagement program that encourages business and residents to construct greywater and rainwater collection systems that can be used for irrigation and other non-potable uses		Marketing & Outreach	Planning	LOW	Marketing & Outreach, bundled into a larger campaign would cost roughly \$100,000. Assume this action is one of many measures included in an outreach campaign, the cost drops to LOW	

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
	<b>Municipal</b>						
	<b>Objective: Reduce City GHG emissions</b>						
<b>M-1.1</b>	<b>Measure: Set a zero-carbon goal for the City Government</b>						
	Pass a resolution committing Piedmont's municipal facilities and activities to zero-carbon by 2050 and develop interim milestones		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures. Staff time needed to draft and pass resolution	
	<b>Objective: Reduce emissions from City buildings and energy supply</b>						
<b>M-2.1</b>	<b>Measure: Reduce energy use in city buildings</b>						
	When remodeling or repairing City buildings, include opportunities for energy efficiency retrofits or green building certification		Infrastructure	Public Works	MED	1-12% additional cost for energy efficiency, 5-19% additional cost for zero energy	"Incremental Costs of Zero Net Energy Buildings." New Buildings Institute. 2014.
	Construct new City buildings to ZNE and green building certification standards		Infrastructure	Public Works	MED	1-12% additional cost for energy efficiency, 5-19% additional cost for zero energy (New Buildings Institute: "Incremental Costs of Zero Net Energy Buildings." 2014.	"Incremental Costs of Zero Net Energy Buildings." New Buildings Institute. 2014.
	Increase the energy efficiency of lighting and appliances in City buildings as opportunities arise		Infrastructure	Public Works	LOW	1-12% additional cost for energy efficiency, 5-19% additional cost for zero energy (New Buildings Institute: "Incremental Costs of Zero Net Energy Buildings." 2014.	"Incremental Costs of Zero Net Energy Buildings." New Buildings Institute. 2014.
	Switch from natural gas to electric appliances once the electricity supply nears 100% and the technology becomes affordable		Staff Time	Public Works	TBD	TBD	
	Investigate strategies for reducing energy use at the City aquatic facilities		Staff Time	Public Works	TBD	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures.	
<b>M-2.2</b>	<b>Measure: Monitor Building Performance</b>						
	Consider installing electronic building performance displays in all publicly accessible buildings		Infrastructure	Public Works	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures.	
	Conduct energy audits of all buildings every 10 years		Staff Time	Public Works		Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures.	
<b>M-2.3</b>	<b>Measure: Increase the amount of renewable energy on-site and through the grid</b>						
	Evaluate the potential for and install cost-effective renewable energy systems on City Properties		Staff Time	Planning		Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures.	
	Commit to 100% renewable energy through EBCE.			Public Works	LOW	Minimal additional annual costs after EBCE launches for 100% renewable energy	
	When constructing new buildings or replacing and structurally upgrading roofs, build solar ready or include the installation of solar in the bid process		Infrastructure	Public Works	LOW	Building solar ready adds costs to construction, but minimizes additional costs when installing solar panels. Costs of building solar ready are far lower than \$75,000 per building	TRC Energy Services. "City of Palo Alto 2013 Building Energy Efficiency Reach Code Cost Effectiveness Study." 5 March 2015.

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
M-2.4	<b>Measure: Reduce emissions from high global warming potential gases</b>						
	Enforce the ban on petroleum powered leaf blowers and maintenance equipment		No additional cost	Public Works	LOW	Grant recieved from BAAQMD to transition from fossil fuel to electric leaf blowers	
	Replace high GWP refrigerant air conditioners and dispose of them properly		Infrastructure	Public Works	LOW	At time of AC replacement, additional cost of heat pump to replace traditional AC unit costs an additional \$2,000-\$3,000	"How much do heat pumps cost to install or replace?." <i>Home Advisor</i> . <a href="http://www.homeadvisor.com/cost/heating-and-cooling/install-a-heat-pump/">http://www.homeadvisor.com/cost/heating-and-cooling/install-a-heat-pump/</a>
	Continue to maintain Piedmont's urban forest and plant new trees where possible to sequester carbon emissions, improve air quality, and help reduce the head island effect.		No additional cost	Public Works	LOW	Piedmont currently maintains an extensive tree canopy. Continuing to do so adds no additional cost to the City	
	<b>Objective: Reduce Municipal Transportation Emissions</b>						
M-3.1	<b>Measure: Reduce employee transportation emissions</b>						
	Promote employee ride-shares, walking, biking, and public transportation as commuting alternatives		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures.	
	Provide a shower and changing area for City employees to facilitate biking to work		Infrastructure	Public Works	LOW	Installing a shower would cost less than \$75,000, likely less than \$5,000	
	Install EV chargers accessible to City employees		Infrastructure	Public Works	LOW	Likely cost \$1,000-\$2,000 per charger	Josh Agenbroad. "Pulling Back the Veil on EV Charging Station Costs." <i>RMI Outlet</i> . 29 April 2014.
M-3.2	<b>Measure: Reduce municipal vehicle fleet emissions</b>						
	Develop a fleet purchasing policy that prioritizes fuel efficiency and ZEVs		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures.	
	<b>Objective: Reduce Solid Waste Generated by City Services</b>						
M-4.1	<b>Measure: Reduce solid waste generated by the city or city-related events</b>						
	Implement zero-waste City Events, including compostable dinnerware, water refilling stations, and banning plastic water bottles		No additional cost	Public Works	LOW	Little to no additional cost if already buying dinnerware	
	Institute paperless practices for City Council, Commissions, and community meetings			Planning	LOW	Purchase iPads for all City Council and Planning Commission members at \$400 each	
	Enforce and expand the City's environmental purchasing policy		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures.	
	Conduct a solid waste audit for City facilities		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures.	
	Consider meat-free options for City events		No additional cost	Planning	LOW	No additional cost to not buy meat	

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
	Educate City employees and the public on recycling and composting at city events and facilities		Staff Time	Planning		Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures.	
	Replace paper towels with electric hand dryers in City bathrooms		Infrastructure	Public Works	LOW	Cost per hand dryer is about \$500 and there are cost savings from not needing to purchase paper towels	"Calculate Your Facilities Savings vs. Paper Towels." EXCEL. <a href="http://www.exceldryer.com/calculator-long/">http://www.exceldryer.com/calculator-long/</a>
	<b>Objective: Reduce City Water Use</b>						
M-5.1	<b>Measure: Reduce water use in City buildings</b>						
	Install water efficient fixtures in City buildings, including motion sensor faucets in bathrooms		Infrastructure	Public Works	LOW	Approximately \$300 per fixture	The Home Dept: <a href="http://www.homedepot.com/b/Bath-Bathroom-Faucets-Bathroom-Sink-Faucets-Touchless-Bathroom-Sink-Faucets/N-5yc1vZbrgl">http://www.homedepot.com/b/Bath-Bathroom-Faucets-Bathroom-Sink-Faucets-Touchless-Bathroom-Sink-Faucets/N-5yc1vZbrgl</a>
	Install water efficient appliances, such as dishwashers and hot water heaters		Infrastructure	Public Works	LOW	At time of replacement, purchase high efficiency appliances	
M-5.2	<b>Measure: Reduce and capture water use in City landscapes</b>						
	Transition current water-intensive landscaping to drought-tolerant landscaping, limiting areas requiring intensive irrigation		None	Public Works	LOW	No additional cost to do drought tolerant landscaping than standard landscaping. Additionally money can be saved on water bills.	
	Facilitate the installation of weather-based evapotranspiration (ET) controller irrigation systems in City landscapes.		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures.	
	Implement the City's Green Infrastructure Plan		Infrastructure	Public Works	MED-HIGH		
	<b>Objective: Use the City's resources to disseminate and collect information on climate change</b>						
M-6.1	<b>Measure: Enhance and update the City's climate action program outreach efforts</b>						
	Develop a user-friendly web page and/or build the City's social media presence to provide information on energy and water efficiency programs, waste reduction best practices, renewable energy, electric vehicles, and other resources. Investigate ways to include the GHG emissions reduction potential of each action		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures.	
	Distribute information to residents and commercial business owners on energy and water audit programs, rebates, waste reduction best practices, and environmental stewardship.		Marketing & Outreach	Planning	LOW	Mailers cost \$2,000-\$5,000	City of Hayward Staff
	Host educational events on residents reducing GHG emissions		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures.	

	Measures and actions by sector	2030 GHG Reduction Potential (MTCO2e)	Kind of Cost	Lead Actor	Cost	Description	Outside Sources
M-6.2	<b>Measure: Collect information to track progress on the Climate Action Plan</b>						
	On application forms for building and design review permits include a questionnaire regarding energy efficiency improvements included in the construction, and that heightens awareness of others not considered		Staff Time	Planning	LOW	Assume Staff Time is absorbed by a full time staff member working on sustainability dividing their time between measures.	
	<b>Objective: Consider adjusting taxes to reflect the social costs of carbon</b>						
M-7.1	<b>Measure: Reduce the City's carbon footprint through carbon pricing</b>						
	Consider adjusting the utility tax to act as a revenue neutral carbon tax on natural gas while reallocating money to reduce electricity and/or communication taxes through 2030			Residents	LOW	If revenue neutral, no additional cost to residents	
	Through a City vote, establish a carbon tax on natural gas that dedicates its revenue to energy efficiency, renewable energy, and fuel switching incentives for residents			Residents	LOW	If revenue neutral, no additional cost to residents	
	Support State and Federal efforts to establish a tax or fee on carbon.			Residents	LOW	If revenue neutral, no additional cost to residents	

## Prioritization and First Steps

### A few standout observations:

- Phasing out **air conditioning** units with high global warming potential (GWP) refrigerants is one of the most impactful actions in terms of GHG reduction potential. The chemicals used as refrigerants leak into the atmosphere in small quantities, but can be thousands of times more impactful than CO<sub>2</sub> emissions. Currently, we do not have data on the number of air conditioners in Piedmont. However, if everyone in Piedmont acquired an air conditioner that used high GWP refrigerants, this would add an additional 15%, or 6,700 MTCO<sub>2</sub>e of emissions, to our GHG inventory, not counting the ones generated by the electricity required to power them.<sup>1</sup> Information on how to distinguish which air conditioners use low GWP refrigerants can be found on the U.S.EPA's Ozone Layer Protection page.<sup>2</sup>

