RICAPS
Regionally Integrated Climate Action Planning Suite

# City of Brisbane
# Climate Action Plan

August 26, 2015

Prepared in collaboration with City/County Association of Governments of San Mateo County

# Acknowledgements


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This climate action plan was developed using the Regionally Integrated Climate Action Planning Suite (RICAPS), funded by a grant from the Bay Area Air Quality Management District (BAAQMD) and by California utility customers, administered by Pacific Gas and Electric Company (PG&E) under the auspices of the California Public Utilities Commission and with matching funds provided by the City and County Association of Governments of San Mateo County (C/CAG).

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## LETTER FROM THE MAYOR, Terry O'Connell



Right now is a critical time for our community, our economy, and our environment. We are fortunate in Brisbane to be surrounded by a wealth of knowledge and opportunity, fostered by our businesses' innovation and emboldened by our residents' entrepreneurial spirit. Brisbane has a strong history of supporting environmental preservation principles, as exemplified by The Open Space Plan, Priority Conservation Area designation of San Bruno Mountain, and adoption of the Baylands Sustainability Framework. This drive to protect natural resources is one of the core values of our community. However, resources fundamental to the vibrancy of Brisbane are at risk from the effects of climate change which, in San Mateo County, threatens to increase sea level, summer temperatures, the prevalence and strength of storms, and air pollution; to aggravate health problems; and to decrease the reliability of the water supply.

Climate change is a global problem, and only through local solutions designed to meet the needs of our community can we mitigate and adapt to its impacts and protect the environment. Together, we can conserve our scarce resources, thereby saving our families and companies money, increasing the resilience of our economy and emergence of new markets that prioritize green technologies. This plan is a comprehensive and strategic approach to sustainability, offering a suite of recommended actions that will engage all members of Brisbane's community in this journey to safeguard our environment. The Plan also includes ideas to allow our City government to "walk the talk" by implementing practices that minimize our own impacts on the environment by echoing the energy efficiency, water conservation and alternative transportation programs and services our Climate Action Plan proposes to establish for our community.

This small but important step is just the beginning of an exciting time of environmental stewardship and community transformation in which the City of Brisbane is taking the lead. But, as you can see when reviewing this Plan, the proposed efforts of Brisbane are small when compared to the collective action of our citizenry. Sustainability requires more than just environmental protection; it will take leadership and partnership to deploy these actions. We invite you to actively join Brisbane's transition to a clean environment, healthy community, and prosperous future. The key to Brisbane's success is you!

Terry O'Connell, Mayor

# 1 Introduction

The City of Brisbane is pleased to present the following Climate Action Plan. This Plan is designed to be a blueprint of our community's response to the challenges posed by climate change. Climate scientists around the world, represented by the Intergovernmental Panel on Climate Change, have an unequivocal position: human activity is changing the earth's climate through the release of greenhouse gas (GHG) emissions resulting primarily from the combustion of fossil fuels. The longer communities delay taking action, the greater the risk humans face of irreversibly depleting nonrenewable resources and harming our environment. However, it is conceivable, and increasingly foreseeable, that humans will delay so long that useful policy and programs will become infeasible and both human civilization and the biosphere will be permanently damaged.

Our city cannot solve the climate crisis alone. Together with our partners in county, state, and federal government, Brisbane has committed to taking steps to reduce our emissions and create new programs and services that will support our community and our families in doing the same. This Plan offers ways to make our homes more energy efficient and increase the amount of locally produced renewable energy. It suggests improvements to infrastructure and transit that allow people to go about their business on foot, by bicycle, or via public transportation, and offers ways to reduce the waste heading to our landfills. Finally, this Plan outlines measures that will make our municipal government a more efficient and resource-conservation minded organization.

"Hell and high water" aptly describes what 194 nations, including the United States, pledged to avoid when they signed and ratified the United Nations Framework Convention on Climate Change back in 1992. Even then, the hypothesis that human activities like fossil fuel burning and deforestation were warming the climate was supported by a mountain of evidence that was persuasive to most of the scientific community. The Convention committed the signatories to "avoid dangerous (anthropogenic—that is, human caused) interference with the climate system"—but it did not specify exactly what should be done, nor commit any of the signatories to emissions reductions limits. It was not until 2005 that specific (but modest) emissions reduction targets for developed nations were put in force by the Kyoto Protocol. Although the Protocol came into effect, the refusal of the United States to ratify the agreement limited its effectiveness.

In the succeeding years, the scientific evidence has become ever more persuasive. Contending explanations for the observed and measured rise in global temperatures, such as an increase in the energy emitted by the sun, have been tested and ruled out: the vast majority of climate scientists now agree that human emissions of the major anthropogenic "greenhouse gases"--

carbon dioxide, methane, and a couple of others—are trapping heat that would otherwise escape from earth into space. The case for strong policy action has become overwhelming: scientists and governments alike agreed in 2009 in Copenhagen that the goal of policy action should be to limit the temperature increase to two degrees Celsius—a "threshold" beyond which the disruptions to agriculture, ecosystems, and organized human life are likely to be intolerable.[1] Meanwhile, the greenhouse gases that we have dumped into the atmosphere since the Industrial Revolution (circa 1750) have caused temperatures to rise inexorably, and more quickly in recent years. NASA's Earth Observatory reports that global average temperatures are now .8° C (1.4° Fahrenheit) warmer than they were before the Industrial Revolution.[2] As a result, we are already seeing "hell and high water" and are barreling very quickly toward much worse. On our present course, we will likely increase greenhouse gas concentrations in the atmosphere enough to blow past the 2° C ceiling by 2050—and perhaps, according to climate expert Michael Mann, as soon as 2036.[3]



http://www.cubehouse.ca/images/globe_hand_175h.jpg

Unfortunately, the policy "brakes" on emissions are not being applied with anywhere near the pressure the climate situation demands. That's especially true for the United States, which lacks a comprehensive federal climate policy even though the U.S. is the world's largest *cumulative* emitter of carbon dioxide, the main greenhouse gas. The U.S. therefore has a disproportionate impact on the global climate and a considerable share of the responsibility for the climate burden carried by countries like the Philippines, which as a poor country has emitted very little carbon.[4] [5] U.S. actions (or inactions) are important not only in and of themselves, but because what we do as a self-proclaimed world leader serves as an example to (or an excuse for) other countries,

[1] Many scientists fear that even 2◦C is too risky, and want policy ambitious enough to limit temperature rises to 1.5◦C. I need to locate a source or two here.

[2] See http://earthobservatory.nasa.gov/Features/WorldOfChange/decadaltemp.php for an interactive graphic illustrating the temperature increases up to the present by decade.

[3] Mann's piece in Scientific American is online here: http://www.scientificamerican.com/article/earth-will-cross-the-climate-danger-threshold-by-2036/

[4] Philippines climate envoy Yeb Sano's emotional speech at the 2013 international climate summit in Warsaw is essential viewing: https://www.youtube.com/watch?v=7SSXLIZkM3E

[5] Cumulative (historical) emissions) count, because carbon dioxide stays in the atmosphere for as long as hundreds of years. The U.S. has been emitting a large quantity of carbon dioxide since it became an industrial superpower and an "automobile nation" early in the 20th century. The carbon dioxide Americans emitted then is helping to warm the atmosphere now.

including high emitters like China and India. President Obama has taken important executive actions to reduce carbon emissions and has achieved a voluntary agreement with China. But Congress, under the influence of the powerful fossil fuel and other carbon-intensive industries, can still obstruct or undermine these actions, and polluters have launched an offensive against the President's Clean Power Plan, which is intended to reduce power plant emissions, in the courts.

U.S. cities and states have moved forward on their own (although help in the form of incentives and funding from the federal government are still essential if we are to meet the rigorous emissions-reductions targets that are necessary to stabilize the climate and minimize the damage). Californians have been among the first to step up to the plate. In 2006, the California state legislature made history by adopting AB 32, the Global Warming Solutions Act, which committed the world's 8th largest economy (2013 ranking) to shrinking its climate-changing carbon emissions to 1990 levels by the year 2020, a 15% reduction from "business as usual" when adopted. In April of 2015, California Governor Jerry Brown increased the ambition of these efforts by executive order, announcing a state emissions-reduction goal of 40% below 1990 levels by 2030. As the world's 12th largest emitter of the atmospheric carbon that has already measurably affected both global and local climates, California has a special responsibility to act. AB 32, enhanced by Brown's executive order, is a down payment, and a substantial one. As it creates the policies and measures necessary to achieve the law's emissions reduction goals, California will act as a laboratory, setting examples that may ease the path of other states and regions.

The California Air Resources Board (CARB), the implementing agency for AB 32, recognizes that cities like Brisbane have been ahead of the curve with green building ordinances, retrofits, and improvements in municipal practices. The CARB calls local governments "essential partners" in the effort to roll out AB 32, and asks local governments to develop Climate Action Plans to reduce carbon emissions from their own operations and those of business and residents within the framework provided by the law. We are pleased to introduce Brisbane's Climate Action Plan—a cooperative effort involving Brisbane City staff, consultant DNG-VL (provided by San Mateo City/County Association of Governments) and citizen volunteer members of the Open Space and Ecology Committee—and to reaffirm our city's role in that state/local partnership.

**Climate emergency: hell and high water**

Humans, especially those of us who live in wealthier countries, are pouring vast quantities of heat-trapping gases, known as greenhouse gases (GHGs), into the atmosphere at increasing

rates.[6] These GHGs, produced by fossil fuel extraction and burning, deforestation and land use changes, factory farming and landfilling of organic materials, trap heat that would otherwise be reflected away from the earth and into space.

The scientific community is nearly unanimous in agreement that our greenhouse gas emissions have warmed the global average temperature of the Earth by .85° C, or close to one and one-half degrees F, above pre-industrial temperatures. This apparently small increase has resulted in dramatic changes: rapid ice melt in the Arctic, Greenland, West Antarctica and glaciated regions worldwide[7]; sea level rise that has already led to chronic flooding in places from Norfolk, VA to Bangladesh; lethal, crop-killing summer heat waves on all continents,[8] longer, fiercer fire seasons, and extreme weather including drought, hurricanes and "extreme precipitation events," all of which present direct threats to people's lives and livelihoods.

Other climate-driven changes may have less immediate and dramatic effects on humans, but are likely to be just as significant for the human future, since we depend on well-functioning ecosystems and the goods and services they provide. Warming oceans are "bleaching" and eventually killing the corals that build reefs, the most productive ecosystems in the oceans. Closer to shore, when combined with nitrogen-rich runoff (that is, water contaminated with synthetic fertilizer or human or animal waste), the warming of surface waters encourages vast algae blooms, which may be themselves poisonous[9]--and which, when they die, remove the oxygen from the water, causing "dead zones" that cannot support marine life. An enormous bloom of toxic algae along the entire Pacific coast of North America which was first spotted in May 2015 had by August forced the closure of a long section of the Washington coast to crab fishing, as the toxin from the algae worked its way through the food web.[10] Terrestrial ecosystems, too, are reeling from temperature changes that have altered the habitats of many species, as well as the timing of biological processes. Some caterpillars, for instance, no longer

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[6] Global carbon dioxide ($CO_2$) emissions amounted to 36 billion tons in 2010. They are increasing at about 2.5% per year (www.co2now.org). Methane is an even more powerful GHG—up to 80 times more--than $CO_2$. Annual global methane emissions are approximately 450-500 teragrams; a teragram is about 1.1 million tons.

[7] See Extreme Ice Survey (www.extremeicesurvey.org), *National Geographic's* photoessay "The Big Thaw" (June 2007, http://ngm.nationalgeographic.com/2007/06/big-thaw/big-thaw-text); "Greenland and Antarctic melting at "unprecedented rate," (Climate News Network September 2014, at http://www.rtcc.org/2014/09/01/greenland-and-antarctic-melting-at-unprecedented-rate/).

[8] European heat waves in 2003 and 2010 killed tens of thousands of people each. No particular event like this can be directly attributed to anthropogenic global warming, but rising average temperatures do make heat spikes more likely, according to climate researchers: increasing average temperatures is like loading the dice. See "European heat wave was warmest in 500 years," NBC Science, March 17, 2011, http://www.nbcnews.com/id/42139347/ns/technology_and_science-science/t/european-heat-wave-was-warmest-years/#.VLcXZXvo4c0.