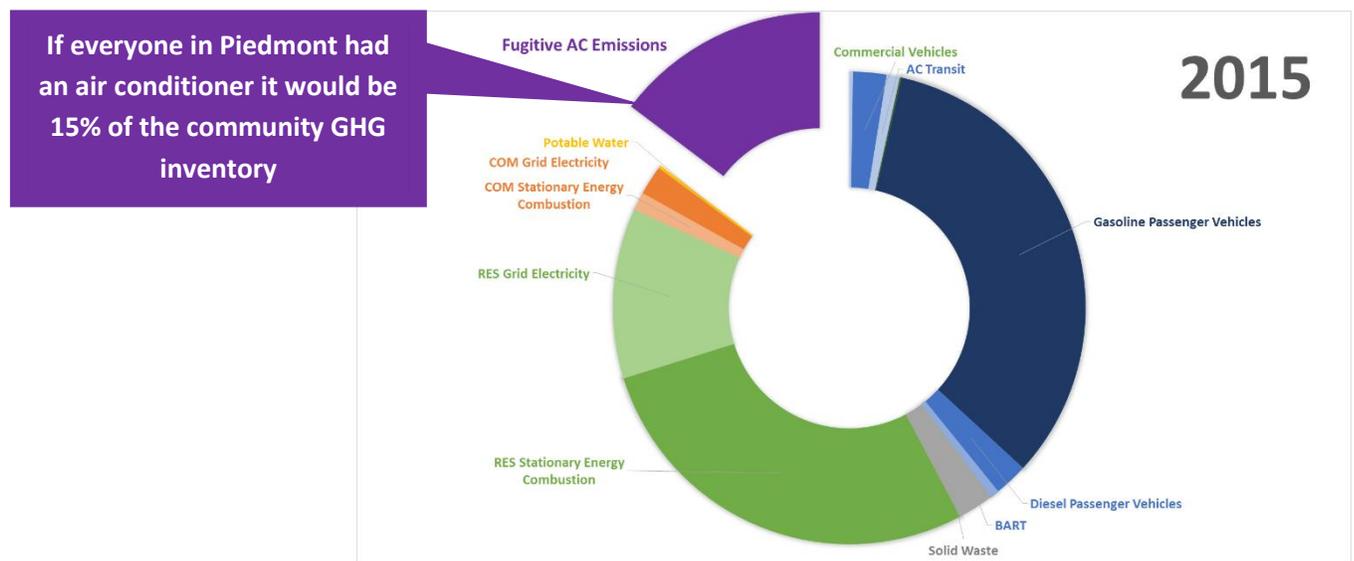


Figure 5.3

- Electric vehicles (EVs)** can be equivalent in price, or even less expensive than the average retail price of petroleum-fueled vehicles, given rebates, incentives, and increasing market saturation. Purchasing an EV when making a new car purchase can reduce household carbon footprints by about half.<sup>3</sup> The City could look into ways to dedicate public parking spaces for EVs and their charging Stations.

<sup>1</sup> [https://www.arb.ca.gov/cc/inventory/slcp/doc/hfc\\_inventory\\_tsd\\_20160411.pdf](https://www.arb.ca.gov/cc/inventory/slcp/doc/hfc_inventory_tsd_20160411.pdf)  
[http://css.snre.umich.edu/sites/default/files/css\\_doc/CSS09-12.pdf](http://css.snre.umich.edu/sites/default/files/css_doc/CSS09-12.pdf)

<sup>2</sup> "Transitioning to Low-GWP Alternatives in Residential and Commercial Air Conditioning." EPA. <https://www.epa.gov/ozone-layer-protection/transitioning-low-gwp-alternatives-residential-and-commercial-air>. Accessed 7 August 2017.

<sup>3</sup> "New-Car Transaction Prices Grow Nearly 3 Percent Year-Over-year in May 2017, According To Kelley Blue Book." Kelley Blue Book. 1 June 2017. <http://mediaroom.kbb.com/2017-06-01-New-Car-Transaction-Prices-Grow-Nearly-3-Percent-Year-Over-Year-in-May-2017-According-To-Kelley-Blue-Book> Accessed 3 July 2017.

- **Fuel switching** from gas to electric water heaters can reduce about half of a home’s natural gas emissions. However, in order for it to be cost-effective and to maximize GHG reductions, electrification should be coupled with solar electricity in order to ensure that the extra energy needed to power electric appliances is renewable. Key triggers for installing electric heat pump water heaters are at time of new construction or at time of replacement.
- Spreading awareness about **consumption-based GHG emissions** and keeping an eye out for regional consumption inventories will lead to a more comprehensive understanding of Piedmont’s GHG emissions. Actions that can be taken now center on education and awareness to promote green purchasing.

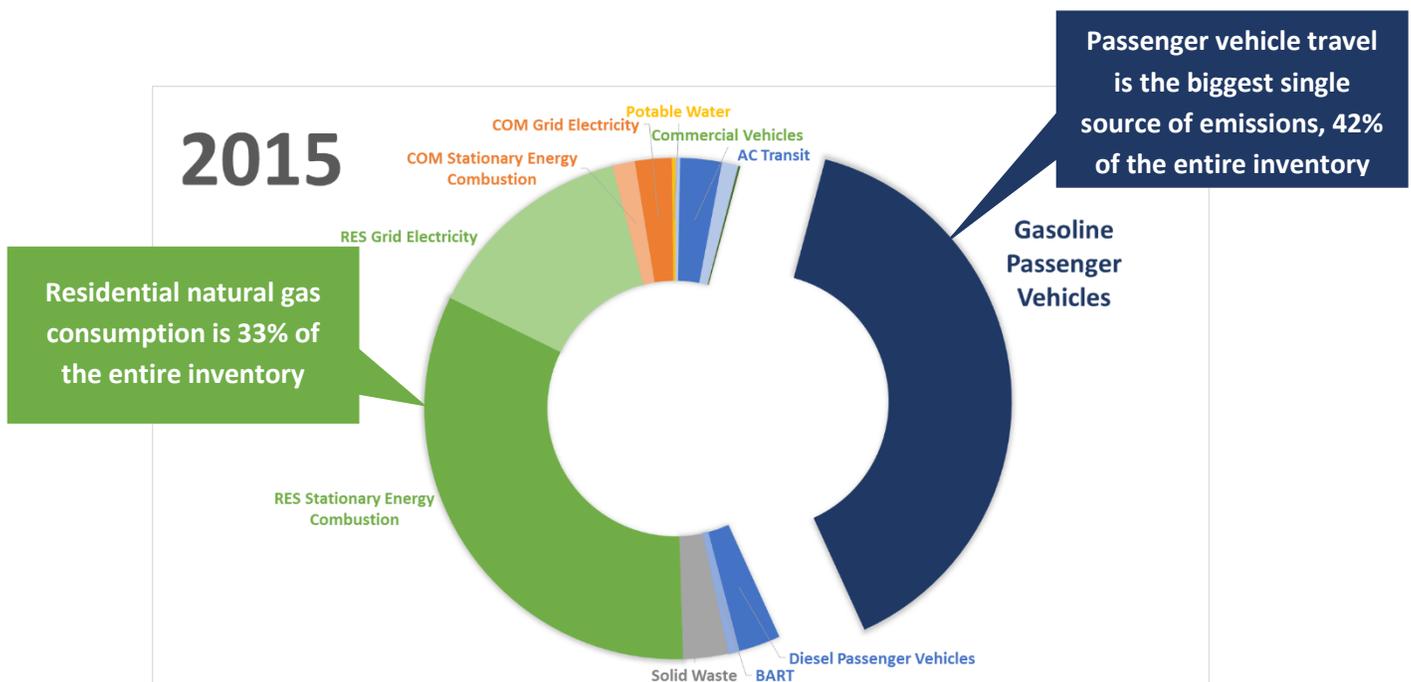


Figure 5.4

## Piedmont's Climate Action Resources

The City of Piedmont has many pre-existing assets for addressing climate change, as well as the support of City staff, elected officials, and residents. This section will give a brief overview of the physical landscape of Piedmont and some of the environmental resources that already exist within the city.

### Urban Forest

The City of Piedmont has about 59 acres of parkland and maintains over 7,000 trees on 85 streets and has an on-going program to plant, maintain, and replace these trees.<sup>4</sup> The tree canopy extends throughout the City, providing a beautiful local environment. Sycamores are the most common street tree, but there are many other species, including acacia, birch, camphor, carob, cherry, chestnut, elm, ginkgo, hawthorn, linden, liquidambar, magnolia, mulberry, pepper, plum, and poplar.

Piedmont's extensive tree canopy provides shade and cooling, reducing the need for air conditioning. Piedmont's General Plan describes the benefits of an Urban Forest, which "...provides nesting areas for birds, moderates temperatures, enhances property values, stabilizes slopes, reduces noise, absorbs air pollutants, and is a source of inspiration and beauty."<sup>5</sup> The City of Piedmont works hard to maintain the health and beauty of the trees which has benefits for residents of Piedmont as well as sequestering carbon dioxide.

### Solar Energy

Piedmont has the potential to provide renewable energy for nearly all of its residents and businesses through on-site photovoltaic installations. According to Google's Project Sunroof estimates, Piedmont could generate approximately 42.7 thousand MWh per year, substantially more than the 31.8 MWh used in Piedmont in 2015.<sup>6</sup> Eliminating grid electricity demand and replacing it with locally-generated solar energy, combined with storage, would reduce Piedmont's GHG emissions by roughly **6,000 MTCO<sub>2</sub>e**, eliminating 15% of the community GHG emissions.

Solar energy can also be used to heat water. Solar water heating systems collect solar thermal energy and convert it into hot water. The concept of solar thermal water heating is simple and the technology has been around for

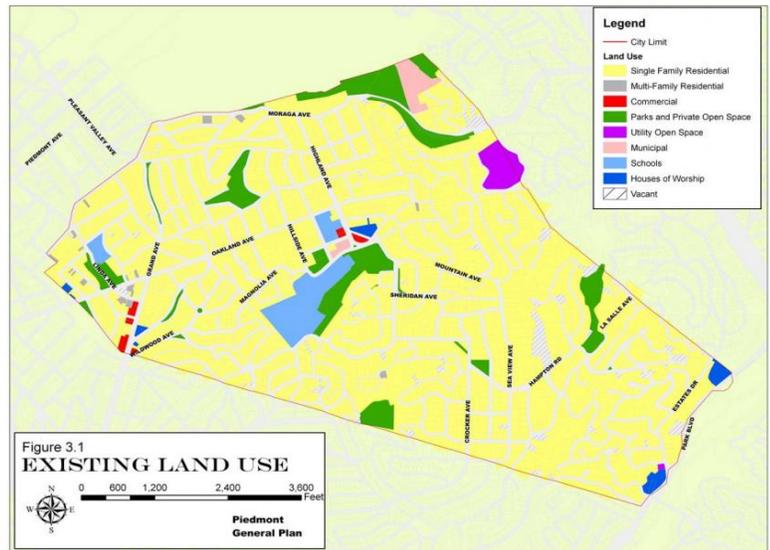


Figure 5.5

<sup>4</sup> "City of Piedmont General Plan." *City of Piedmont*. 6 April 2009.