[9] See "Driven by Climate Change, Algae Blooms Behind Ohio Water Scare are New Normal," in *National Geographic News* (August 4, 2014, http://news.nationalgeographic.com/news/2014/08/140804-harmful-algal-bloom-lake-erie-climate-change-science/).

[10] See CBS News, August 5, 2015, http://www.cbsnews.com/news/toxic-algae-bloom-in-pacific-even-larger-than-thought/

hatch in sync with the arrival of migratory birds, which consequently lack food for rearing their young. A 2014 Audubon Society study of 588 North American bird species found that 314 of them would be "climate-threatened" or "climate-endangered" by the end of the century.[11] Pests such as pine beetles are multiplying because mild winters allow them to breed all year, killing millions of acres of forest in the Western U.S. and Canada, while midwinter mild spells followed by a return to normal winter temperatures are devastating crops such as cherries.[12]

Californians up and down our state have firsthand experience with unpleasant climate-induced changes, most notably the current historic drought that has left withered landscaping, empty reservoirs and several Central Valley towns without drinking water. A 2013 report issued by the California EPA says starkly that "climate change poses an immediate and growing threat to California's environment, public health and economic vitality."[13] Agriculture is perhaps most obviously at risk—but climate change in California has already been linked to phenomena ranging from increases in heat-related deaths and illnesses to population surges among agricultural and other pests and declines in forest health, and to a fire "season" that often lasts all year.

As a coastal state, California is vulnerable to sea level rise, and the heavily developed Bay Area with its dense population living in close proximity to the shoreline is especially so. For most of the 20th century, sea levels rose at about 1.7 mm per year—but in the last two decades of the 20th century and subsequently, sea level rise has accelerated to 3.1 mm per year because of melting terrestrial ice and because water expands as it warms. A recent study bearing the imprimatur of the nation's major scientific bodies projects that; taking into account likely further acceleration, sea levels in Central California will rise between 2 and 12 inches in less than two decades, by 2030. By this century's end, the same report projects 17 inches of sea level rise at the conservative end—but as much as 66 inches (5 ½ feet) if we are not so lucky.[14] [15] [16] A 2009 report from the Pacific Research Institute estimates that almost half a million people and $100 billion in coastal property are at risk with 1.4 meters of sea level rise, which is at the more conservative end of the range of possibilities.[17] [18]

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[11] See www.climate.audobon.org.

[12] http://glenarborsun.com/will-climate-change-kill-the-michigan-cherry/

[13] Office of Health Hazard Assessment, California Environmental Protection Agency. Links to the summary and full report are available here: http://oehha.ca.gov/multimedia/epic/2013EnvIndicatorReport.html

[14] Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, Future. http://www.ecy.wa.gov/climatechange/docs/ipa_slr_nrcbrief.pdf

[15] Sea level rise maps can be viewed here: http://geology.com/sea-level-rise/san-francisco.shtml and here http://www.bcdc.ca.gov/slr.shtml

[16] The sea level rise "wild card" has to do with how rapidly large ice sheets, such as those covering Greenland, melt. Predictions vary widely.

[17] Heberger et al, 2009 (Pacific Institute). The Impacts of Sea Level Rise on the California Coast, downloadable here http://pacinst.org/publication/the-impacts-of-sea-level-rise-on-the-california-coast/. Links to interactive sea level rise maps are also available on this page.

***Visible, adverse changes have been brought about by a mere 1.5° F temperature increase. If we do not act promptly and urgently to reduce all sources of greenhouse gas emissions, much worse is in store.*** The Intergovernmental Panel on Climate Change (IPCC), which is charged with evaluating and summarizing for policymakers thousands of peer-reviewed climate change research studies, recently issued its Fifth Assessment Report. If we continue emitting carbon dioxide, methane and other greenhouse gases on our present trajectory, the IPCC estimates temperature increases by the end of the century will be from about 3 to as much as 6.5◦ Celsius, or between about 5 and 11◦F. Positive climate feedbacks, in which the consequences of warming lead to even more warming, could drive temperatures to the higher end of that range. The most worrisome feedback scenario concerns methane frozen in Arctic soils and seabeds. Methane is a powerful greenhouse gas. A molecule of methane is less persistent in the atmosphere than carbon dioxide, but can trap up to 80 times more heat next to the earth than a molecule of carbon dioxide [needs footnote]. The possibility of large-scale Arctic methane releases as the permafrost melts are therefore extremely worrisome, since they could potentially drive global temperatures up very quickly [needs footnote]. Abrupt, non-linear changes like this could throw the climate into a self-perpetuating warming trajectory that is beyond any human control. Such risks underline the need for *precaution* and reducing emissions as much as possible as quickly as possible—a World War II-scale effort.

**Ocean acidification—the $CO_2$ double whammy**

Only a portion of the billions of tons of carbon dioxide we emit every year by burning fossil fuels stays in the atmosphere, where it traps heat. About a third of it dissolves in the oceans, where it does a different, but equally significant, kind of damage. Carbon dioxide acidifies water (lowers its pH), and as it does so it is expected to have direct adverse effects on certain marine animals, especially those that live in shells. As food sources for many other animals, from fish to birds to sea otters, shellfish are an important part of the ocean food web. The Pacific Marine Environmental Laboratory (PMEL) affiliated with the National Oceanic and Atmospheric Administration says that, as a result of human carbon dioxide emissions, the oceans are already 30 percent more acidic than they were before the Industrial Revolution. If we continue on the projected "business as usual" carbon emissions path, PMEL projects that the oceans will be 150 percent more acidic by 2100. While PMEL indicates that it is "premature" to attribute recent failures of farmed shellfish "crops" to human-induced ocean acidification, it does say that acidification poses a risk to the $100 million/year shellfish industry—and as it increases and

[18] A recent report principally authored by renowned climate scientist James Hansen suggests that we could be on track for multiple meters of sea level rise within a much shorter time frame than has been predicted, and that even 2°C could lock in melting of large ice sheets. See http://thinkprogress.org/climate/2015/07/27/3684564/james-hansen-climate-danger-hyper-anthropocene/. A link to the paper by Hansen et. al is included in the article.

affects the ocean food web, to the one billion people in the world for whom fish and shellfish are the main sources of animal protein.[19]

## CLIMATE ACTION: WHAT WE CAN DO

Carbon emissions result from almost everything we do, since fossil fuel burning generates most of the electricity we use and powers nearly all of our transportation.[20] That's why we've poured enough carbon into the atmosphere to warm the earth's climate in only a few hundred years. But that same fact means that there are lots of ways to reduce those emissions, many of which are both easy and inexpensive. Our personal choices—which foods we eat, how we get around, energy and water-thrifty habits around the house—can reduce emissions (also see Appendix B). But scientists tell us that in order to have a chance of stabilizing the climate at no more than 2◦C (about 3.6◦F) above pre-industrial temperatures, we've got to have *policies* in place that can swing our whole society—individuals, corporations, governments—into the post-fossil fuel era, and quickly. Those policies are what Brisbane's Climate Action Plan is all about.



http://www.coolcalifornia.org/article/step-3-develop-a-climate-action-plan

### Reducing emissions from fossil fuels: Three Strategies

As author Ozzie Zehner points out in his valuable book *Green Illusions,*[21] images of windmills and solar panels come quickly to most of our minds when we consider climate change and what to do about it. Almost all climate analysts agree that coal, oil and natural gas must play rapidly-diminishing roles—roles so diminished that they completely disappear from our energy mix in less than a century. But that does not mean that climate policy should be envisioned simply as "changing out" our current fossil fuel energy sources for wind and solar. The ways we use energy, and how much we use, have to change, too. That is because although the sun delivers more energy to the earth daily than we can use, solar energy is diffuse—that is, every square meter of the earth's surface receives a relatively small amount of solar energy. Capturing enough of it to power an energy-hungry way of life therefore requires a lot of space, and rooftops alone will not be sufficient to power installations such as computer server farms. For example, the newly-operational Ivanpah solar-thermal plant south of Las

[19] http://www.pmel.noaa.gov/co2/story/What+is+Ocean+Acidification%3F
[20] Emissions from deforestation and agriculture are important parts of the overall climate change picture, too, as are methane emissions from landfills, which are addressed in the "Solid Waste" portion of the Brisbane CAP.
[21] University of Nebraska Press, 2012.

Vegas has a power-production capacity of 392 megawatts (MW), or enough to power about 140,000 homes (a medium-sized conventional power plant produces about 500 MW)—and it occupies roughly 4,000 acres, or five square miles, of land. Siting that plant was controversial, because it is located in an area where (federally-endangered) desert tortoises live. A number of them had to be relocated, and some did not survive. Similar problems are likely to arise at other sites, meaning that the fewer such power plants are necessary, the better off habitats and ecosystems are likely to be. Wind turbines, too, can damage ecosystems, largely because of bird kills, so they have to be sited carefully. Moreover, both wind and solar are *intermittent sources*, so solar plants and wind turbines don't always perform at capacity.[22] Energy storage and building transmission lines over large areas can help to even out or compensate for intermittency, but the main takeaway from all this is that measures to *minimize energy demand* are absolutely central to an effective emissions-reduction policy.

***The three main strategies to reduce carbon emissions from fossil fuels:***

****Efficiency—getting "more bang for the buck"***

****Conservation—reducing the need for, and use of, fossil fuel energy***

****Substituting no/low carbon renewables for fossil fuels***

As you read this Climate Action Plan, you will notice that while many of the recommended policies and measures, such as Brisbane's participation in studying a Community Choice Aggregation/Energy Plan for San Mateo County, are intended to support and facilitate the installation and use of low-carbon energy sources (primarily solar), others are intended to reduce emissions by minimizing demand. Measures to improve the efficiency—and thereby reduce energy use while maintaining the same level of service—in residential, commercial and government buildings, are central. Similarly, the Plan proposes that the City adopt policies to purchase a range of products that operate at high levels of energy efficiency. Behavioral changes are addressed in the Plan as well: it recommends measures like reducing exterior night-lighting, tree-planting to keep the city cool and reduce demand for energy-intensive air conditioning, and incentivizing local hiring to reduce commuting, transportation being one of the major sources of emissions in the Bay Area.

[22] http://www.reviewjournal.com/business/energy/giant-ivanpah-solar-plant-south-las-vegas-falls-short

## 1.1 Why the City of Brisbane has a Climate Action Plan

The City of Brisbane, with our partner the City and County Association of Governments (C/CAG) of San Mateo County, and with partial grant funding from the Bay Area Air Quality Management District (BAAQMD) and Pacific Gas and Electric Company (PG&E), has developed this Climate Action Plan in order to support cities in achieving a number of objectives, including:

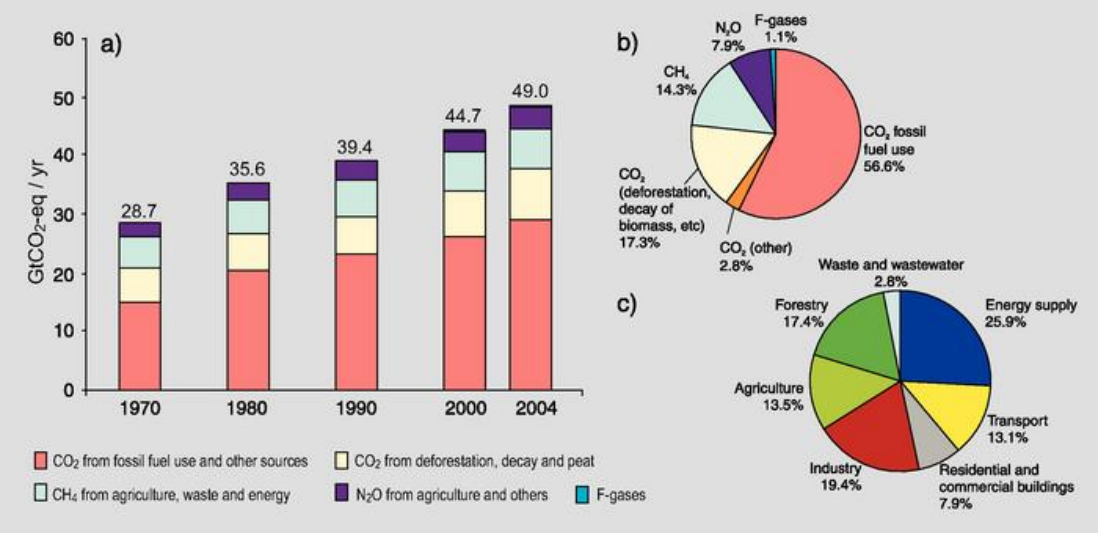
- **To demonstrate environmental leadership** – We as a community can rise to the difficult challenge of reducing the impact of climate change by taking reasonable steps to reduce our GHG emissions.
- **To save money and promote green jobs** - Residents, businesses, and government will reduce their utility costs through increased energy and water efficiency. A focus on efficiency creates job opportunities within the community that contribute to protecting our environmental resources.
- **To comply with letter and spirit of state environmental initiatives –** California is taking the lead in tackling climate change while driving the new energy markets and fostering new environmental services. As such, we have a responsibility to help the state meet its goals to reduce greenhouse gas emissions.