<sup>5</sup> "City of Piedmont General Plan." *City of Piedmont*. 6 April 2009.

<sup>6</sup> "Estimated rooftop solar potential of Piedmont, CA." *Google Project Sunroof*. <https://www.google.com/get/sunroof/data-explorer/place/ChIJ9cUZf399hYARP70kjNztjQs/>. Accessed 3 July 2017.

many years. This can minimize the natural gas needed to provide hot water for a home, further reducing GHG emissions. Solar hot water systems can cut water heating fuel use by 50-80%.<sup>7</sup>

## Existing Housing Stock

While energy efficiency upgrades are vital to meeting climate action goals, modifying existing buildings is often both cheaper and more efficient than new construction. Piedmont is a mostly built-out city with few empty lots. While the age of Piedmont homes can provide challenges to meeting modern energy efficiency standards, the City's existing building stock provides the opportunity to avoid embodied emissions in new building construction.<sup>8</sup> Embodied emissions encompasses the entirety of the energy consumed in the process of creating, processing, and transporting materials. Preservation of building stock saves energy, reduces emissions, and conserves resources. Piedmont's building stock can be retrofitted to improve its energy efficiency, including the installation of energy efficiency appliances, light bulbs, insulation, windows, and more. When coupled with actions to reduce construction and demolition waste through diversion and deconstruction, Piedmont has the ability to leverage its existing homes to reduce GHG emissions while preserving natural resources.

## Existing Low-carbon Transportation Infrastructure

Residents in Piedmont have extensive options for low-carbon transit. AC Transit runs bus lines throughout Piedmont, the City is dense and walkable, and Piedmont is in close proximity to several Bay Area Rapid Transit (BART) stations. In addition, Piedmont's Pedestrian and Bicycle Master Plan (PBMP), adopted in 2014, outlines strategies to encourage active transportation, largely focusing on increasing the safety of biking and walking and improving infrastructure. Taking full advantage of existing public and active transit options can reduce the number of trips made by personal vehicle, the largest single source of Piedmont's GHG emissions.

## Financing Opportunities

Financing Climate Action is a challenge, but there are opportunities to pursue funds that directly support implementation goals. Incentive programs and information are available for residents, public agencies, and businesses through PG&E, EBMUD, BAAQMD, BayREN, and the Database of State Incentives for Renewables & Efficiency (DSIRE). Appendix A provides a list of current financing opportunities divided into opportunities for efficiency, renewable energy, schools and government, energy storage, and vehicles.

## Partnerships with Other Jurisdictions

As Piedmont is a relatively small city, partnering with neighboring jurisdictions is another key implementation strategy supporting CAP 2.0. The City of Piedmont already collaborates with regional organizations like the East Bay Energy Watch and the Alameda County Energy Council. Recently, Piedmont has joined other Alameda County cities in the creation of East Bay Clean Energy (EBCE). EBCE is a Community Choice Aggregation (CCA) program that will provide local control over the County's supply of power while also providing clean, renewable electricity to residents and businesses. Globally, the City is a participant in the Global Covenant of Mayors, reports GHG emissions through the Carbon Disclosure Project (CDP), and utilizes tools provided by ICLEI.

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<sup>7</sup> "Estimating the Cost and Energy Efficiency of a Solar Water Heater." *Energy.gov*. <https://energy.gov/energysaver/estimating-cost-and-energy-efficiency-solar-water-heater>. Accessed 3 July 2017.

<sup>8</sup> "Embodied Energy Calculator." *The Greenest Building*. 2007. <http://thegreenestbuilding.org/>. Accessed: 22 August 2017.

## Individual Action

Individual action by residents and business owners is vital to implementing many measures within Piedmont’s CAP 2.0. Below is a list of ideas on how to get started reducing your business’s or household’s GHG emissions. The strategies below are intended to increase civic engagement with climate change, promote collaboration, and incentivize effective action on the state and federal levels.

Individual Actions by Sector	LOW or No Cost?
<b>Buildings and Energy</b>	
Get an energy audit to find ways to increase energy efficiency.	<b>YES!</b>
Use PG&E's resources to track monthly energy usage compared to similar households.	<b>YES!</b>
Adopt energy conservation measures such as adding insulation or energy-efficient windows.	
At point of replacement, consider installing energy conserving appliances and fixtures, such as on-demand tankless water heaters, Energy Star appliances, and LED lightbulbs.	
Consider Property Assessed Clean Energy (PACE) financing and other energy improvement financing programs as you make energy efficiency upgrades.	
Consider Zero Net Energy (ZNE) for new construction	
Participate in a residential energy reduction challenge program	<b>YES!</b>
Transition away from natural gas by installing electric furnaces, water heaters, dryers, stoves, and more	
Voice support for city policies that reduce GHG emissions	<b>YES!</b>
Prepare your home or business for electrification through the installation of solar PV and storage, and upgrading your electrical panel	
Join East Bay Clean Energy (EBCE) at the highest green option	<b>YES!</b>
Consider replacing wood burning fireplaces with gas or electric ones	
Consider alternatives to air conditioning or use refrigerants with low global warming potential	<b>YES!</b>
<b>Transportation</b>	
Increase the number of trips you make by walking or biking	<b>YES!</b>
Participate in Bike to Work Day and other bike promotion and educational events	<b>YES!</b>
Try out an electric bike to get up Piedmont's hills	

Organize a "walking school-bus" to transport a group of kids to and from school	<b>YES!</b>
Increase your use of buses and BART	<b>YES!</b>
Carpool instead of driving alone	<b>YES!</b>
Buy an electric vehicle	
Investigate ride-share and bike share opportunities before buying another car	<b>YES!</b>
Use alternatives to air travel when possible. Purchase carbon offsets when it is not.	<b>YES!</b>
<b>Solid Waste &amp; Consumption</b>	
Reduce food waste	<b>YES!</b>
Consider backyard composting	<b>YES!</b>
Fix things that are broken instead of buying new things	<b>YES!</b>
Bring your own bags to stores	<b>YES!</b>
Use the bulky items pick-up program to ensure proper disposal for old refrigerators, E-waste, and air-conditioning units	<b>YES!</b>
Talk with your contractor about alternatives to traditional building demolition such as relocation, deconstruction, and salvage	<b>YES!</b>
Check out your carbon footprint with the Global Footprint Network's Calculator	<b>YES!</b>
Support State legislation that requires producers to be involved in end-of-life product management	<b>YES!</b>
Support a regional plastic water bottle ban	<b>YES!</b>
Support product labeling that includes information about GHG emissions associated with the lifecycle of products	<b>YES!</b>
Support government actions to reduce GHG emissions, such as a border adjusted carbon tax	<b>YES!</b>
Consider eating more low-carbon foods such as minimally processed foods, fruits, grains and vegetables	<b>YES!</b>
Host a vegetarian dinner party or start a meatless Monday program at your work or school	<b>YES!</b>
Encourage the creation of community gardens on public and private lands including school campuses, City lands, and church properties	<b>YES!</b>
Support farmers markets	<b>YES!</b>
Promote and support tool lending libraries, convene interested community stakeholders, develop a plan to start a lending library, own or operate a lending library as part of local government	<b>YES!</b>
Promote local arts, entertainment, recreation and local businesses which have a lower GHG footprint than buying goods	<b>YES!</b>
Compost and recycle all waste that can be diverted from landfills	<b>YES!</b>

<b>Water</b>	
Use EBMUD's free water efficiency audit	<b>YES!</b>
Use EBMUD's rebates for water efficiency	<b>YES!</b>
If you have a pool, use a pool cover to prevent evaporation	<b>YES!</b>
Set a goal of reducing hot water use by 15%	<b>YES!</b>
Consider efficient alternatives to traditional water heaters, like tankless water heaters, electric heat pump water heaters, or solar thermal hot water heaters	
Use drought-tolerant landscaping and install efficient irrigation and greywater systems	<b>YES!</b>
<b>Community Engagement</b>	
Support a statewide carbon tax and consider local adoption of carbon pricing mechanism	<b>YES!</b>
Volunteer with community environmental groups	<b>YES!</b>

## Community Engagement and Outreach

Given that Piedmont is overwhelmingly a residential community and that the majority of its GHG emissions come from this sector, it is extremely crucial to engage community members and involve them in the implementation phase to ensure that CAP 2.0 succeeds in meeting its GHG reduction goals and to provide support for global climate change mitigation goals. Ideally, this will not only accomplish the goals set forth in this document, but also bring a greater number of Piedmont residents into the growing global movement to combat climate change. Piedmont's greatest resource is its residents, with their community focus, creativity, and influence well beyond our City boundaries. This is particularly amplified by our school system, where students are engaged in a wide range of social and environmental issues both during their time in Piedmont and after they have left.

Thus, an important part of Piedmont's CAP is to also leverage this resource to support not only local GHG emission reduction efforts but also efforts beyond its borders, where even more impactful actions can occur. Every community must do its part, and Piedmont's efforts should be in the context of regional and state climate action efforts.

Specific goals of community engagement and outreach efforts include:

1. Providing resources, education, and training for individuals and community groups
2. Raising awareness and identifying opportunities for mitigation and adaptation actions by individuals and community groups,
3. Encouraging and supporting Piedmont and its residents to lead by example

Below is a list of community engagement concepts that the City, as well as the PUSD and other community groups, can consider employing to generate action by individuals, families, and neighborhoods. These ideas are intended to increase community engagement, collaboration, and support for climate action in Piedmont.

### **City of Piedmont Website**

The City of Piedmont currently has its own website with an entire section devoted to the City's Climate Action Program. This platform is extremely valuable in communicating to the public and an excellent way to provide periodic updates on the feasibility and affordability of new technologies as it pertains to climate action. Currently, the City does provide information on various rebate programs, but these efforts should be kept up-to-date and further expanded to include more discussion of new technologies and updates to relevant state regulations. As different home energy, transportation, water conservation, waste reduction, and other CAP-related technologies become more affordable and/or feasible, updates can be regularly shared to the entire Piedmont community via the City's website. Focused outreach campaigns can be carried out to raise awareness of specific new technologies that could feasibly be adopted by many residents. As a result, the City's website can become a trusted source of up-to-date information for residents, and one that can provide a clear picture of which measures are the most feasible and secure to adopt.

### **Social Media**

The City of Piedmont has an online presence through the City's website and an email notification list of residents wishing to be kept apprised of progress with CAP 2.0. However, the City does not have a strong social media presence. Currently, the City does have a Nextdoor account, a social media network that facilitates communication among neighbors in communities. Beyond Nextdoor, there is an opportunity to further build the City's presence on other social media platforms such as Facebook, Twitter, and Instagram that have the potential to reach wider

audiences. These would be extremely effective tools for announcing events, running informational campaigns, showcasing sustainable City events and actions, and updating the community on CAP 2.0's progress.