## 1.2 Climate Science

Climate change presents one of the most profound challenges of our time. A broad international consensus exists among atmospheric scientists that the Earth's climate system is being destabilized in response to elevated levels of greenhouse gas emissions in the atmosphere. This is primarily from the combustion of fossil fuels for energy use. Greenhouse gas emissions include carbon dioxide ($CO_2$) methane ($CH_4$), nitrous oxide ($N_2O$), and three man-made gasses: hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride ($SF_6$).

The following graphic from the Intergovernmental Panel on Climate Change (IPCC), the leading international scientific body on climate change, shows the growth and distribution of anthropogenic (human-caused) greenhouse gas emissions in the atmosphere.

**Figure 1: Growth and Distribution of Global Anthropogenic GHG emissions**




Source: International Panel on Climate Change, Fourth Assessment Report

The largest contributor to climate change is carbon dioxide emissions, followed by methane and nitrous oxide. Carbon dioxide is emitted through the combustion of fossil fuels such as coal and petroleum as well as through the decomposition of clear-cut forests (deforestation).

A recent comprehensive study of climate impacts on the United States, written by a task force of U.S. government science agencies, led by the National Oceanic and Atmospheric Administration (NOAA),[23] reaches the following key conclusions:

1. **Global warming is unequivocally and primarily human-induced**. Average global temperature has increased over the past 50 years. This observed increase is due primarily to human-induced emissions of heat-trapping gases.

2. **Climate changes are underway in the United States and are projected to grow.** Climate-related changes have already been observed in the United States and within its coastal waters. These changes include increases in heavy downpours, rising temperatures and sea level, rapidly retreating glaciers, thawing permafrost, lengthened growing seasons, lengthened ice-free seasons in the ocean and on lakes and rivers, earlier snowmelt, and alterations in river flows.

3. **Widespread climate-related impacts are occurring now and are expected to increase.** Climate changes are already affecting water, energy, transportation,

[23]U.S. Global Change Research Program 2009. "Global Climate Change Impacts in the United States", Page 12. http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts

agriculture, ecosystems, and health. These impacts are different from region to region and will grow under projected climate changes.

4. **Climate change will stress water resources.** Access to clean water is an issue in every region, but the nature of the potential impacts varies. Drought, related to reduced precipitation, increased evaporation, and increased water loss from plants, is an important issue, especially in the West. Floods and water quality problems are likely to be amplified by climate change in most regions. Declines in mountain snowpack are important in the West and Alaska, where snowpack provides vital natural water storage and supply.

5. **Crop and livestock production will be increasingly challenged.** Agriculture is considered one of the sectors most adaptable to changes in climate. However, increased heat, pests, water stress, diseases, and weather extremes will pose adaptation challenges for crop and livestock production.



http://www.themonitordaily.com/rising-temperatures-may-lead-to-a-20-foot-sea-level-rise/23753/

6. **Coastal areas are increasingly at risk from sea-level rise and storm surge.** Sea-level rise and storm surges place many U.S. coastal areas at increasing risk of erosion and flooding, especially along the Atlantic and Gulf Coasts, Pacific Islands, and parts of Alaska. Energy and transportation infrastructure and other property in coastal areas are very likely to be adversely affected. In an article by the Atmospheric Chemistry and Physics Discussions, Hansen et al.[24] concludes that persistent burning of fossil fuels will result in increasing temperatures and sea level rise of multiple meters. A sea level rise of this magnitude would require rebuilding of cities and shorelines.

7. **Threats to human health will increase.** Health impacts resulting from climate change are related to heat stress, waterborne diseases, poor air quality, extreme weather events, and diseases transmitted by insects and rodents.

8. **Climate change will interact with many social and environmental stresses.** Climate change will combine with pollution; population growth; overuse of resources;

[24] http://www.atmos-chem-phys-discuss.net/15/20059/2015/acpd-15-20059-2015.pdf

urbanization; and other social, economic, and environmental stresses to create larger impacts than from any of these factors alone.

9. **Thresholds will be crossed, leading to large changes in climate and ecosystems.** There are a variety of thresholds in the climate system and ecosystems. These thresholds determine, for example, the presence of sea ice and permafrost and the survival of species, from fish to insect pests. These all have implications for society.

10. **Future climate change and its impacts depend on choices made today.** The amount and rate of future climate change depends primarily on current and future human-caused emissions of heat-trapping gases and airborne particles. Responses involve reducing emissions to limit future warming and adapting to the changes that are unavoidable.

According to the current scientific consensus, a 2°C increase in average global temperature over the next century is a "safe" level of global warming. To limit the average global temperature increase to 2°C, GHG concentrations need to be stabilized at a level well below 450 parts per million (ppm). As of 2012, global atmospheric concentration of $CO_2$ stands at 390.5 ppm[25]. Achieving this level requires global GHG emissions to be reduced by at least 50 percent below their 1990 levels by the year 2050.

## 1.3 Projected San Francisco Bay Area Climate Impacts

Historical records show that sea level in San Francisco Bay has risen about seven (7) inches (18 cm) over the past 100 years. Scientists agree that the rate of sea level rise is accelerating, but projections of future sea levels vary considerably. Present projections used by the State of California[26] are for 14 inches of sea level rise by 2050 (using 2000 as the baseline) and for between 40 and 55 inches by 2100, depending upon the emissions scenario used. In 2009, the Bay Conservation and Development Commission (BCDC) released *Living With a Rising Bay*, an assessment that included the following[27]:

- Increased flooding risk for 270,000 Bay Area residents with a 55 inch rise
- Estimated $36 billion in at-risk property by 2050, and $62 billion by 2100
- Estimated 95% of tidal wetlands vulnerable to sea level rise, which may increase flooding and erosion

[25] Carbon Dioxide Information Analysis Center of the Oak Ridge National Laboratory and the U.S. Department of Energy: http://cdiac.ornl.gov/pns/current_ghg.html

[26] Sea-Level Rise Task Force of the Coastal and Ocean Working Group of the California Climate Action Team (CO-CAT), 2010. State of California Sea-Level Rise Interim Guidance Document. October 2010.

[27] San Francisco Bay Conservation and Development Commission. 2009. (April) Draft Staff Report. Living with a Rising Bay: Vulnerability and Adaptation in San Francisco Bay and on its Shoreline. Available at: http://www.bcdc.ca.gov/proposed_bay_plan/bp_1-08_cc_draft.pdf

The Pacific Institute, with support from the California Energy Commission (CEC), California Department of Transportation, and the Ocean Protection Council, has produced inundation maps for the shores of San Francisco Bay that indicate which areas are vulnerable to 16-inch and 55-inch rises in sea level.[28] The Bay shoreline, from Brisbane to East Palo Alto, is a typical San Francisco Bay low-lying shoreline which provides vital ecological, industrial, and residential functions, yet is already vulnerable to inundation from both tidal and fluvial sources. Both the San Francisco Airport and the Port of Redwood City are at risk, as are segments of critical transportation infrastructure including segments of Highway 101, approaches to the Dumbarton and San Mateo Bridges, and the Caltrain commuter rail line.

According to a 2009 study[29] by the CEC, the Pacific Institute and others, 110,000 people live in areas of San Mateo County that are vulnerable to a 100-year flood event with a 1.4 meter rise in sea level. The County infrastructure and facilities at risk from the same event include:

- $24 billion worth of buildings and contents, mostly along the Bay (replacement value);
- 530 miles of roadways;
- 10 miles of railroads;
- San Francisco Airport (SFO), including the 31 MegaWatt United Cogen power plant located there;
- Wastewater treatment plants operated by the Cities of South San Francisco/San Bruno, City of Millbrae, City of San Mateo, South Bayside System Authority, Mid-Coastside Sewer Authority, and SFO (total treatment capacity of approximately 44 Million Gallons per Day);
- 78 EPA-regulated hazardous materials sites;
- 34 square miles of coastal wetlands.

[28] Maps available at http://www2.pacinst.org/reports/sea_level_rise/hazmaps/San_Francisco_South.pdf
[29] Heberger, Matthew, Heather Cooley, Pablo Herrera, Peter H. Gleick, and Eli Moore (2009). The Impacts of Sea Level Rise on the California Coast. PIER Research Report, CEC-500-2009-024-D, Sacramento, CA: California Energy Commission.




**Figure 2: Projected Sea Level Rise - San Mateo County Shoreline[1]**

The range of current sea level rise estimates presents very different scenarios to cities, which must decide how to expend limited resources to protect critical land uses and infrastructure. As the shoreline migrates landward, habitats and flood hazard areas will also shift. Past development of residential, commercial, and public access infrastructure may limit the flexibility of set-backs or adjustments to the Bay shoreline.

### 1.3.1 Extreme Heat & Storm Events



California in general should expect overall hotter and drier conditions with a reduction in winter rain (and concurrent snow in the mountains), as well as increased average temperatures. There is a high likelihood that extreme weather events, including heat waves, wildfires, droughts, and floods will be among the earliest climate impacts experienced.[30] In San Mateo County, higher average sea levels mean that storms will impact the Pacific coast and Bay shoreline more severely, with higher storm surges, more extensive inland flooding, and increased erosion. If more frequent or severe natural disasters occur, more emergency and public health services will be needed to deal with the consequences.



Heat related illness and mortality are expected to increase. Though extreme heat events in coastal areas like San Mateo County are not expected to be as severe or as long-lasting as further inland, the residential population is not as well prepared or equipped to deal with higher temperatures. Air conditioning is far less common, for example. Outdoor workers, elderly populations, and infants are particularly vulnerable to extreme temperatures.

Higher temperatures and drier summer conditions produce higher levels of ozone, which can exacerbate respiratory illnesses, particularly among vulnerable populations such as children and the elderly. Higher temperatures and drier conditions can also increase the potential for wildfires, which could lead to declines in air quality and also cause negative impacts to respiratory and cardiovascular health.

Local agriculture is also likely to be impacted by extreme weather events, with higher temperatures and less water availability for agricultural production resulting in lower production and a potential decline in food security.

[30] California Natural Resources Agency, 2009, *California Climate Adaptation Strategy*, http://www.climatechange.ca.gov/adaptation/

### Additional Resources about Climate Change

- International Panel of Climate Change Fourth Assessment Report: http://www.ipcc.ch/publications_and_data/publications_and_data_reports.shtml
- U.S. Global Change Research Program http://www.globalchange.gov/publications/reports/scientific-assessments/us-impacts
- Pew Center on Climate Change: http://www.pewclimate.org/
- National Ocean and Aeronautical Administration (NOAA) http://www.climate.gov/#Data_And_services
- U.S. Environmental Protection Agency: http://www.epa.gov/climatechange/indicators.html
- Real Climate http://www.realclimate.org/

## 1.3.2 Public Health




http://www.arb.ca.gov/research/aaqs/caaqs/ozone/ozone-fs.pdf

Most Californians are not aware of recent statistics that suggest that California is home to the worst air quality in the nation, with over 90% of Californians breathing unhealthy air.