### **Recognizing Sustainable Community Actions**

While the actions presented in CAP 2.0 are expected to lower an individual's carbon footprint, many of the sustainable actions presented are essentially invisible to others. For example, an individual deciding to switch to electric appliances is an impactful action, but one that occurs at the household level and is out of view of the greater community. An "honor roll" of residents and businesses taking specific actions such as this to reduce their GHG emissions can be published regularly. It is important that success stories of residents and business owners taking sustainable actions be recognized and promoted to the wider community. Doing so will give residents the chance to learn what carbon reduction efforts their fellow community members are pursuing. Ideally, this sharing of information will encourage and inspire other Piedmonters to take actions themselves and share those actions with the greater community. Showcasing these community success stories can be accomplished through the City website, newspapers, Piedmont's public TV station, and social media. In addition, as least one design award can be given for a climate-friendly project (most energy-efficient remodel, most drought tolerant landscaping, etc.). Community organizations and the PUSD can investigate implementing versions of this concept for their own members and students, respectively.

### **Residential Tracking Platform**

The development of an online, residential tracking platform is an action referred to throughout CAP 2.0 and particularly in actions BE-1.2G, SW-1.2F, and WW-1.2D. The idea is to create an online platform where Piedmont residents can log and track carbon reducing actions their households and businesses are pursuing. The platform would generate estimated financial savings and CO<sub>2</sub> reductions based on the actions logged. Users, which can include individual residents, groups of residents, businesses, schools, and community groups, could earn points based on the actions they take. Some actions would be worth more points than others depending on its difficulty level and estimated impact on GHGs. This point system would be expected to foster friendly competition among users, and would be an excellent way to disseminate information on actions individual community members can take. Furthermore, this platform would have the potential to provide the City with useful information on the progress being made at the household level.

### **Collaboration with Community Organizations**

Given that the success of implementing many of the CAP 2.0 measures will depend on behavior change and the involvement of individual community members, business owners, schools and houses of worship, it is important that the City continues to collaborate with community partners and leaders on GHG emissions reduction. Collaboration could occur through community workshops, informational campaigns, volunteer engagement, and marketing. Particularly, there is opportunity for increased collaboration with the PUSD and their existing network of parent and student organizations to disseminate information and provide education on GHG reduction. Piedmont has a generous number of community groups, foundations, societies, clubs, and neighborhood emergency preparedness groups. Increased collaboration and engagement with these community groups provides considerable opportunities for the public to participate in actions to reduce their carbon footprint. In addition, this engagement with community groups can help provide the City information on what the community identifies as their needs, obstacles, and interests.

It is also important that the City support and encourage the formation of community groups dedicated to climate action. This can include the formation of GHG reduction support groups, which can be a very effective tool for promoting household GHG emissions reductions. These groups would provide a space for neighbors, friends, or interest group members to meet on a regular basis to set goals, report on progress, and together learn about additional ways they can reduce their emissions. The City can support these efforts by providing information about various curricula that already exist for such groups, by seeking any available funding for group leader trainings, by helping groups connect with experts who can speak to them about specific topics, and by sharing these groups' successes with the rest of the community. There are also residents who are interested in educating the community at large about specific GHG reduction actions. Working through an already-existing community organization, such as Piedmont Connect, and in coordination with City staff, these residents can form a climate advocacy group whose efforts can include newspaper articles, online articles, opinion pieces, house meetings, lawn sign and banner campaigns, helping the formation of GHG reduction support groups, and other creative means of focusing community attention on climate action.

### **Creating an Advisory Body Consisting of City, PUSD Representatives, and Community Members**

The creation of an advisory body consisting of City, school, and community members is recommended. This advisory body can be jointly appointed by both the City and PUSD and can provide support for the CAP measures presented in CAP 2.0 by hosting educational workshops, creating private sector programs that support local business and home owners in reducing their carbon footprint, and by initiating regional efforts such as the creation of a sister city program and a climate ambassadors program to share our successes with nearby cities. This advisory body can be an important partner in implementing the community engagement efforts presented in this section and other City efforts such as the Pedestrian and Bicycle Master Plan (PBMP).

### **Increasing Community Awareness of Piedmont's Climate Action Plan**

Since most residents will not have time to read the entire CAP 2.0 document, a condensed, graphically-appealing version of it that is distributed online would be an important step towards ensuring that all residents are aware of our community's climate action goals. Periodic progress updates on Piedmont's GHG reductions can also be provided online to ensure that all residents are apprised of this progress.

### **Initiate a Climate Action Speaker Series**

A large number of experts on various aspects of climate action who would be willing to share their expertise for free either live in Piedmont or work for local organizations, agencies or businesses. Setting a regular time and location for informal, low-key speaker events, coupled with a pot-luck dinner or other social event, would build community and motivation for residential climate action.

### **Ensuring Sufficient Staffing to Support CAP 2.0 Outreach & Implementation**

Through the CivicSpark Climate Fellows program, Piedmont has had a full-time dedicated intern working on climate action each year since 2015. Interns have, indeed, been invaluable in developing this CAP 2.0. Continuing to participate in the CivicSpark program is essential to the implementation of CAP 2.0. In addition, increasing the amount of staff time dedicated to climate action should be considered, and any grant or other opportunities for additional climate action staffing should be pursued. Ideally, Piedmont will eventually have a full-time permanent staff member dedicated to climate action and sustainability programs, including those related to community engagement and outreach.

## Setting up Piedmont for 2050 Deep Decarbonization

On June 19, 2017, the Piedmont City Council confirmed its ongoing commitment and support to meeting the goals laid out in the Paris Climate Agreement and the requirements of the Global Covenant of Mayors. Taking action on climate change requires long term planning and working towards a 2050 vision of decarbonization, which includes laying the groundwork for zero carbon infrastructure and energy. The State of California's GHG reduction goal is also 80% below baseline by 2050, which is in line with international agreements on reductions needed from developed countries.<sup>9</sup>

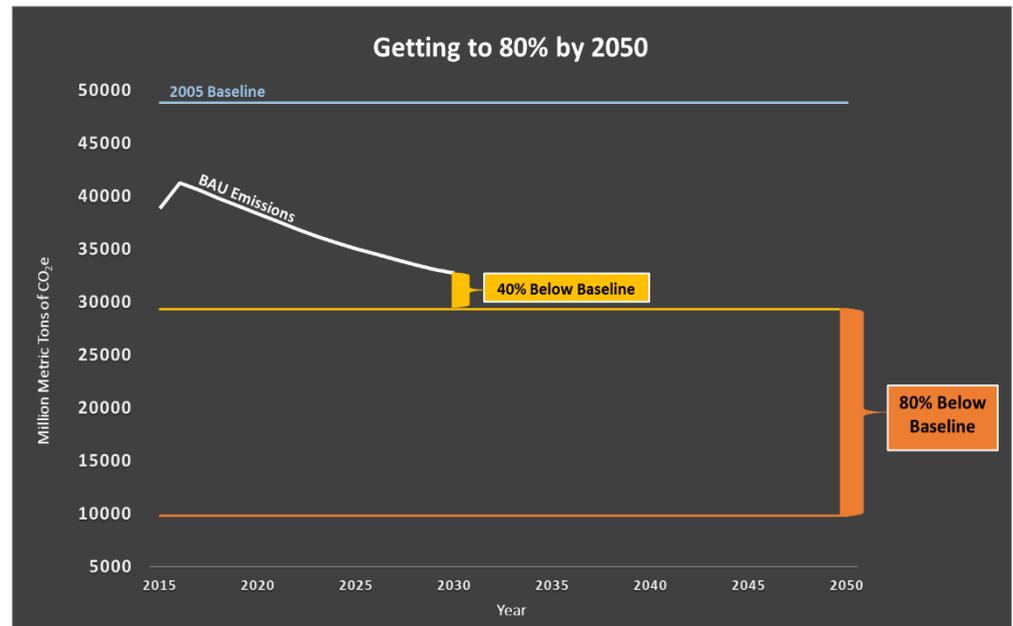


Figure 5.5

Given Piedmont's unique city profile, the largest opportunities for GHG reductions are in the building and transportation sectors. Reductions in both of these sectors will rely heavily on individual action. As such, community engagement and support will be integral in meeting CAP 2.0's 2030 and 2050 goals.

Piedmont is on track to meeting its GHG reduction goals, but will need to take aggressive action to meet an 80% reduction by 2050. Looking forward to 2050, it is vital to plan now to fuel switch from natural gas to electricity, to maximize energy efficiency, to secure renewable electricity, and to switch to non-carbon transportation. Much of the technology to decarbonize already exists but needs broader adoption, acceptance, and supportive policies. CAP 2.0 aims to achieve GHG reductions by 2030 while also setting the City and community on a path for long-term success at deep decarbonization.

<sup>9</sup> "First Long-Term Climate Strategies Submitted to UN Under Paris Agreement: Plans by the US, Mexico, Germany, and Canada." UNFCCC. 17 November 2016. <http://newsroom.unfccc.int/paris-agreement/first-long-term-climate-strategy-submitted-to-un-under-paris-agreement/>. Accessed 7 August 2017.

**By 2050, Piedmont plans to have...**

- Maximized the energy efficiency potential of its existing buildings
- Electrified its transportation sector and created accessible biking and walking infrastructure
- Established the means to produce and obtain renewable electricity
- Met its waste and water reduction targets
- Created a local hazard mitigation plan that addresses climate vulnerabilities and adaptation
- Made efforts to reduce the emissions associated with consumption of food, goods, and services
- Maximized its ability to sequester carbon through land use and management
- Minimized the emissions from municipal activities

**Benefits of Climate Action**

- A healthier community and better quality of life
- Financial savings for residents and businesses
- Reduction in hazards posed by climate change
- Success in meeting the standards of broader community and international agreements
- A more self-sufficient and resilient Piedmont
- Increased local, clean energy
- Energy independence and reduced reliance on fossil fuels
- A robust green energy economy
- A better world for our community and families

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# Appendix

## Appendix A: Financing Opportunities

Financing Climate Action is a challenge, but there are opportunities to pursue funds that directly support implementation goals. Programs are available for residents, public agencies, and businesses. Key resources for further information on incentive programs are PG&E, EBMUD, BAAQMD, BayREN, and the Database of State Incentives for Renewables & Efficiency (DSIRE). Figure 6.1 has a list of financing opportunities. These are divided into efficiency, renewable energy, schools and government, energy storage, and vehicle sectors.