According to the California Air Resources Board, unhealthy levels of ozone (smog) and particulate matter annually contribute to:

- 19,000 premature deaths
- 9,400 hospital admissions for respiratory and cardiovascular disease
- 280,000 asthma and other lower respiratory symptoms
- 22,000 cases of acute bronchitis
- Millions of school and work days lost due to respiratory conditions[31]

In addition, climate change, including increased summer temperatures, can have adverse effects for the health of City of Brisbane's residents and workers, especially the vulnerable populations such as children, seniors, and those with existing chronic illnesses, as mentioned in Section 1.3.1.

San Mateo County Health System, in accordance with the Centers for Disease Control, serves a number of functions to reduce health risks related to climate change. These include informing cities about the risk to public health from climate change, creating tools that support decision-

[31] American Lung Association. Land Use, Climate Change & Public Health Issue Brief: Improving Public Health and combating climate change through sustainable land use and transportation planning. Spring 2010.

making and capacity building related to mitigating adverse health outcomes from climate change, and serving as a credible leader in planning for the public health impacts of climate change.

The City of Brisbane intends to work with the San Mateo County Health System to mitigate public health dangers and maintain or improve long-term health by encouraging local residents and workers to be part of the solution. Research shows that individuals who live in mixed-use and walkable communities have a 35 percent lower risk of obesity.[32] Another study estimates that the walking associated with transit use saves individuals $5,500 over the course of their life by reducing obesity-related medical costs.[33]

City of Brisbane and the Health System will support programs that promote more walkable and bikeable cities, which not only promote healthier lifestyles, but also decrease reliance on vehicles that contribute to climate change.

## 1.4 State Policy and Regulatory Context

The State of California has been a leader in developing and implementing policies and regulations to directly address the risk of severe climate change. Below we summarize the key statewide legislation aimed to reduce GHG emissions. There are many supporting pieces of legislation and other related initiatives that are sector specific. These are more fully described in Chapter 3.

### Assembly Bill 32, the California Global Warming Solutions Act of 2006

In September 2006, the California legislature passed Assembly Bill (AB) 32, which set the goal of reducing GHG emissions back to 1990 levels by 2020. AB 32 finds and declares that "global warming poses a serious threat to economic well-being, public health, natural resources and the environment of California." The legislation granted authority to the Air Resources Board to establish multiple mechanisms (regulatory, reporting, voluntary and market) to achieve quantifiable reductions in GHG emissions to meet the statewide goal.

### Assembly Bill 1493, the Pavley Bill

In 2002, the California legislature enacted Assembly Bill (AB) 1493 (aka "the Pavley Bill"), which directs the Air Resources Board to adopt standards that will achieve "the maximum feasible and cost-effective reduction of greenhouse gas emissions from motor vehicles," taking into account

[32] Frank, Lawrence D., et al. Obesity relationships with community design, physical activity, and time spent in cars. American Journal of Preventive Medicine, Volume 27, Issue 2, Pages 87-96, August 2004.

[33] Active Living Research; Robert Wood Johnson Foundation, 2009

environmental, social, technological, and economic factors. In September 2009, the Air Resources Board adopted amendments to the "Pavley" regulations to reduce GHG emissions in new passenger vehicles from 2009 through 2016.

### Senate Bill 375

In September 2008, Senate Bill (SB) 375 was signed into law to provide emissions reduction goals related to vehicle-miles traveled on a regional planning level. The bill seeks to align regional transportation planning efforts with regional GHG reduction targets and land use and housing allocations. SB 375 requires metropolitan planning organizations (MPOs) to adopt a sustainable communities strategy or alternative planning strategy. The Air Resources Board, in consultation with the MPOs, has set a per capita GHG reduction target for emissions of passenger cars and light trucks in the San Francisco Bay Area of 7 percent below 2005 levels by 2020, and 15 percent below 2005 levels by 2035. In July of 2013, Plan Bay Area, a long-range integrated transportation and land-use/housing strategy through 2040 for the San Francisco Bay Area, was jointly approved by the Association of Bay Area Governments (ABAG) Executive Board and by the Metropolitan Transportation Commission (MTC). The Plan includes the region's Sustainable Communities Strategy and the 2040 Regional Transportation Plan and represents the next iteration of a planning process that has been in place for decades.

### California 33 Percent Renewable Portfolio Standard (RPS)

California's Renewable Portfolio Standard (RPS) was originally established by legislation enacted in 2002. Subsequent amendments to the law have resulted in a requirement for California's electric utilities to have 33 percent of their retail sales sourced from eligible renewable resources in 2020 and all subsequent years. Renewable resources include wind, solar, geothermal, wave, and small hydroelectric power.

## 1.5 Regional Efforts

The following regional efforts promoting GHG reductions are already under way:

**City/County Association of Governments of San Mateo County (C/CAG).** C/CAG is a council of governments consisting of the County of San Mateo and its 20 cities. The organization deals with topics such as transportation, air quality, stormwater runoff, hazardous waste, solid waste and recycling, land use near airports, abandoned vehicle abatement, and issues that affect quality of life in general. C/CAG supports a number of sustainability initiatives including the following:

- ***San Mateo County Energy Watch.*** This program is a local government partnership between PG&E and C/CAG to promote energy efficiency in municipal and non-profit

buildings. The program is managed and staffed by RecycleWorks, a program of the County of San Mateo.

- ***Congestion Management Agency.*** C/CAG serves as the Congestion Management Agency for San Mateo County to identify strategies to respond to future transportation needs, develop procedures to alleviate and control congestion, and promote countywide solutions.

**Energy Upgrade California in San Mateo County.** This San Mateo program aims to help residential consumers make improvements to their homes so they will use less energy, conserve water and other natural resources, and become healthier and more comfortable. The program connects homeowners with participating contractors who can help plan and complete energy efficiency projects and take advantage of rebates. Energy Upgrade California is a partnership among California counties, cities, non-profit organizations and the state's investor-owned utilities (e.g. PG&E).

**Joint Venture: Silicon Valley Network.** Established in 1993, Joint Venture: Silicon Valley Network provides analysis and action on issues affecting the local economy and quality of life. The organization brings together established and emerging leaders -- from business, government, academia, labor, and the broader community -- to spotlight issues and work toward innovative solutions. Joint Venture is dedicated to promoting climate-friendly activities that help the local economy and improve quality of life in Silicon Valley.

**PG&E's Sustainable Communities Team.** A PG&E Community Energy Manager has been assigned to San Mateo County to work jointly with each municipality to develop a comprehensive energy management strategy that the city can implement across institutional, residential, business, and industrial sectors. In addition, PG&E can provide city and county energy usage data, GHG inventory assistance and information on innovative pilot grant funding for projects that help to reduce GHG emissions in each community.

**Silicon Valley Leadership Group (SVLG) Bay Area Climate Change Compact.** SVLG is an organization consisting of principal officers and senior managers of member companies to work cooperatively with local, regional, state and federal government officials to address major public policy issues affecting the economic health and quality of life in Silicon Valley. In 2009, SVLG organized the Bay Area Climate Change Compact, which establishes a framework for regional cooperation and setting aggressive goals for the reduction of greenhouse gas emissions.

**Sustainable San Mateo County (SSMC).** SSMC was established in 1992 by a group of San Mateo County citizens who sought to create a broader awareness of the sustainability concept. SSMC supports multiple programs to promote energy efficiency, alternative transportation and

education on sustainability concepts which focus on the intersections of the environment, the economy and social equity. SSMC's Energy Ambassador program supports the Energy Upgrade California program by providing homeowners free personal energy reviews and education on home energy efficiency.

**Sustainable Silicon Valley (SSV).** In 2004, SSV organized a regional voluntary initiative, setting a visionary target of reducing $CO_2$ emissions by 20% below the region's 1990 levels by the year 2010. SSV partners participating in the voluntary $CO_2$ emissions reduction program determine their own baseline year and a $CO_2$ percentage reduction goal to reach by 2010. Each pledging partner also chooses how they will meet this target. Options abound – from improvements in equipment efficiency to energy conservation, the use of renewable energy sources, and purchase of green power and/or promotion of alternative commute options.

## 1.6 Local Efforts

While cities may be vulnerable to climate impacts, they also can play a critical role in reducing the emissions that exacerbate climate impacts. With their concentrations of people and activities at high densities, cities can use resources such as energy, materials, and land more efficiently. Cities are places where high-level knowledge-based activities congregate, along with the expertise needed to tackle climate change. This is especially true in the San Francisco Bay Area.

AB 32 identifies local governments as essential partners in achieving California's goal to reduce GHG emissions. Cities have varying degrees of responsibility for the collection and processing of waste and have responsibility for other environmental infrastructures, such as energy and water. Cities own and manage buildings and vehicle fleets and are able to form partnerships with private interests to mobilize and coordinate community action. Furthermore, cities are uniquely positioned to promote economic development that emphasizes sustainable development and local green-collar jobs.

To date, the City of Brisbane has undertaken the following sustainability efforts:



Photo of San Bruno Mountain. Credit to: D. Coetzee

## City Sustainability Initiatives

### Energy:

The City of Brisbane has completed several measures to reduce energy use. The City Hall facility was remodeled with an energy efficient HVAC system and motion sensing office lighting and a lighting control system for common areas. The building was subsequently awarded an Energy Star for reduced energy use. Energy audits and retrofits to improve energy performance and reduce greenhouse gas emissions have occurred at most other Brisbane municipal facilities, including site and interior lighting upgrades and HVAC control improvements.

The majority of street lights in Brisbane have been converted to LEDs to reduce energy use and increase longevity of the bulbs.

Solar thermal panels and a variable frequency drive for the circulation pump have been installed at the Brisbane Community Pool to reduce energy costs related to heating the pool. In addition, a thermal pool cover was purchased to place over the pool when not in use.

In 2013 Brisbane began participating in the ZipCar car share program with the placement of two hybrid vehicles in a visible, high traffic area. The cars can be utilized for a fee by community and staff members.

After the latest California Building Energy Efficiency (Title 24) code updates became effective on July 1, 2014, Brisbane hosted training on “Compliance Enhancement Strategies for Residential Buildings”, administered by the Bay Area Regional Energy Network. The City of Brisbane also promotes energy saving programs such as: CaliforniaFIRST energy efficiency financing, Peninsula SunShares bulk solar purchase program, Energy Upgrade California and the San Mateo County Energy Watch Challenge for small businesses.

### Water Use:

Brisbane remains among the lowest per capita water users in San Mateo County. We continue to participate in regional water conservation programs offering rebates to qualified customers for high-efficiency clothes washers, high-efficiency toilets and rain barrels, as well as offer landscape audits to our largest commercial users.

Guidelines have been developed by the city to support the capture and reuse of rainwater in a safe and effective manner. The instructional guidelines provide residents with education and information on how to conserve potable water by collecting, storing and utilizing rainwater for

outdoor applications.

Brisbane's water conservation program involves public education and outreach, an ordinance prohibiting water waste, as well as a water-efficient landscaping ordinance that requires large landscape plans to show use of drought-tolerant plants and water-efficient irrigation.

Brisbane partnered with a local conservation group that is recovering and restoring an earthen vee-ditch (previously mowed down to nearly bare earth every year) with native plant materials. There has been no noticeable decrease in the stormwater capacity of this facility, but there has been a substantial increase in the output of the water quality after stormwater winds its way through the planted bottom of the "vee creek". A significant corollary benefit is that the in-stream plants are now home to several species of native animals, including insects, amphibians, and birds.

A rain garden and bioswale at Brisbane City Hall captures runoff water from the roof and parking lot before it enters the City's storm drain system. The engineered bioretention areas collect and treat runoff by filtering it through selected vegetation, thus keeping pollutants out of the San Francisco Bay. The project was funded in part by a San Mateo County Stormwater Pollution Prevention Program Demonstration Project grant and features an informational sign.

**Waste Reduction:**

The City of Brisbane renegotiated its franchise agreement with South San Francisco Scavenger (SSFS) in 2014. As a result, SSFS implemented a residential food scraps collection program in January 2015. Food waste bins were provided to all Central Brisbane residents to collect scraps before placement in the green compost collection bin in advance of the scheduled pick-up. Green waste bins are picked up weekly, as compared to every two week before the food scrap program was put in place.

Brisbane City Council adopted a plastic bag ban in 2013 and a polystyrene ban in 2014. Both of these ordinances are modeled after and administered by San Mateo County's Environmental Health Division. Adoption of such ordinances has been shown to reduce trash accumulation in landfills and waterways, as well as benefit wildlife from the reduced litter.

According to the South San Francisco Scavenger company, Brisbane's 2013 diversion rate was 80%, which is statistically low for the Bay Area. Residents may recycle batteries, light bulbs, and plastic bags at a waste collection site at City Hall, local hardware store and/or the local post office.

Brisbane's construction and demolition ordinance requires the following: For demolition, 100% of inert solids and 50% of debris must be diverted. Construction and remodeling requires 50% diversion of all construction and demolition debris. Salvage and recovery requirements for a demolition project are as follows: prior to demolition an applicant shall make the structure planned for demolition available for salvage and recovery.

City Council and upper and middle management staff utilize iPads to view agenda packages rather than printed copies. The Open Space and Ecology Committee (OSEC) has opted to make their meeting packet electronic. During OSEC meetings, Power Point software and monitors are utilized to view materials.

City staff computers are refurbished rather than replaced new. Copy paper products purchased are recycled. Packaging materials and mailing envelopes are recycled. Building plan check is performed digitally rather than on paper. City makes large documents of community interest available for digital download and prints copies upon request only.

**Sustainable Streets/Transportation:**

Brisbane pays into a shuttle consortium with other businesses in Crocker Industrial Park to participate in the Peninsula Congestion Relief Alliance Shuttle service to transport residents and workers to and from the Brisbane Caltrain stop and the nearest BART station. Brisbane distributes shuttle pass cards to employees and residents of Brisbane upon request.

The city recently adopted a Safe Pedestrian Routes to Schools Plan to improve pedestrian routes and make them safer for children to walk to school and bus stops, as well as pedestrians walking to markets, the library, community centers, the community park and various other parks and ball fields, and the community pool.

Brisbane recently installed rapid reflective flashing beacons for two crosswalks at intersections; one adjacent to the elementary school, and one close to and on the middle school route, at an uncontrolled crossing in the downtown business district. Providing improved safety measures at these street crossings will encourage more walking and bicycling for short trips and reduce reliance on the automobile.

**All Sector:**

The City Council adopted a Baylands Sustainability Framework based on the ten One Planet Communities principles for the large portion of undeveloped land in its northeast quadrant.

The city has adopted an ordinance to set fixed solar permit fees for residential permits and will provide expedited solar permitting review to promote adoption of rooftop photovoltaic systems, per solar streamlining bill AB 2188.

The City of Brisbane, together with the City and County of San Francisco, obtained Priority Development Area (PDA) status from the Association of Bay Area Governments for 574 acres of Bi-County Baylands property. PDA status is generally conferred on infill development opportunity areas that are primed for a pedestrian and bicycle-friendly environment served by transit.

In addition to significant aquatic and open space resources at the Baylands, the City has acquired approximately 48 acres of land on San Bruno Mountain to protect as open space per the City adopted Open Space Plan. This property is within the San Bruno Mountain Habitat Conservation Plan (HCP), and provides habitat for endangered butterfly species and host plants.

Brisbane has established a vegetation management program to control the encroachment of invasive plants and sustain the native habitat value of the City's open space on San Bruno Mountain adjacent to San Bruno Mountain State and County Park. A vegetation management plan is developed each year by a community advisory committee, and the restoration work is then carried out by contractors.

Brisbane continues to maintains and expand its extensive array of open space and outdoor facilities in the form of parks, athletic fields (soccer and softball), tennis courts, basketball courts, a community pool, a skatepark, walking and biking paths along the bay shore and paths and trails adjacent to San Bruno Mountain.

The City of Brisbane, together with San Mateo County and the City of South San Francisco, has applied for Priority Conservation Area status for the San Bruno Mountain area/habitat from the Association of Bay Area Governments and the Metropolitan Transportation Commission. Brisbane's portion of the application seeks to include a number of areas adjacent or related to San Bruno Mountain that host native plants and habitat for endangered species, including the several endangered butterflies whose habitat exists on these properties. Several of the areas have the additional benefit of serving as recreation opportunities.

In spring 2012, the City of Brisbane launched a year round weekly Farmers Market, in partnership with the West Coast Farmers Market Association. The close knit residential community and large business community have been enjoying local organic produce, fresh food and other related products while minimizing Brisbane's carbon footprint.

The city permits the raising of fowl and beekeeping and has a thriving community garden and community orchard. Chapter 6.14 of the Municipal Code allows up to a total of four fowl, birds, rabbits or rodents on one property, unless special permits are obtained. Bees are kept on city property adjacent to the local community garden and are maintained by community members.

The Open Space and Ecology Committee (OSEC) has an Education and Outreach subcommittee that educates the public on sustainability and environmental issues. OSEC provides input to staff regarding a Sustainability page on the city's website, an environmental library shelf at Brisbane branch of the San Mateo County public library system, and writes articles and creates materials for print and social media.

The Open Space and Ecology Committee hosts three to four events per year: Earth Day, Habitat Restoration Day, a Lagoon Cleanup Day and an informational booth at the annual Day in the Park. Earth Day and Habitat Restoration Day target local outdoor areas in need of invasive non-native plant species and litter removal. Litter is removed from Brisbane Lagoon on Lagoon Cleanup day, which coincides with the California Coastal Commission Cleanup Day. Day in the Park is a community festival in which OSEC develops displays and hands out materials on sustainability and environmental issues to the public. The Brisbane community is greatly involved in all these events.

Citizen groups involved:
City Council, the Planning Commission, Green Building Ordinance Subcommittee, Sustainability Subcommittee, the Open Space and Ecology committee has all been instrumental in working with staff to develop these initiatives. The Open Space and Ecology committee had significant input into this Climate Action Plan.

## 1.7 City of Brisbane's Climate Action Plan Process

This climate action plan was developed in partnership with the City and County Association of Governments of San Mateo County (C/CAG). The C/CAG RICAPS template and Brisbane's climate strategy is based on the ICLEI ─ Local Governments for Sustainability (previously known as International Council for Local Environmental Initiatives) 5-Milestone process as seen in the framework below.

### 1.7.1 Framework for Climate Action

The ICLEI 5-Milestone process is a management process based on increasing knowledge through each step to achieve the targeted GHG emissions reductions.

**Figure 0: Iterative Management Processes for Climate Action (Source: ICLEI)**




- **Leadership Commitment:** Define the overall vision and goals for the community.
- **Milestone 1 (Inventory Emissions):** Conduct a baseline emissions inventory and forecast.
- **Milestone 2 (Establish Target):** Adopt an emissions reduction target for the forecast year.
- **Milestone 3 (Develop Climate Action Plan):** Identify feasible and suitable strategies and supporting actions to reduce emissions and achieve co-benefits aligned with the overall vision and goals.
- **Milestone 4 (Implement Climate Action Plan):** Enact the plan.
- **Milestone 5 (Monitor/Evaluate Progress):** Establish feedback loops to assess and improve performance, including an assessment and adjustment of the necessary human, financial and data resources.

In November 2009, all San Mateo County member jurisdictions completed their 2005 community and municipal GHG inventories as part of a joint effort with ICLEI, Joint Venture Silicon Valley Network, and the County of San Mateo, funded by C/CAG. This C/CAG assisted Brisbane and other member jurisdictions with Milestones 2 and 3. The City of Brisbane is responsible for implementing the actions identified in this climate action plan to complete Milestone 4.

To support Milestone 5, C/CAG is working with jurisdictions to study online forecasting and calculation tools to allow its jurisdictions to track total community GHG emissions. A chosen tool will assist cities to monitor the effectiveness of emissions reduction efforts by tracking GHG emissions and emission reductions achieved from various strategies.




OSEC committee member at the OSEC booth on Day in the Park community event.

### 1.7.2 Public Outreach and Community Engagement

The OSEC citizen advisory committee's Climate Action Plan (CAP) subcommittee worked together with staff to develop this Climate Action Plan. Review of drafts of the CAP took place during televised public OSEC meetings. Videos of the meetings were replayed on community cable access Channel 27 and are available on the city's website together with the meeting materials. Outreach via the city's weekly Community Engagement email blast, city publications and newsletters, city Facebook page, city website, community channel and local sign boards was performed to encourage community members to attend meetings to give input on the CAP. A slide requesting community input was also circulated on the community cable access channel. The completed CAP will be reviewed for consideration for adoption by City Council at a public meeting.

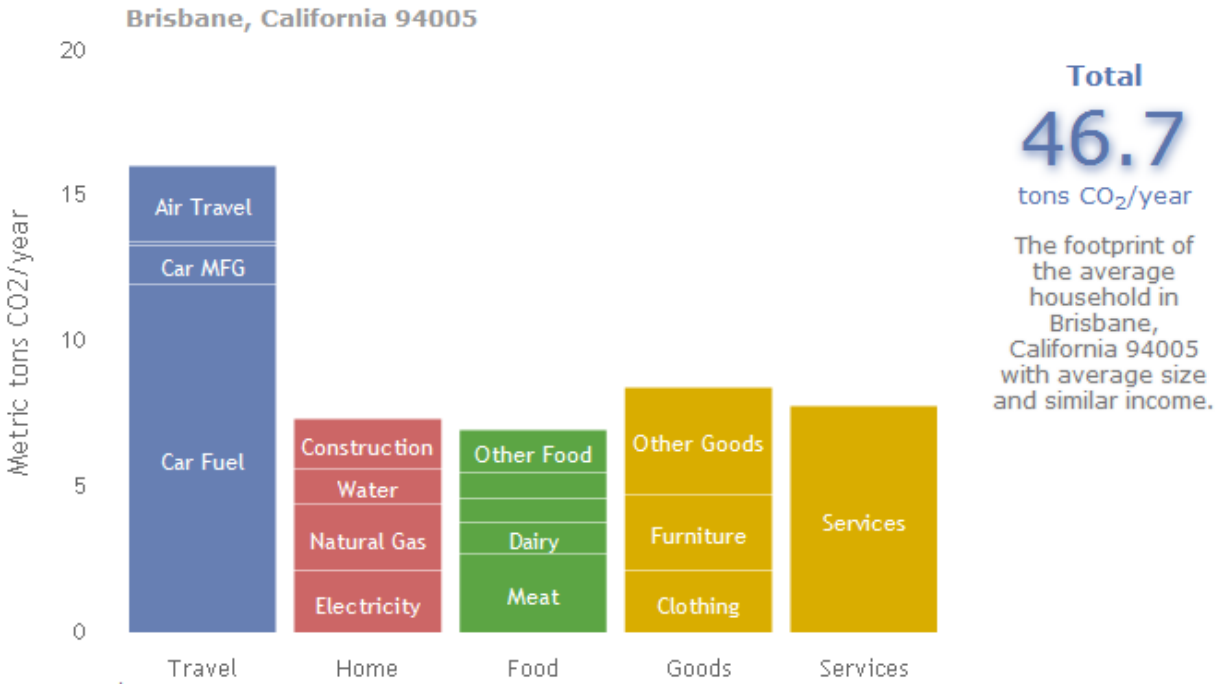
The CAP proposes an ad hoc citizen oversight committee during implementation consisting of members from the community, and including minorities and youth.

The plan will also outline outreach and education initiatives for the community to instill behavior change and encourage participation.

# 2 Greenhouse Gas Inventory and Forecast

The emissions inventory provides an important foundation for the climate action plan, providing a baseline year (2005), against which progress toward the City goal of reducing greenhouse emissions 15% by 2020 can be measured. The completed plan will include a business-as-usual (BAU) forecast of GHG emissions, which will enable the City of Brisbane to estimate the amount of emissions reductions needed to meet its goal.