Efficiency
<b>1. PACE Financing</b>
<i>PACE (Property Assessed Clean Energy) is a financing mechanism tied to the loan on your property that can be used to support energy efficiency and renewable energy projects. In Piedmont, approved PACE providers include CaliforniaFIRST, Alliance NRG, PACE Funding Group, the HERO Program, and Figtree PACE Program.</i>
<b>2. REEL Financing</b>
<i>The Residential Energy Efficiency Loan Assistance Program is a financing pilot program to enable homeowners to fund energy efficiency projects.<sup>1</sup></i>
<b>3. FHA PowerSaver Loan Program<sup>2</sup></b>
<i>Financing program for homeowners to make energy efficiency and renewable energy upgrades.</i>
<b>4. PGE Solar Water<sup>3</sup></b>
<i>Rebate and a tax credit for residential or business solar water heating installations.</i>
<b>5. PG&amp;E Energy Efficiency Rebate Program<sup>4</sup></b>
<i>PG&amp;E offers rebates for different products that increase home efficiency.</i>
<b>6. PGE Retrocommissioning Program<sup>5</sup></b>
<i>PG&amp;E pays businesses based on energy savings after increasing the efficiency of existing equipment.</i>
<b>7. Energy Upgrade California<sup>6</sup></b>
<i>Rebate program for California homeowners to make energy efficiency improvements in their homes.</i>
<b>8. PG&amp;E Savings by Design<sup>7</sup></b>
<i>This program provides incentives and education on energy efficiency for building designers and owners.</i>

<sup>1</sup> "Residential Energy Efficiency Loan Assistance Program." *California State Treasurer*. <http://www.treasurer.ca.gov/CAEATFA/cheef/reel/index.asp>. Accessed 3 July 2017.

<sup>2</sup> "FHA PowerSaver Loan Program." *Energy.gov*. <https://energy.gov/savings/fha-powersaver-loan-program>. Accessed 3 July 2017.

<sup>3</sup> "Solar Hot Water Heating." *PG&E*. [https://www.pge.com/en\\_US/residential/solar-and-vehicles/options/solar/water-heating/water-heating.page](https://www.pge.com/en_US/residential/solar-and-vehicles/options/solar/water-heating/water-heating.page). Accessed 3 July 2017.

<sup>4</sup> "Explore PG&E rebates." *PG&E*. [https://www.pge.com/en\\_US/residential/save-energy-money/savings-solutions-and-rebates/rebates-by-product/rebates-by-product.page?](https://www.pge.com/en_US/residential/save-energy-money/savings-solutions-and-rebates/rebates-by-product/rebates-by-product.page?). Accessed 3 July 2017.

<sup>5</sup> "Retrocommissioning." *PG&E*. [https://www.pge.com/en\\_US/business/save-energy-money/facility-improvements/retrocommissioning/retrocommissioning.page](https://www.pge.com/en_US/business/save-energy-money/facility-improvements/retrocommissioning/retrocommissioning.page). Accessed 3 July 2017.

<sup>6</sup> "Home Energy Efficiency." *Energy Upgrade California*. <https://www.energyupgradeca.org/home-energy-efficiency/>. Accessed 3 July 2017.

<sup>7</sup> "Explore the Savings By Design Program." *PG&E*. [https://www.pge.com/en\\_US/business/save-energy-money/facility-improvements/savings-by-design/savings-by-design.page?WT.mc\\_id=Vanity\\_cnc](https://www.pge.com/en_US/business/save-energy-money/facility-improvements/savings-by-design/savings-by-design.page?WT.mc_id=Vanity_cnc). Accessed 3 July 2017.

<b>9. EBMUD Rebates for Water Efficiency<sup>8</sup></b>
<i>East Bay Municipal Utility District provides rebates for improving water efficiency in yards and homes.</i>
<b>10. PG&amp;E On-Bill Financing<sup>9</sup></b>
<i>Interest-free loan for businesses replacing old equipment for energy efficient models.</i>
<b>11. BAAQMD Residents Grant Funding<sup>10</sup></b>
<i>Rebate and incentive programs for Bay Area residents.</i>
<b>12. BayREN Multi Family Programs<sup>11</sup></b>
<i>Rebates and consulting programs for multi-family properties to increase energy efficiency</i>
<b>13. BayREN Home Upgrade</b>
<i>Incentives for home energy efficiency improvements.<sup>12</sup></i>
<b>14. BayREN PAYS On-Bill Efficiency Program</b>
<i>Pay As You Save program for on bill financing for water efficiency improvements.</i>
<b>Renewable Energy</b>
<b>15. Renewable Feed-in Tariff (FIT) Program</b>
<i>The Renewable Market Adjusting Tariff (ReMAT) is a feed-in tariff program for small renewable generators less than 3 MW in size.<sup>13</sup></i>
<b>16. Property Tax Exclusion for Solar Energy Systems</b>
<i>Tax exclusion for solar energy systems installed through 2024.<sup>14</sup></i>
<b>17. Residential Renewable Energy Tax Credit<sup>15</sup></b>
<i>A 30% federal tax credit for solar electric and solar water heater systems.</i>
<b>18. PG&amp;E Net Energy Metering<sup>16</sup></b>
<i>Billing program for private rooftop solar use that allows you to gain credit for electricity you reduce. There is also Virtual Net Energy Metering which can be used in multi-unit housing.</i>
<b>19. Bay Area SunShares<sup>17</sup></b>
<i>Piedmont participates in Bay Area SunShares to provide streamlined access and group discounts to clean energy and zero-emissions vehicles.</i>
<b>Schools and Government</b>
<b>20. Bright Schools Program<sup>18</sup></b>
<i>Provides an energy audit for schools to reduce energy use.</i>

<sup>8</sup> "Rebates." *East Bay Municipal Utility District*. <http://www.ebmud.com/water-and-drought/conservation-and-rebates/residential/rebates/>. Accessed 3 July 2017.

<sup>9</sup> "Energy Efficiency Financing." *PG&E*. [https://www.pge.com/en\\_US/business/save-energy-money/financing/energy-efficiency-financing/energy-efficiency-financing.page](https://www.pge.com/en_US/business/save-energy-money/financing/energy-efficiency-financing/energy-efficiency-financing.page). Accessed 3 July 2017.

<sup>10</sup> "Residents." *Bay Area Air Quality Management District*. <http://www.baaqmd.gov/grant-funding/residents>. Accessed 3 July 2017.

<sup>11</sup> "Programs." *Energy Upgrade California*. <http://www.bayareamultifamily.org/programs>. Accessed 3 July 2017.

<sup>12</sup> "Home Upgrade." *Energy Upgrade California*. <https://www.bayareaenergyupgrade.org/upgrade-options.html>. Accessed 3 July 2017.

<sup>13</sup> "Renewable Feed-In Tariff (FIT) Program." *California Public Utilities Commission*. 7 February 2017. <http://www.cpuc.ca.gov/feedintariff/>. Accessed 3 July 2017.

<sup>14</sup> "Property Tax Exclusion for Solar Energy Systems." *Energy.gov*. <https://energy.gov/savings/property-tax-exclusion-solar-energy-systems>. Accessed 3 July 2017.

<sup>15</sup> "Residential Renewable Energy Tax Credit." *DSIRE*. March 2017. <http://programs.dsireusa.org/system/program/detail/1235>. Accessed 3 July 2017.

<sup>16</sup> "Understand Net Energy Metering and your bill." *PG&E*. [https://www.pge.com/en\\_US/residential/solar-and-vehicles/green-energy-incentives/solar-and-renewable-metering-and-billing/net-energy-metering-program-tracking/understand-net-energy-metering.page](https://www.pge.com/en_US/residential/solar-and-vehicles/green-energy-incentives/solar-and-renewable-metering-and-billing/net-energy-metering-program-tracking/understand-net-energy-metering.page). Accessed 3 July 2017.

<sup>17</sup> *Bay Area SunShares*. <http://www.bayareasunshares.org/>. Accessed 3 July 2017.

<sup>18</sup> "The Bright Schools Program." *California Energy Commission*. <http://www.energy.ca.gov/efficiency/brightschoools/>. Accessed 3 July 2017.

<b>21. Energy Efficiency Financing for Public Sector Projects</b>
<i>Cities, counties, public institutions, public hospitals, public schools, and special districts are eligible for low-interest loans for energy efficiency projects.<sup>19</sup></i>
<b>22. Energy Partnership Program<sup>20</sup></b>
<i>Cities, counties, special districts, and public facilities are eligible to participate in a program to identify energy savings opportunities.</i>
<b>23. BAAQMD Public Agencies Grant Funding<sup>21</sup></b>
<i>Bike, trip reduction, and clean vehicle programs to support public agencies.</i>
<b>24. PG&amp;E LED Streetlight Program<sup>22</sup></b>
<i>Provides rebates and rate changes for upgrading streetlights to LEDs.</i>
<b>Energy Storage</b>
<b>25. Self-Generation Incentive Program<sup>23</sup></b>
<i>PG&amp;E provides incentives for residential and commercial buildings to install energy storage or selected energy technologies.</i>
<b>Vehicles</b>
<b>26. PGE Clean Fuel Rebate for fueling electric vehicles<sup>24</sup></b>
<i>EV owners can get a rebate for using electric fuel.</i>
<b>27. California Clean Vehicle Rebate Program<sup>25</sup></b>
<i>California provides rebates for residents purchasing or leasing electric or hybrid vehicles</i>
<b>28. Federal Tax Credit for All Electric and Plug in Hybrid Vehicles<sup>26</sup></b>
<i>Up to \$7,500 tax credit for electric vehicles purchased after 2010.</i>
<b>29. Bay Area SunShares<sup>27</sup></b>
<i>Piedmont participates in Bay Area SunShares to provide streamlined access and group discounts to clean energy and zero-emissions vehicles.</i>
<b>Other Opportunities</b>
<b>1. State and Regional Grants</b>
<i>State and regional grants are sometimes available to fund climate action and transportation work.</i>
<b>2. Safe Routes to Schools</b>
<i>Safe Routes to School is an international movement focused on increasing the number of children who walk or bicycle to school by funding projects that remove barriers that currently prevent them from doing so.</i>
<b>3. Collaboration with other Alameda County cities</b>

<sup>19</sup> "Energy Efficiency Financing." *California Energy Commission*. <http://www.energy.ca.gov/efficiency/financing/index.html>. Accessed 3 July 2017.

<sup>20</sup> "Energy Partnership Program." *California Energy Commission*. <http://www.energy.ca.gov/efficiency/partnership/>. Accessed 3 July 2017.

<sup>21</sup> "Public Agencies." *Bay Area Air Quality Management District*. <http://www.baaqmd.gov/grant-funding/public-agencies>. Accessed 3 July 2017.