Greenhouse gas reductions are measured in units of Metric Tons of Carbon Dioxide equivalents (MT $CO_2e$). The average household in Brisbane has a carbon footprint of 46.7 metric tons of carbon dioxide equivalents per year. This number is based on lifestyle and consumption of resources, travel modes, energy consumption, dietary choices, and goods and services used.




http://coolclimate.berkeley.edu/calculator (2013)

To better grasp the scale and size of a metric ton of carbon dioxide equivalents, the cube in the photo below represents one metric ton of carbon dioxide:



http://greenblizzard.com/carbon-basics/

## 2.1 Inventory Sources and Data Collection Process

An inventory of GHG emissions requires the collection of information and data from a variety of sectors and sources. The emissions inventory completed for the City of Brisbane follows the standard outlined in the BAAQMD's GHG Plan Level Quantification Guidance (dated May 2012) as well as the Local Government Operations Protocol[34].

[34] Local Government Operations Protocol – For the quantification and reporting of greenhouse gas emissions inventories (Version 1.0). Developed in partnership by California Air Resources Board, California Climate Action Registry, ICLEI – Local Governments for Sustainability, and The Climate Registry. September 2008. Note that a newer version (version 1.1, dated May 2010) of the LGOP is available; however, at the time the GHG inventory was completed for the City of [CITY], version 1.0 was the only version available.

Table 1 summarizes the sectors, emissions sources, and energy types included in our GHG inventory.

**Table 1: Sectors and Emissions in the GHG Inventory**

| Sector | Emissions sources | Energy types |
|---|---|---|
| Residential | Energy and water use in residential buildings | Electricity<br>Natural gas |
| Commercial | Energy and water use in commercial, government and institutional buildings | Electricity<br>Natural gas |
| Industrial | Energy and water use in industrial facilities and processes | Electricity<br>Natural gas |
| Transportation and Land Use* | All road vehicles<br>Public transportation<br>Light rail<br>Off-road vehicles/equipment | Gasoline<br>Diesel<br>Compressed natural gas<br>Liquefied natural gas<br>Biodiesel |
| Waste | Landfills<br>Waste stream | Landfill gas (methane) |

* Some sectors may be updated in a new version of the BAAQMD GHG Plan Level Quantification Guidance.[35]

While the BAAQMD GHG Plan Level Guidance recommends the inclusion of GHG emissions from water processing, delivery and wastewater treatment that occurs outside of the city's boundary, these emissions are not included in Brisbane's baseline inventory due to lack of data on the energy used for water processing and delivery and wastewater treatment in the baseline year. The following are emission sources that are mentioned in the BAAQMD GHG Plan Level Guidance, but were excluded from the Brisbane's inventory because they are not applicable in Brisbane: airports and sea ports, non-road vehicle use (planes, trains, ships), and water travel.

ICLEI recently developed the U.S. Community Protocol[36], which is the first U.S.-specific protocol for developing community-wide greenhouse gas emissions estimates. All future inventories should utilize this protocol. Future inventories will also utilize the most recent version of the Local Government Operations Protocol, as well as any updated guidance from the BAAQMD.

The industry-accepted methodology for quantifying a community-wide GHG emissions inventory focuses on emissions that occur from combustion sources within city limits and from electricity consumption. In the future, there may be the opportunity and need to quantify GHG emissions associated with the goods and products procured by communities and its residents. This type of lifecycle emissions accounting is not included in this climate action plan.

[35] For updates to the GHG Plan Level Quantification Guidance, check the BAAQMD website: http://www.baaqmd.gov/Divisions/Planning-and-Research/CEQA-GUIDELINES/Tools-and-Methodology.aspx

[36] U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions (Version 1.0). Developed by ICLEI – Local Governments for Sustainability. October 2012.

## 2.2 Baseline Emissions Inventory for 2005

In the base year of 2005, the City of Brisbane emitted approximately 70,946 metric tons of carbon dioxide equivalents ($CO_2e$) from the residential, commercial, industrial, transportation, waste, and municipal sectors.[37] Municipal sector emissions are calculated and reported because the City of Brisbane generally has more control over these emissions than emissions from the other sectors, and thus the City of Brisbane can implement specific policies and programs to reduce these municipal emissions. However, in the context of the community-wide inventory, the municipal emissions are included in the commercial/industrial sector. Burning fossil fuels in vehicles and for energy use in buildings and facilities is the largest contributor to Brisbane's GHG emissions. Table 2 provides a summary of total citywide (i.e. community and municipal) GHG emissions.

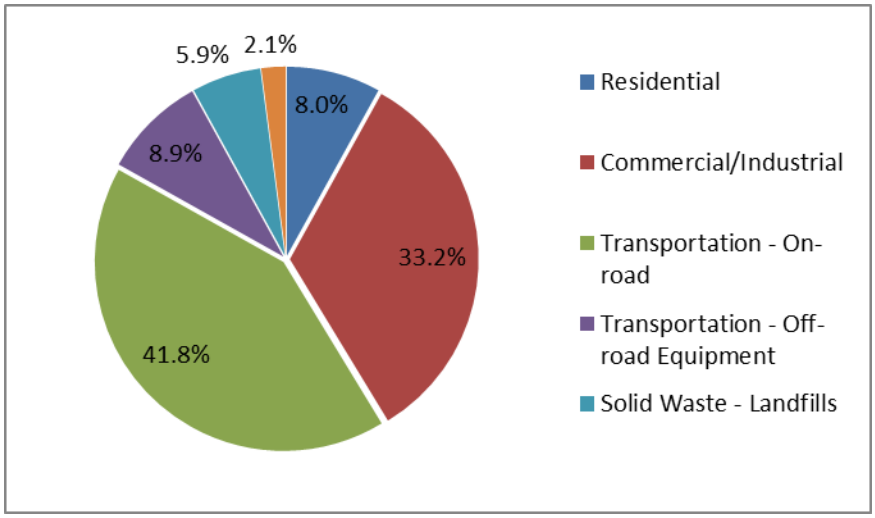
**Table 2: 2005 Community Emissions by Sector**

| Sector | Greenhouse Gas Emissions (metric tons $CO_2e$ ) | Percentage of Greenhouse Gas Emissions |
|---|---|---|
| Residential | 5,711 | 8.0% |
| Commercial/Industrial | 23,588 | 33.2% |
| Transportation – On road | 29,665 | 41.8% |
| Transportation – Off-road equipment | 6,287 | 8.9% |
| Solid Waste – Landfills | 4,212 | 5.9% |
| Solid Waste – Generated Waste | 1,483 | 2.1% |
| **TOTAL** | **70,946** | 100% |

The residential, commercial, and industrial sectors represent emissions that result from electricity and natural gas used in both private- and public-sector buildings and facilities. The transportation sector includes emissions from private, commercial, and fleet vehicles with trips originating and/or terminating within Brisbane's city boundaries as well as the emissions from transit vehicles and the City-owned fleet. Off-road equipment includes lawnmowers, garden equipment, and construction, industrial, and light commercial equipment. Figure 4 shows the proportion of Brisbane's total GHG emissions from all major sources for 2005.

[37] Carbon dioxide equivalent is a unit of measure that normalizes the varying climate warming potencies of all six GHG emissions, which are carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride ($SF_6$). For example, one metric ton of methane is equivalent to 21 metric tons of $CO_2e$. One metric ton of nitrous oxide is 210 metric tons of $CO_2e$.

**Figure 4: Community Emissions by Sector[38] 2005**




As shown above, the two largest categories of emissions are on-road transportation and building energy use (both residential and commercial/industrial).

### 2.2.1 Electricity and Natural Gas Emissions

The emissions from electricity and natural gas were calculated based on guidance in the Community GHG Protocol, and reported by the BAAQMD. Emissions from stationary combustion of natural gases were calculated based on methods in the GHG Community Protocol.

Commercial/industrial and residential activity data was obtained from Pacific Gas and Electric Company (PG&E). Direct access data for commercial/industrial accounts was provided by the California Energy Commission (CEC) for the entire county, which was then apportioned to Brisbane. Direct access service is an optional service that allows customers to purchase electric supplies and additional energy services on the wholesale market, rather than from PG&E. Direct access is currently not available for residential customers. Natural gas consumption data was provided by PG&E.

For Direct access $CO_2$, and all electricity-related $CH_4$ and $N_2O$ emissions, the California grid-average electricity emission factors were used (total state-wide electricity-related GHG emissions divided by the total electricity consumption).

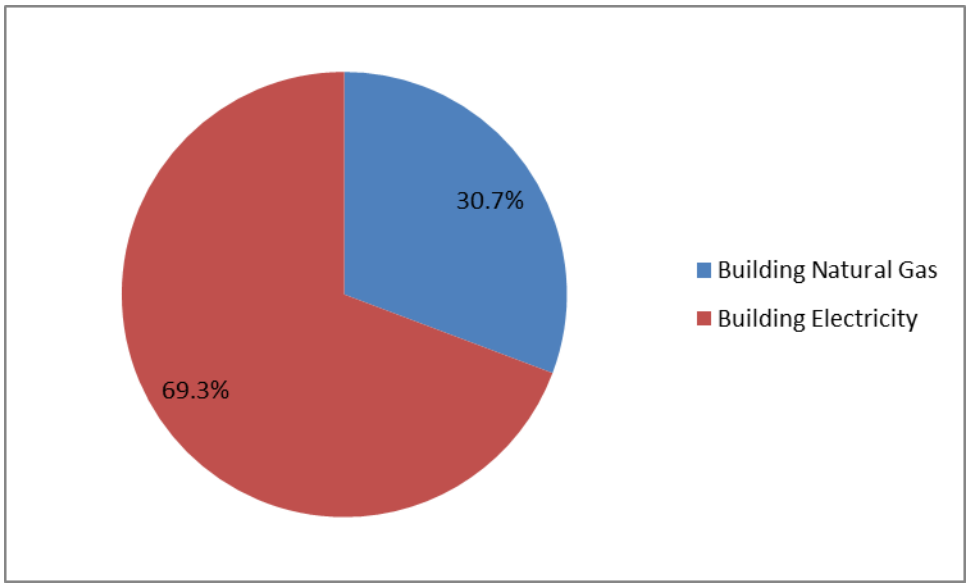
[38] While, Brisbane's water emissions are not displayed separately in the chart above, they have been accounted for in the commercial/industrial and residential building energy sectors.

| Residential Energy Use | | | | | |
|---|---|---|---|---|---|
| **Jurisdiction** | **2005 kWh** | **2005 kWh GHG Emissions (MT $CO_2e$)** | **2005 therms** | **2005 therms GHG Emissions (MT $CO_2e$)** | **Total 2005 GHG Emissions (MT $CO_2e$)** |
| Brisbane | 8,556,529 | 1,912 | 710,229 | 3,799 | 5,711 |

| Commercial Energy Use | | | | | |
|---|---|---|---|---|---|
| **Jurisdiction** | **2005 kWh** | **2005 kWh GHG Emissions (MT $CO_2e$)** | **2005 therms** | **2005 therms GHG Emissions (MT $CO_2e$)** | **Total 2005 GHG Emissions (MT $CO_2e$)** |
| Brisbane | 58,391,941 | 13,054 | 973,605 | 5,207 | 18,261 |

| Direct Access Energy Use | | | |
|---|---|---|---|
| **Jurisdiction** | **2005 kWh** | **2005 kWh GHG Emissions (MT $CO_2e$)** | **Total 2005 GHG Emissions ($CO_2e$)** |
| Brisbane | 12,200,943 | 5,327 | 5,327 |

**Figure 5: Building Energy Use – Fuel Type**




It is important to note that emissions associated with the generation of electricity, which make up a significant portion of the greenhouse gasses associated with building energy, can vary widely from year to year. The GHG emissions associated with electricity use is based on an emissions factor specific to PG&E's territory and is calculated annually by PG&E and then made available to cities. The source of the emission factor used for the 2005 baseline inventory is the Greenhouse Gas Emission Factors white paper by PG&E.

This factor varies year over year because PG&E's electricity sources change. For instance, the utility specific emissions factor for PG&E in 2006 was 455.81 lbs/MWh, whereas in 2008 it was 641.35 lbs/MWh. For PG&E, the variance is typically dependent on the availability of hydroelectric resources. During low precipitation years, there is less water available to generate emissions-free hydropower. Because of this, PG&E must compensate by supplying more electricity generated from natural gas or coal.

For the 2005 baseline inventory, the 2005 emissions factor was used. For future inventories, a three-year average emissions factor may be considered to address the potential large variance from year to year.



http://latimesblogs.latimes.com/.a/6a00d8341c630a53ef014e8744ae6a970d-pi

### 2.2.2 Transportation Emissions

As with many Bay Area cities, vehicle travel in Brisbane is the largest single source of GHG emissions. Most methods for estimating transportation emissions are based on vehicle miles traveled (VMT). Community-wide VMT estimates are highly dependent on the accounting rules and analytical tools used. Two general approaches are allowed in the Community GHG Protocol; the in-boundary method, in which all VMT within the limits of the jurisdiction are included; and the origin-destination method, in which trips are allocated to each jurisdiction based on whether they started or ended in the jurisdiction. Notably, the in-boundary method includes “pass-through” traffic, or trips that do not start or end in the jurisdiction, but the origin-destination method does not include these trips. Trips that start and end within the jurisdiction are included in both methods.

The origin/destination method of calculating GHG emissions was used. In 2005, the GHG emission quantity for transportation was 35,952 MT $CO_2$ e, and the business as usual projection for 2020 was 36,804 MT $CO_2$ e.

To achieve the target of 15% below 2005 baseline emissions by 2020, Brisbane will have to reduce emissions by 13,876 MT $CO_2$ e. The origin/destination method allows for inclusion of state policies that would assist in achieving Brisbane’s reduction goal by reducing GHG emissions by 12,867 MT $CO_2$ e. The remaining 1,009 MT $CO_2$e emissions to reduce will be covered by locally applied measures found in Chapter 3 of this plan.

The three statewide initiatives that assist in reducing GHG emissions include:

**Assembly Bill 1493, the Pavley Bill**. In 2002, the California legislature enacted Assembly Bill (AB) 1493 (aka “the Pavley Bill”), which directs the Air Resources Board to adopt standards that will achieve "the maximum feasible and cost-effective reduction of greenhouse gas emissions from motor vehicles," taking into account environmental, social, technological, and economic factors. In September 2009, the Air Resources Board adopted amendments to the “Pavley” regulations to reduce GHG emissions in new passenger vehicles from 2009 through 2016.

**Low Carbon Fuel Standard (LCFS)**. Fuel carbon intensity, defined as the amount of carbon per gallon, is addressed by the State of California’s Low Carbon Fuel Standard, which mandates that a 10 percent overall reduction in the carbon intensity of transportation fuels (gasoline, diesel, natural gas, electricity, and so on) be achieved by 2020.

**California 33 Percent Renewable Portfolio Standard (RPS).** California’s Renewable Portfolio Standard (RPS) was originally established by legislation enacted in 2002. Subsequent amendments to the law have resulted in a requirement for California’s electric utilities to have 33 percent of their retail sales sourced from eligible renewable resources in 2020 and all

subsequent years. Renewable resources include wind, solar, geothermal, wave, and small hydroelectric power.

Beyond the three statewide and the additional local sustainable street measures, this plan will not cover GHG emissions from land use and other transportation issues for which policy is determined by the City of Brisbane's General Plan.

| State Initiative | Sector | BAU Sector Emissions | % Reduction in BAU Sector Emissions | MT CO2e Avoided Resulting from State Initiative |
|---|---|---|---|---|
| AB 1493 (Pavley) | Transportation | 36,804 | 19.7% | 7,250 |
| LCFS | Transportation | 36,804 | 7.2% | 2,650 |
| 33% RPS | Electricity (Energy) | 17,351 | 17% | 2,967 |
| TOTAL | | | | **12,867** |

### 2.2.3 Solid Waste




http://www.recologysanmateo.com/files/RecologySanMateoCounty/RSMC_RecyclePo

Emissions from waste result from organic materials decomposing in the anaerobic environment of a landfill that produces methane—a GHG 21 times more potent than carbon dioxide. Organic materials (e.g., paper, plant debris, food waste, and so forth) generate methane within the anaerobic environment of a landfill while non-organic materials do not (e.g., metal, glass, and so on). Table 3 shows the approximate breakdown of the materials Brisbane sent to landfills in 2005. Materials that do not release GHGs as they decompose are included in the "All Other Waste" category.

**Table 3: Assumed Waste Composition[39]**

| Waste Type | GHG emissions (MT $CO_2e$) | Waste Share |
|---|---|---|
| Paper Products | 813 | 54.8% |
| Food Waste | 320 | 21.6% |
| Plant Debris | 85 | 5.7% |
| Wood/Textiles | 239 | 16.1% |
| All Other Waste | 0 | 0 |
| Landfill cover- Plant debris | 26 | 1.8% |
| **Total** | **1,483** | **100%** |

### 2.2.4 Municipal Operations

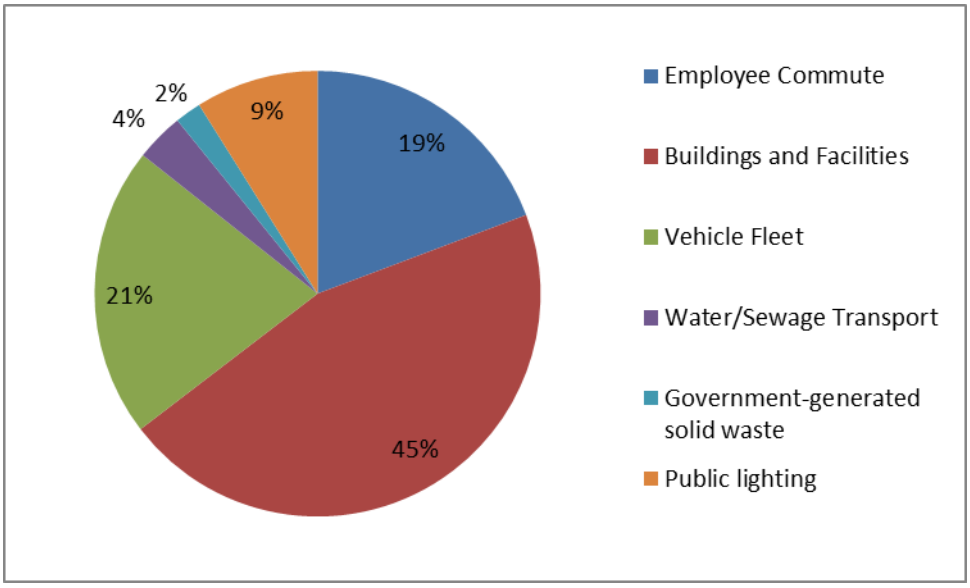
Sources of emissions from municipal operations are primarily facilities that house employees and the transportation and equipment required for those employees to perform city services.

**Table 4: 2005 Brisbane Government Operations Emissions by Sector**

| Sector | GHG Emissions (metric tons $CO_2e$) |
|---|---|
| Employee Commute | 242 |
| Buildings and Facilities | 570 |
| Vehicle Fleet | 265 |
| Water/Sewage Transport | 44 |
| Government-generated solid waste | 24 |
| Public lighting | 112 |
| **TOTAL** | **1,256** |

[39] Waste characterization: CIWMB 2004 Statewide Waste Characterization Study. This state average waste characterization accounts for residential, commercial and self-haul waste. http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097

**Figure 7: Municipal Operations – Greenhouse Gas Emissions**




### 2.2.5 Emissions Forecast for 2020 and 2035

Based on the 2005 community and municipal operations emissions inventories, the City of Brisbane projected a forecast of future emissions for the year 2020. The emission forecast represents a “business-as-usual” prediction of how GHG emissions would grow in the absence of a GHG policy. Conducting an emissions forecast is essential for developing the climate action plan, because one must compare future reductions with future emissions levels, not current levels.

The projected business-as-usual GHG emissions are based on the emissions from the existing growth pattern and General Plan prior to the adoption of this climate action plan. More specifically, business-as-usual emissions would occur if the City of Brisbane were to continue its 2005 patterns of travel, energy and water consumption, and waste generation and disposal. Therefore, the business-as-usual emissions are projected in the absence of any mitigation measures, policies or actions that would reduce emissions over time, including landmark state legislation described in section 1.4. Programs, policies, and measures implemented after 2005 are considered beyond business-as-usual. The projections from the baseline year of 2005 uses growth factors specific to each of the different economic sectors. Table 5 and 7 below summarize the results of the forecast.

**Table 5: Brisbane "Business as Usual" Emissions Forecast for 2020**

| Emissions Sources | 2005 ($MTCO_2$) | 2010 ($MTCO_2$) | (Projected) 2020 ($MTCO_2$) | Annual Growth Rate (2010 to 2020) | Percent change from 2005 to 2020 |
|---|---|---|---|---|---|
| Residential | 5,711 | 5,847 | 5,969 | 0.21% | 4.5% |
| Commercial/Industrial | 23,588 | 22,425 | 23,903 | 0.64% | 1.3% |
| Transportation | 35,952 | 33,173 | 36,804 | 1.04% | 2.4% |
| Generated Waste | 5,695 | 7,267 | 7,267 | 0.21% | 30.3% |
| Water | N/A | 82 | 82 | N/A | N/A |
| **TOTAL** | **70,946** | **68,794** | **74,180** | **0.69%** | **7.1%** |

We projected the emissions forecast for each sector, because specific factors affect each sector differently (e.g. new building energy codes or new fuel economy standards for vehicles). This approach provides a better approximation of future emissions. The following points explain how the emissions forecast was estimated for each sector:

- For the residential energy sector, the compounded annual population growth rate was calculated from 2005 through 2020 using population projections from Association of Bay Area Governments (ABAG).

- For the commercial/industrial energy sector, Brisbane relied on the analysis contained within "California Energy Demand 2008-2018: Staff Revised Forecast,"[40] a report by the California Energy Commission (CEC), which shows that commercial floor space and the number of jobs have closely tracked the growth in energy use in the commercial sector. Using regional job projections for the San Francisco Bay Area from ABAG's *Projections 2009,*[41] it was estimated that the compounded annual growth in energy use in the commercial sector from 2005 to 2020 will be 7.1 percent.

- For transportation, the City of Brisbane relied on "Transportation Energy Forecasts for the 2007 Integrated Energy Policy Report," in which the CEC projects that on-road vehicle miles traveled (VMT) will increase at an annual rate of 1.509 percent per year through 2020.[42] The recently passed federal Corporate Average Fuel Economy standards and the State of California's pending tailpipe emission standards could

[40] http://www.energy.ca.gov/2007publications/CEC-200-2007-015/CEC-200-2007-015-SF2.PDF
[41] http://www.abag.ca.gov/planning/currentfcst/regional.html#
[42] Report available at: http://www.energy.ca.gov/2007publications/CEC-600-2007-009/CEC-600-2007-009-SF.PDF. Compounded Annual growth rate for 2005-2020 is calculated from Table 4 on page 12. In light of recent fuel cost increases, the calculation assumes high fuel cost scenario.

significantly reduce the demand for transportation fuel in Brisbane. An analysis of potential fuel savings from these measures has not been included in this business-as-usual forecast. Regardless of future changes in the composition of vehicles on the road as a result of state or federal rulemaking, emissions from the transportation sector will continue to be largely determined by growth in VMT.

- For waste-related emissions growth, the primary determinate for growth in emissions for the waste sector is population. Therefore, the compounded annual population growth rate for 2005 to 2020 of 0.69 percent (the same as the residential sector projection) was used to estimate future emissions in the waste sector.

## 2.3 Emission Reduction Targets

The *California AB 32 Scoping Plan* seeks to bring California to a low carbon future, reaching 1990 emissions levels by 2020. As part of that reduction, the plan asks municipal governments to reduce their emissions by at least 15 percent by 2020 compared with current levels (current levels are defined as 2008 levels or earlier). The plan also directs local governments to assist the state in meeting California's emissions goals. Many cities have consequently adopted community-wide emissions reduction targets at least 15 percent below 2005 levels by 2020. Some cities in the Bay Area have sought even stricter emissions targets. For example, since 2002, the City of San Francisco has sought to reduce its emissions to 20 percent below 1990 levels by 2012[43]. Seattle, Portland, and Denver have set similar targets. However, the vast majority of Bay Area cities have adopted the 2020 target of 15 percent reduction compared with 2005 levels as it is in line with State objectives and technically achievable.

This climate action plan summarizes the actions that City of Brisbane is planning to take to reduce emissions within our community.