<sup>22</sup> "Earn money back with LED streetlight rebates." *PG&E*. [https://www.pge.com/en\\_US/business/save-energy-money/business-solutions-and-rebates/lighting/led-street-lighting/led-streetlight-rebates.page](https://www.pge.com/en_US/business/save-energy-money/business-solutions-and-rebates/lighting/led-street-lighting/led-streetlight-rebates.page). Accessed 3 July 2017.

<sup>23</sup> "Energy storage and generation incentives." *PG&E*. [https://www.pge.com/en\\_US/business/solar-and-vehicles/your-options/solar-programs/self-generation-incentive-program/self-generation-incentive-program.page](https://www.pge.com/en_US/business/solar-and-vehicles/your-options/solar-programs/self-generation-incentive-program/self-generation-incentive-program.page). Accessed 3 July 2017.

<sup>24</sup> "Clean Fuel Rebate for fueling electric vehicles." *PG&E*. [https://www.pge.com/en\\_US/residential/solar-and-vehicles/options/clean-vehicles/electric/clean-fuel-rebate-for-electric-vehicles.page](https://www.pge.com/en_US/residential/solar-and-vehicles/options/clean-vehicles/electric/clean-fuel-rebate-for-electric-vehicles.page). Accessed 3 July 2017.

<sup>25</sup> "Drive clean and save." *California Clean Vehicle Rebate Project*. <https://cleanvehiclerebate.org/eng>. Accessed 3 July 2017.

<sup>26</sup> "Federal Tax Credits for All-Electric and Plug-in Hybrid Vehicles." *U.S. Department of Energy*. <https://www.fueleconomy.gov/feg/taxevb.shtml>. Accessed 3 July 2017.

<sup>27</sup> *Bay Area SunShares*. <http://www.bayareasunshares.org/>. Accessed 3 July 2017.

*As Piedmont is a relatively small city, partnering with neighboring jurisdictions is another key implementation strategy for supporting the CAP and acquiring funding.*

**4. Carbon Pricing**

*There are many reasons to price carbon, including internalizing externalities, reducing the use of high global warming potential fuels, transitioning from natural gas to renewable electricity, and raising revenue to fund climate action programs. There are different ways the City could implement a form of carbon pricing, and these are worth further consideration. Below are a handful of suggested models.*

1. Climate impact fee on development that meets a designated threshold
2. Establish a carbon tax that dedicates its revenue to incentivizing energy efficiency projects or other GHG reduction measures
3. A carbon tax or revenue neutral carbon tax on utility bills that prices high carbon energy (natural gas) and subsidizes low-carbon energy (100% green electricity).
4. Support a statewide carbon tax

Figure 6.1

## Appendix B: Climate Action Plan Task Force Meetings

The Climate Action Plan (CAP) Task Force was an advisory body to staff and the City Council created by City Council on January 17, 2017. The CAP Task Force reviewed the draft CAP update, provided staff with comments and advice on how it might be improved before it is considered by Council, and collaborated with staff to propose a target for 2030 emissions reductions. Consideration was given to the feasibility of and interest in suggested GHG emissions reductions measures. Public meetings of the Task Force were held monthly and provided an opportunity to engage other residents and business owners in this decision-making process. Public meetings also allowed City staff to better understand the characteristics, priorities, and goals of community members. Below are the members of the CAP Task Force and summaries of each of the Task Force meetings.

### CAP Task Force Members

- **Brett Hondorp**  
Brett Hondorp is Vice President of Alta Planning + Design, a multi-modal transportation planning and engineering consultancy dedicated to creating active and healthy communities. Over the last 20 years he has managed hundreds of bicycle and pedestrian network plans, trail corridor studies, school safety plans and mobility programs. Brett co-founded Alta Bicycle Share which launched bicycle share systems in New York, Washington DC, San Francisco, Chicago, Seattle, and Melbourne.
- **Sophia Lincoln (PUSD Student Representative)**  
Sophia Lincoln is a senior at Piedmont High School. As President of the Piedmont High School Environmental Club, she is currently working with the Global Student Embassy to improve environmental conditions locally. She also interned with a few classmates at Save the Bay during her sophomore year of High School. Now, as the high school student representative of the Climate Action Plan Task Force, Sophia hopes she can take her efforts towards sustainability a step further.

- **Margaret Ovenden**

A 12-year resident of Piedmont, Margaret is on the Steering Committee for Piedmont Connect, which she co-founded in 2010. Connect is a community group that brings residents together to take action towards an environmentally sustainable future. She also has served on PUSD's Green Initiative Task Force. She has been a policy and advocacy specialist on issues of access to healthcare for patients of Community Health Centers, and she has conducted research on the cultural clashes that occur in international charity work.

- **Steven Schiller**

Steve is a 20-year Piedmont resident, who has been active in state, national and international climate change mitigation actions since the 1990s. He is a professional engineer, an advisor and Board Director for private companies and non-profits delivering innovative clean energy solutions, and advisor to Lawrence Berkeley National Laboratory, the U.S. Department of Energy and the U.S. Environmental Protection Agency's Climate Protection Partnership Division. For over six years he was a regulator with the United Nation's Framework Convention on Climate Change Clean Development Mechanism. He is also the former Vice Chair of the California Climate Action Registry Board (appointed by State Senate) and was one of the founders of The Climate Registry.

- **Bruce Wolfe**

Bruce Wolfe grew up in Piedmont, where his passion for environmental stewardship was kindled in camping trips with the Piedmont Boy Scouts and family hikes in the East Bay Regional Parks, inspired by projects celebrating the first Earth Day in high school, and developed at Stanford, where he initiated his dorm's first recycling program, interned at U.S. EPA, and earned a Masters in Environmental Engineering. Since Stanford, he has worked at the San Francisco Bay Regional Water Board, implementing programs that preserve, protect, and restore the Bay Region's water quality and serving as the Water Board's Executive Officer since 2003. After leaving Piedmont for school, he returned with his family in 1987, where he continues to enjoy living and working to preserve and improve Piedmont's and the Bay Area's quality of life.

- **Tracey Woodruff, Chair**

Tracey is Professor in the Department of Obstetrics, Gynecology, and Reproductive Sciences and Philip R Lee Institute for Health Policy Studies at the University of California, San Francisco and the Director of the Program on Reproductive Health and the Environment. She is a recognized scientific expert in evaluating exposures to environmental pollutants and their effects on prenatal and child health. She has authored numerous scientific publications and book chapters. She was previously at the US EPA, where she was a senior scientist and policy advisor in the Office of Policy. She was appointed by the governor of California in 2012 to the Science Advisory Board of the Developmental and Reproductive Toxicant (DART) Identification Committee.

## **CAP Task Force Meeting Summaries (March 2017-January 2018)**

### **March 30, 2017**

The first meeting of Piedmont's Climate Action Plan (CAP) Task Force was focused on recommending an updated greenhouse gas emissions (GHG) reduction goal. Piedmont's current goal is to reduce emissions 15% below 2005 levels by 2020. Staff presented several options for setting a new goal including a per capita emissions goal, a data-based goal, or a goal aligned with state targets. Task Force members and the public discussed the various

options and weighed factors like achievability, climate leadership, and compliance with state targets. The Task Force considered the benefits of using state goals compared to coming up with an independent goal and recommended the adoption of a draft GHG reduction target of 40% below the 2005 baseline by 2030 and 80% below the 2005 baseline by 2050. *In addition, the Task Force discussed the benefits of a “climate ambassadorship” in which young Piedmonters interested in climate action service might be mentored for service in communities beyond Piedmont’s borders.*

#### **April 25, 2017**

The CAP Task Force reviewed material for the Buildings and Energy Use sector, including background information, greenhouse gas emissions forecasting scenarios, and suggested objectives and measures to reduce emissions. The Task Force reviewed and commented on measures related to reducing residential and commercial building energy use. Task Force members and City staff also discussed how to increase public participation in the CAP through publicity, engagement campaigns, and outreach. It was decided to include an agenda item on “community outreach and engagement” in all future Task Force meetings.

#### **May 23, 2017**

The Task Force continued its discussion on the Buildings and Energy Use sector, including measures aimed at reducing GHG emissions from schools, increasing renewable energy, decreasing local air pollution, and investigating upgraded infrastructure and technologies. The Task Force members voted to recommend staff include the measures, as modified throughout the discussion, in the 2030 Climate Action Plan. During discussion of community engagement, it was emphasized that collaboration with the schools would be beneficial and that both staff and Task Force members would reach out to contacts involved in the school district. It was also suggested that outreach should include a community workshop in the fall and potentially a survey.

#### **June 27, 2017**

Staff presented on the Transportation sector GHG emissions and measures. A Piedmont resident presented in the public forum on the potential for a Piedmont Shuttle Bus and the Task Force discussed the potential costs and benefits of this idea. The Task Force reviewed the proposed transportation sector measures and suggested that staff add measures regarding car sharing, electric bikes, and partnership with the school district. During the discussion of community outreach, it was brought up that it is important that the City take action on providing education on what residents can do to reduce GHG emissions that encourages voluntary action and to ensure that the measures aimed at residents are presented in a concise and easily understood manner. It was decided that planning the logistics of a survey and workshop should be tabled until the draft Climate Action Plan is more complete.

#### **July 25, 2017**

The Task Force reviewed the Solid Waste and Consumption sectors. Staff presented a brief background on the methodology and premise of the consumption-based emissions inventory. The Task Force made many suggestions on the proposed measures. They expressed a desire for additional measures focused on diverting construction waste from the landfill and promoting specialized waste drop-off locations. Regarding the Consumption sector, it was recommended to staff that the City host a “Decarbonization Workshop” to spread

awareness of consumption based GHG emissions. The Task Force also discussed ways to gain greater public input on the Climate Action Plan. It was decided to plan a public event, the details of which would be discussed at the September Task Force meeting.

### **August 22, 2017**

In August, the Task Force completed its review of the Water and Wastewater, Adaptation, and Municipal sectors. Key suggestions about the water sector included: incorporating storm water management into other infrastructure projects, looking for ways to store water on public land, and expanding the Water Efficient Landscape Ordinance (WELO) to cover more landscapes. When discussing adaptation, Task Force members wanted to emphasize the regional effects that sea level rise would have on Piedmont. In the municipal sector the Task Force expressed the need for a “net zero-carbon target” for municipal activities and buildings to have the City lead by example. The Task Force also discussed possible dates for a Community Workshop in late October/early November. Task Force Member Margaret Ovenden updated the Task Force on her communication with the schools and inviting them to the September meeting, where a representative from East Bay Community Energy would also be attending as a guest speaker.

### **September 22, 2017**

During the public forum at the beginning of the meeting, several high school students expressed ideas that may help achieve the city’s climate goals, including increasing resident-only parking near the high school to discourage driving to school and placing composting bins throughout Piedmont Park. Guest speakers, Tom Kelly of KyotoUSA and Benjamin Foster of Fosterra, gave a presentation on East Bay Community Energy, focusing on the potential for a 100% renewable default option. The Task Force also discussed the creation of an Outreach Sub-Committee to help with the public workshop. Tracey Woodruff motioned to establish the sub-committee and appoint Margaret Ovenden and Steve Schiller on this sub-committee, Bruce Wolfe seconded, and all Task Force members voted in favor. Steve Schiller did not vote as he was not present during this portion of the meeting. Staff and Task Force members Margaret Ovenden and Tracey Woodruff reported on their meeting with Piedmont Unified School District about their sustainability plans and future options for partnering with the City to accomplish common goals. The Task Force also further discussed community engagement and the scope of a community workshop. It was decided that there should be two community workshops. The first workshop is tentatively scheduled for November 7 and would likely involve guest speakers and focus on educational content that relates to the main objectives of the draft CAP. The date and details of the second workshop will be discussed at future Task Force meetings.

### **October 24, 2017**

Task Force Chair Tracey Woodruff was absent at this meeting. Task Force members present at this meeting agreed Margaret Ovenden would act as Vice-Chair for the duration of it. For the first item on the agenda, Staff gave a report on the Climate Action Plan status and presented a timeline for next steps: Staff said that the Plan would be shared with the Task Force and with City Department Heads by Friday, October 27<sup>th</sup>; with a two-week review period that ends with reviewers sending comments back to City Staff by Friday, November 10<sup>th</sup>. Staff also mentioned that once this input is incorporated into the plan Staff will post it on the City’s website and work on the pertinent CEQA documentation. It was agreed that at the next Task Force meeting on November 28<sup>th</sup> the

Task Force will consider recommending the CAP to be presented at the December 18<sup>th</sup> City Council meeting. Staff mentioned that taking it to Council on this date would allow Piedmont to comply with the Covenant of Mayors requirements and timeline. The second item of the agenda included an update on the format, presenters and topics for the November 7<sup>th</sup> Community Workshop, which was led by Margaret Ovenden. After a discussion, it was decided the presentations would be followed by a Q&A session and group discussions geared towards gauging and generating community involvement. The meeting ended with a brief discussion on a possible future community workshop; the group agreed this will be discussed in future meetings to agree on date, format, and content.

### **November 7, 2017 – Community Workshop**

During this meeting, Task Force member Margaret Ovenden and City Staff presented a summary of this Climate Action Plan to the community. There were three guest speakers presenting that night as well: Sarah Moe, Senior Consultant at DNV GL gave a presentation on actions residents can take to curb our community's GHG emissions; Chris Jones, Program Director of the Cool Climate Network at UC Berkeley talked about Piedmont's Carbon Footprint based on a Consumption-based model study; and finally, Councilmember Tim Rood gave a presentation on East Bay Community Energy. Attendants split in 5 discussion groups towards the end of the meeting, facilitated by Task Force members and City Staff.

### **December 8, 2017**

Task Force member, Bruce Wolfe, was absent at this meeting. All other members were present. As per the first item on the agenda, staff and Task Force members briefly reviewed the November 7<sup>th</sup> community workshop. Next, staff presented next steps and a tentative schedule of events should the task force recommend that the Climate Action Plan (CAP) go to City Council by the end of the meeting. Under this scenario, the CEQA notice of intent to file an initial study/negative declaration and the recommended draft CAP would be made available by December 15 for public comment until January 30, 2018. Staff also noted that the term of the Task Force was nearing its end, as the term extends to one year from the date of establishment (January 17, 2017 as per City Council Resolution No. 4-17), or the receipt of a Draft CAP by the City Council, whichever is earlier. Next, the Task Force discussed the revised CAP and determined that they would not be making a recommendation on the CAP at this meeting. The Task Force requested that staff consider the inclusion of community engagement strategies and revisions to the executive summary that highlight the CAP's priorities. The Task Force discussed some priority items that might be included in the executive summary. Staff agreed to create a draft executive summary and send it to Task Force members no later than Friday December 15, 2017, after which the Task Force will have one week to provide their feedback. The Task Force also decided to hold its final meeting on Wednesday, January 10, 2018 to consider a version of the CAP that includes their requested revisions, and to discuss interest by Task Force members in extending its term.

### **January 10, 2018**

All six Task Force members were present at this meeting. Staff presented a summary of the December 8, 2017 meeting and discussion. The Task Force then took testimony from the public on the draft Climate Action Plan 2.0, after which they began their discussion of the draft plan. CivicSpark Fellow Cody Ericksen summarized the edits that had been made to the plan in response to comments from Task Force members since the December

2017 meeting. The Task Force discussed and agreed upon a few minor edits regarding: photos for the cover page; more motivating language for the call to action by residents on pages 10 and 11 of the plan; the addition of Action MUN-7.1C for the City's support of a state and/or federal fee or tax on carbon; the addition of text identifying airplane travel as a significant source of consumption-based emissions; and edits to the Implementation Chapter related to the creation of a climate action and sustainability advisory board. At the conclusion of their discussion and with member Steve Schiller abstaining, the Task Force voted to recommend that the City Council approve, as amended, the Draft Climate Action Plan 2.0. The final discussion of the meeting was next steps. Staff stated that the City Council's consideration of the CAP 2.0 is expected to occur at their meeting of March 19, 2018 and that the plan would be released and publicized for public comment promptly after the final amendments had been completed. The public comment period would be open until the end of February, at which point the public comments would be collated into a report to Council its March 19, 2018 meeting. Staff also stated that a community workshop to present the CAP 2.0 to the public would be scheduled during the comment period. Before concluding its meeting, the Task Force scheduled a meeting for Wednesday, February 7, 2018 to discuss and generate a list of collateral and activity to engage the public in GHG emissions reduction efforts outlined in the plan.

### **February 7, 2018**

Task Force members Brett Hondorp and Steve Schiller were not present at this meeting. As per the first item on the agenda, Staff presented a summary of the January 10, 2018 meeting and described the steps taken after the Task Force voted to recommend that the draft Climate Action Plan 2.0 be considered by City Council. These steps included filing the CEQA documents with the State Clearinghouse and the Alameda County Clerk-Recorder's office, providing information to residents on the public comment period through a series of public notices and press releases, and creating an online survey on the draft CAP 2.0. Staff and the Task Force then discussed the format of the February 26th Open House. It was agreed that the main topics to be covered at the Open House will be home energy assessments and purchasing renewable energy through East Bay Community Energy. Task Force member Margaret Ovenden agreed to present on Piedmont Connect as a way for residents to become involved in climate action. Next, the Task Force discussed outreach ideas, including the creation of a sustainability advisory committee or expanding the scope of an existing one to include sustainability. Community organizations that the City could potentially partner with are Piedmont Connect, Boy Scouts, Piedmont Maker Group, and the Piedmont Appreciating Diversity Committee. The final item on the agenda was the possibility of holding another Task Force meeting in March. After discussion, it was decided that no further meetings would be needed.

### **February 26, 2018 – Community Open House**

During this meeting, Task Force chair Tracey Woodruff and City Staff presented a brief overview and update on the Draft Climate Action Plan 2.0 to the community, including preliminary CAP survey results. There were three guest speakers presenting that night as well: Margaret Ovenden, Climate Action Plan Task Force member, gave a presentation on ways residents can get involved in curbing our community's GHG emissions and provided information on Piedmont Connect; Jeffery Liang, Senior Program Services Specialist at StopWaste, and Amanda Brunato, from Ultimate Home Performance, gave a presentation on the importance and benefits of home energy assessments and provided a case study to attendees; and finally, Dan Lieberman, Senior Manager of Account Services at East Bay Community Energy (EBCE) gave a presentation on EBCE's upcoming rollout, the power

offerings, and projected costs. Time for Q&A was made available toward the end of the Open House, with most questions being directed to Dan Lieberman about EBCE.

## **Appendix C: GHG Inventory Background and Methodology**

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A base year GHG inventory for the City of Piedmont was completed by independent consultant AECOM for the year 2005. As a primarily residential community, Piedmont's largest source of emissions was residential energy consumption. The second largest contributor was the transportation sector. Together, non-residential energy use, water consumption, and waste sent to landfills contributed less than 10% to the overall inventory. The distribution of emissions sources has stayed very consistent between years 2005-2015.

In 2010, a new methodology for inventorying government and community GHG emissions, the U.S. Community Protocols for Accounting and Local Government Operating Protocols, was adopted as the standard across the San Francisco Bay Area. The new methodology was applied to the 2005 inventory and baseline emissions were estimated to be 48,300 MT CO<sub>2</sub>e. Using this calculation method in 2010, it was determined that community activities resulted in approximately 44,750 metric tons of CO<sub>2</sub>e that year.

In 2014, it was estimated that Piedmont produced 39,456 MTCO<sub>2</sub>e. 2014's substantial drop in emissions was attributed to a reduction in natural gas usage throughout the City. Approximately 85% of the reductions were the result of decreased natural gas usage between 2010 and 2014.

To calculate emissions in 2015, City staff utilized ICLEI's U.S. Community Protocol. Additionally, a new global, community protocol was published and is now the standard for GHG reporting. Piedmont's GHG inventories were updated using the Global Protocol for Community-Scale Emissions (GPC), as well as the greenhouse gas global warming potentials found in the most recent Intergovernmental Panel on Climate Change (IPCC) report.<sup>28</sup> In 2015, community emissions were 38,497 MTCO<sub>2</sub>e and municipal activities contributed 960 MTCO<sub>2</sub>e to the community's total. Municipal activities contribute only about 2% to Piedmont's total emissions.

In 2017, all previous inventories were updated to include consistent data and newer sources of information. All inventories were updated in accordance with the GPC guidelines. The most recent GHG inventory was reviewed by CDP staff and met reporting requirements of the Global Covenant of Mayors. As new data becomes available, or as estimates of the global warming potential of gases are adjusted, GHG inventories need to be updated to provide accurate, year-to-year comparisons.

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<sup>28</sup> The use of the most recent IPCC values is standard in the United States. The EPA uses the most recent, 100 year GWP values for greenhouse gas inventories. <https://www.epa.gov/ghgemissions/understanding-global-warming-potentials>

## Community GHG Emissions

2005		2010		2014		2015	
<b>Buildings and Energy Use</b>	<b>MTCO<sub>2</sub>e</b>						
Residential Electricity	7150	Residential Electricity	6170	Residential Electricity	5506	Residential Electricity	5018
Residential Natural Gas	16771	Residential Natural Gas	17274	Residential Natural Gas	12138	Residential Natural Gas	12728
Commercial Electricity Use	1133	Commercial Electricity Use	918	Commercial Electricity Use	1022	Commercial Electricity Use	866
Commercial Natural Gas	520	Commercial Natural Gas	612	Commercial Natural Gas	409	Commercial Natural Gas	563*
<b>Total</b>	<b>25573</b>	<b>Total</b>	<b>24974</b>	<b>Total</b>	<b>19075</b>	<b>Total</b>	<b>19177</b>
<b>Transportation Emissions</b>	<b>MTCO<sub>2</sub>e</b>						
AC Transit Diesel	450	AC Transit Diesel	426	AC Transit Diesel	410	AC Transit Diesel	399
AC Transit Gasoline	10	AC Transit Gasoline	7	AC Transit Gasoline	50	AC Transit Gasoline	51
BART	0	BART	420	BART	266	BART	266
Commercial Vehicles	1689	Commercial Vehicles	1891	Commercial Diesel	1075	Commercial Diesel Vehicles	1039
Diesel Passenger Vehicles	638	Diesel Passenger Vehicles	580	Commercial Gas	114	Commercial Gas Vehicles	116
Gasoline Passenger Vehicles	17424	Gasoline Passenger Vehicles	16729	Diesel Passenger Vehicles	1073	Diesel Passenger Vehicles	1058
				Gasoline Passenger Vehicles	15430	Gasoline Passenger Vehicles	15172
<b>Total</b>	<b>20210</b>	<b>Total</b>	<b>20054</b>	<b>Total</b>	<b>18418</b>	<b>Total</b>	<b>18102</b>
<b>Solid Waste</b>		<b>Solid Waste</b>		<b>Solid Waste</b>		<b>Solid Waste</b>	
Solid Waste	2620	Solid Waste	1454	Solid Waste	1115	Solid Waste	1128
<b>Water and Wastewater</b>		<b>Water and Wastewater</b>		<b>Water and Wastewater</b>		<b>Water and Wastewater</b>	
Potable Water	110	Potable Water	110	Potable Water	115	Potable Water	90
Wastewater Emissions	305	Wastewater Emissions	310	Wastewater Emissions	1	Wastewater Emissions	1
<b>Total</b>	<b>415</b>	<b>Total</b>	<b>420</b>	<b>Total</b>	<b>116</b>	<b>Total</b>	<b>91</b>
<b>Total Emissions 2005</b>	<b>48818</b>	<b>Total Emissions 2010</b>	<b>46901</b>	<b>Total Emissions 2014</b>	<b>38724</b>	<b>Total Emissions 2015</b>	<b>38497</b>
<b>% Below Baseline</b>	<b>0%</b>	<b>% Below Baseline</b>	<b>4%</b>	<b>% Below Baseline</b>	<b>21%</b>	<b>% Below Baseline</b>	<b>21%</b>

## Municipal GHG Emissions

2005		2010		2014		2015	
<b>Facilities</b>	<b>MTCO<sub>2</sub>e</b>	<b>Facilities</b>	<b>MTCO<sub>2</sub>e</b>	<b>Facilities</b>	<b>MTCO<sub>2</sub>e</b>	<b>Facilities</b>	<b>MTCO<sub>2</sub>e</b>
Natural Gas	61	Natural Gas	68	Natural Gas	162	Natural Gas	170
Electricity	130	Electricity	100	Electricity	105	Electricity	106
Streetlights	74	Streetlights	69	Streetlights	70	Streetlights	59
Sprinkler use	-	Sprinkler use	-	Sprinkler use	4	Sprinkler use	4
<b>Total</b>	<b>265</b>	<b>Total</b>	<b>237</b>	<b>Total</b>	<b>341</b>	<b>Total</b>	<b>339</b>
<b>Vehicle Fleet</b>	<b>MTCO<sub>2</sub>e</b>						
Vehicle Fleet	179	Vehicle Fleet	227	Vehicle Fleet	115	Vehicle Fleet	116
<b>Contracted Vehicles</b>	<b>MTCO<sub>2</sub>e</b>						
Gasoline	250	Gasoline	222	Gasoline	28	Gasoline	63
Diesel	0	Diesel	0	Diesel	3	Diesel	0
<b>Employee Commute</b>	<b>MTCO<sub>2</sub>e</b>						
Employee Commute	269		306		338		331
<b>Total</b>	<b>698</b>	<b>Total</b>	<b>755</b>	<b>Total</b>	<b>484</b>	<b>Total</b>	<b>510</b>
<b>Solid Waste</b>		<b>Solid Waste</b>		<b>Solid Waste</b>		<b>Solid Waste</b>	
Solid Waste	62	Solid Waste	64	Solid Waste	88	Solid Waste	111
<b>Total Emissions 2005</b>	<b>1025</b>	<b>Total Emissions 2010</b>	<b>1056</b>	<b>Total Emissions 2014</b>	<b>913</b>	<b>Total Emissions 2015</b>	<b>960</b>

## Appendix D: Forecasting

Forecasts, in MTCO<sub>2</sub>e, were completed using Clearpath. GHG emissions forecasts are generated to determine emissions reductions necessary to meet targets. Emissions through 2030 were projected using population growth rates, energy consumption trends, and the effects of existing state policies. Emissions forecasts were used to determine the need for CAP emissions reductions. Figure 6.2 includes the complete emissions forecast by sector through 2030 as well as a description of the assumptions used to calculate the forecast. The following figure, figure 6.3, includes assumptions used to determine emissions reduction potential of measures or objectives. GHG reduction forecasts were also generated using Clearpath and used many of the standard assumptions for GHG reductions. While these estimates provide useful approximations, GHG reduction potentials should not be the only factor used to prioritize implementation. Many measures' emissions impacts cannot be estimated. All CAP measures included in this document move Piedmont towards reducing GHG emissions.

Forecasted Emissions through 2030						2030 Forecast Assumptions	Notes
Year	Water & Wastewater	Solid Waste	Buildings and Energy	Transportation	TOTAL	Water & Wastewater	
	MTCO <sub>2</sub> e	MTCO <sub>2</sub> e	MTCO <sub>2</sub> e	MTCO <sub>2</sub> e	MTCO <sub>2</sub> e	Water & Wastewater	<i>Piedmont Population Growth Rate</i>
2016	91	1129	22001	17730	40,951	Solid Waste	
2017	91	1130	21587	17356	40,164	Solid Waste	<i>Piedmont Population Growth Rate</i>
2018	92	1131	21203	16991	39,417	Buildings and Energy	
2019	92	1132	20850	16633	38,707	Residential Electricity Growth Rate	<i>Rate of current decrease based on trends 2005-2015</i>
2020	92	1133	20523	16220	37,968	Electricity Carbon Intensity	<i>To get to near 100% by 2050 based on state goals</i>
2021	92	1135	20221	15818	37,266	Residential Natural Gas	<i>no change, used average from 2005-2015 because this fluctuates based on weather</i>
2022	92	1136	19943	15426	36,597	Commercial Electricity Growth Rate	<i>no change</i>
2023	92	1137	19687	15044	35,960	Commercial Natural Gas Growth Rate	<i>no change, used average from 2005-2015 because this fluctuates based on weather</i>
2024	92	1138	19448	14673	35,351	Transportation	
2025	92	1139	19230	14352	34,813	Gasoline Transportation VMT Growth Rate	<i>MTC VMT forecast</i>
2026	92	1140	19027	14039	34,298	Diesel Transportation VMT Growth Rate	<i>MTC VMT forecast</i>
2027	92	1141	18840	13734	33,807	Pavley II Passenger Vehicle Carbon Intensity	<i>CA State Policy defaults generated by Clearpath</i>
2028	92	1143	18667	13435	33,337	Diesel-Transit VMT Piedmont	
2029	93	1144	18508	13144	32,889	Population Growth Rate	<i>Piedmont Population Growth Rate</i>
2030	93	1145	18361	12958	32,557	Gasoline-Transit VMT	<i>Piedmont Population Growth Rate</i>
						BART	<i>no change</i>

Figure 6.2

GHG Reduction Assumptions		
	2030 GHG Potential (MTCO2e)	Notes on forecasting assumptions
<b>Buildings and Energy</b>		
Objective: Reduce Residential Building Energy Use		
Measure: Disclose building energy consumption	304	per year. Energy benchmarking results in 2.4% reduction in use (EnergyStar). It will take approximately 16 years for all Piedmont homes to participate.
Measure: Reduce electricity and natural gas consumption	1602	In this energy efficiency program, 10% of homes participate per year (383 homes) for 10 years and reduce 56 therms/home, based on Clearpath defaults
Measure: Switch from natural gas to electric appliances, paired with renewable energy	14083	Fuel switching space and water heaters. If program begins in 2018, over 15 years all heaters would likely be replaced with electric heat pumps resulting in roughly 80% reduction in natural gas consumption
Objective: Reduce Commercial Building Energy Use		
Measure: Disclose building energy consumption	18	Assumes a 2.4% reduction in energy consumption. Assumes all business would participate at least once in energy benchmarking by 2030.
Measure: Reduce electricity and natural gas consumption	134	Assumes a 15% reduction in COM building energy use through implementation of energy efficiency programs, modeled using Clearpath
Objective: Increase Renewable Energy to 100%		
Measure: Install on-site renewable energy	218	Google Project Sunroof estimates that the median system in Piedmont could produce
Measure: Increase the amount of renewable energy delivered through the grid	1794	Increasing the amount of renewable energy delivered to the grid to 100% by 2030
Objective: Reduce Local Air Pollution and High Global Warming Potential Gases		
Measure: Decrease the impact of Piedmont's building stock on pollution and GHG emissions	1950*	refrigerant emissions were estimated using methodology from: De Kleine, Robert. "Life Cycle Optimization of Residential Air Conditioner Replacement." University of Michigan. December 2009. Assumes all homes install AC units by 2030.
<b>Transportation</b>		
Objective: Increase number of trips made by biking or walking		
Measure: Provide access to bicycles and bicycle infrastructure	1340	Increase trips made by biking & walking to reduce VMT by 10% by 2030, default Clearpath CO2 reductions
Objective: Increase residents' use of public transit		
Measure: Increase use of buses and BART	32	Increase transit accessibility by 50%, default Clearpath CO2 reductions
Objective: Accelerate the adoption of Electric Vehicles (EV) in Piedmont		
Measure: Support the growth of EV charging infrastructure	5181	Promote and enable electric vehicles to result in a 50% reduction of vehicle miles traveled by 2030
<b>Solid waste</b>		
Objective: Reduce waste going to the landfill	125	Assumes solid waste is reduced an additional 10% by 2030
<b>Water and Wastewater</b>		
Objective: Reduce water use by 20%	13	Assumes water consumption is reduced by 20% by 2030

Figure 6.3