### 2.3.1 Reductions from State-Level Actions



http://myfriendsandiniles.blogspot.com/2012_07_01_archive.html

In addition to the actions outlined here, regulations aimed at reducing GHG emissions at the state and regional levels will also contribute to emissions reductions in Brisbane. For example, the California Renewable Portfolio Standard (RPS) mandates that 33 percent of electricity sold by the State's investor-owned utilities be generated from renewable resources by 2020. These actions were summarized in Section 1.4 of this report. The impact of state-level actions on reducing local emissions is significant, and is shown in relation to the

[43] City of San Francisco 2004. *Climate Action Plan*. http://www.sfenvironment.org/downloads/library/climateactionplan.pdf

City of Brisbane's emissions baseline, business-as-usual forecast, and reduction target in Figure 7.

A summary of the expected emission reductions from state programs is provided in Table 6 below.

**Table 6: Total Emission Reductions from State of California Programs**

| State Initiative | Sector | % Reduction from 2020 GHG Inventory | Reduction in City's Emissions (MT $CO_2e$) |
|---|---|---|---|
| AB 1493 (Pavley) | Transportation | 19.7% | 7,250 |
| LCFS | Transportation | 7.2% | 2,650 |
| 33% RPS | Electricity (Energy) | 17% | 2,967 |
| A. Total Statewide Initiative Emissions Reductions | | | 12,867 |

### 2.3.2 The City of Brisbane Reduction Target

Reduction targets were selected based upon measures identified in the CAP as both a priority for the city and as being attainable. City measures will need to reduce GHG emissions by 1,009 MT $CO_2e$ beyond the emissions reductions from state measures. One thousand nine (1,009) MT $CO_2$ equates to the annual GHG emissions from 212 passenger vehicles or the $CO_2$ emissions from 92.1 homes over one year.

*The City of Brisbane is committing to reducing community-wide greenhouse gas emissions 15 percent by 2020, a reduction of 13,876 metric tons of carbon dioxide equivalent*

Figure 7 below illustrates how the business-as-usual emissions are estimated to increase, thus widening the emissions reductions needed by 2020. Figure 7 also shows the emissions reductions expected from State-Level actions, and the reductions needed to reach the City of Brisbane's emission target. The baseline emissions, forecasted emissions, targeted emissions, and emissions needed to reach the target are shown in Table 7.

Reduction targets were based on compliance with AB 32. AB 32 requires for the state of California to reduce greenhouse gas emissions to 1990 levels by 2020, which equates to 15% below a business as usual scenario.

**Figure 7. Brisbane GHG Reduction Target (15% below 2005 levels by 2020)**

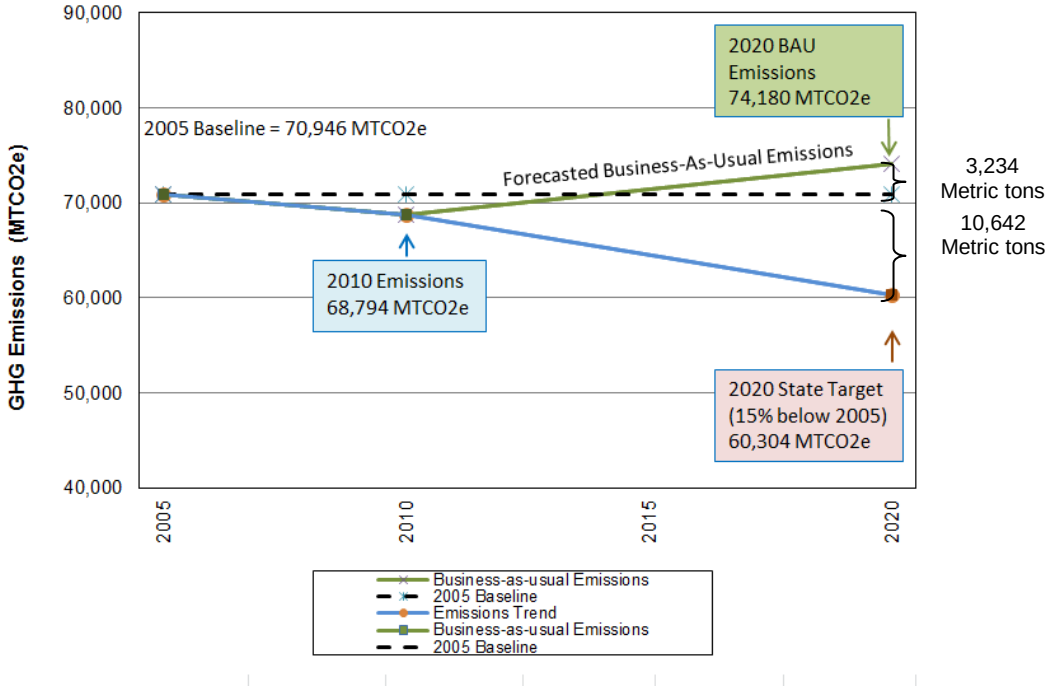



**Table 7: GHG Emissions Projection and Reduction Target**

| 2005 Emissions ($MTCO_2e$) | 2020 Target Emissions at 15% below 2005 ($MTCO_2e$) | 2020 BAU Emissions ($MTCO_2e$) | Emissions Reductions Required ($MTCO_2e$) |
|---|---|---|---|
| 70,946 | 60,304 | 74,180 | 13,876 |

# 3 Climate Action Strategies

This climate action plan is the beginning of a journey towards a more sustainable Brisbane. In these pages, the citizens of Brisbane will find policies and programs that aim to reduce emissions, save energy (and money), and help Brisbane continue to be a desirable and healthy place to live, work, and play as time goes on.

By adopting this climate action plan, the City is committing to take action to reduce GHG emissions. The Plan provides a prioritized list of actions, each of which should be further developed, studied, and vetted independently before being implemented. The programs and policies described give Brisbane a viable path towards reducing emissions that, combined with emissions reductions resulting from State and regional policies, will meet the emissions reduction goals established in AB 32.

The previous chapters presented steps 1 and 2 in the Framework for Climate Action (see section 1.7.1), the emissions inventory of Brisbane and the community emissions reduction target. The following sections represent Step 3: the Climate Action Plan.

Each section below outlines the specific actions, which we call "measures," that seek to reduce GHG emissions from Brisbane. For method of measure selection and prioritization for action, see Section 5.1. Some measures aim to reduce emissions from the community at large, while other measures may specifically focus on the operations of the City of Brisbane. Also, all measures are assumed to lead to specific, quantifiable reduction of GHG emissions, except for the more general supporting measures described in Section 4, Measures requiring further study.

## 3.1 Energy



http://koin.com/2015/06/22/2000-pge-customers-lose-power/

In the United States, buildings account for 70 percent of total electricity use and about 40 percent of GHG emissions.[44] The State of California has long been a leader in implementing policies aimed at improving the energy efficiency of its building stock. The state is committed to first meet its energy needs "through all available energy efficiency and demand reduction resources that are cost effective, reliable and feasible."[45]

[44] Fuller *et al.* 2009. *Toward a Low-Carbon Economy: Municipal Financing for Energy Efficiency and Solar Power*. Environment Magazine

[45] "Energy Action Plan I", California Energy Commission, California Public Utilities Commission and Consumer Power and Conservation Financing Authority. May 8, 2003. Available at: http://docs.cpuc.ca.gov/word_pdf/REPORT/28715.pdf

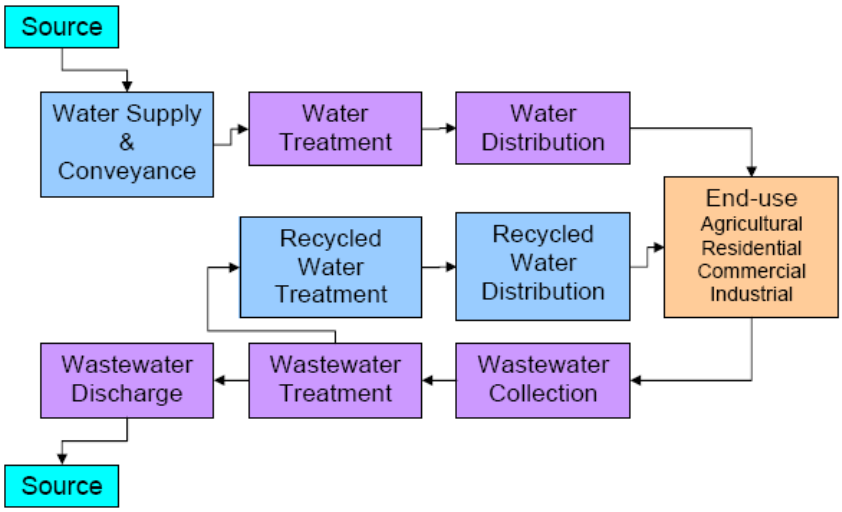
Since the 1970s, California has led the nation in developing and implementing successful energy-efficiency efforts. The California Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24, Part 6 of the California Code of Regulations) mandates minimum levels of energy efficiency in both new construction and renovation projects. These requirements were updated in 2013 to further increase building and appliance energy efficiency. California has also set targets for "zero net-energy" new buildings, in which efficiency and on-site generation are combined to reduce residential buildings to zero net-energy use by 2020 and commercial buildings by 2030.[46]

Building energy is the sector with the most immediately achievable and affordable reduction opportunities. Energy efficiency is the most cost-effective measure for GHG reductions and also has numerous co-benefits such as cost savings over time and promotion of green collar jobs. Design and construction of new buildings, or major renovations of existing ones, provides an opportunity to implement energy-saving measures that reduce GHG emissions. Generous utility rebates and federal tax incentives make investing in energy efficiency increasingly attractive. Along with energy efficiency, California has a long history of supporting renewable energy generation. With the idea of "reduce, then produce," a sensible energy policy seeks to first maximize energy efficiency and then look to generate electricity with low-carbon fuels and renewable resources.

Energy and water use are linked. Energy is needed to transport and to treat water so that it is safe for public consumption. Energy is also used to treat wastewater so that it can be discharged back to the environment. The following diagram demonstrates California's water use cycle.

[46] California Energy Commission, *2007 Integrated Energy Policy Report*, CEC-100-2007-008-CMF

**Figure 8: California's Water Use Cycle**




Graphic: California Energy Commission

Energy is used in each step of the process. Water is collected, treated, and distributed to end users in farms, residences, businesses, and industries. Energy, usually natural gas, is used to heat water for use in buildings. Then energy is needed to treat water for discharge back to the environment. Nineteen percent of the state's electricity and 32 percent of the state's natural gas is consumed during this cycle.[47] Fifty eight percent of the electricity and 98.5 percent of the natural gas consumption stems from just the residential, business, and industrial end users.

Reducing water consumption through efficiency and conservation can make a big impact on energy consumption as well as protect against drought, a common problem in California. Water Conservation Senate Bill X7-7 was enacted in November 2009, requiring all water suppliers to increase water use efficiency. The legislation sets an overall goal of reducing per capita urban water use by 20 percent by December 31, 2020. The California State Integrated Water Management Planning Process promotes bringing together and prioritizing water-related efforts in a systematic way to ensure sustainable water uses and reliable water supplies.

In this chapter, we propose City programs and initiatives that will promote energy and water efficiency as well as renewable energy in both existing and new buildings.

[47] California Energy Commission 2005. *California's Water-Energy Relationship.*

### 3.1.1 Energy Measures

**Community-wide Measures**

**A. Community Choice Aggregation/Energy (GHG savings - 1,407 Annual MT $CO_2e$)**

- Enabled by California legislation (AB117), Community Choice Aggregation/Energy (CCA/E) allows local governments to purchase and generate power to sell to residential and business customers. Energy transmission, distribution, repair and customer service remain the responsibility of PG&E. Brisbane has supported San Mateo County's feasibility study for a CCA/E by resolution and by providing access to energy data.
- The Project Development Advisory Committee (PDAC) will gather and analyze information, determine financial and technical feasibility, and assess levels of public support for establishing CCA/E in San Mateo County.

**B. Participate in Energy Upgrade Program and similar residential rebate/incentives programs as they become available, and promote existing rebates (PG&E, State, Federal) (GHG savings - 72 Annual MT $CO_2e$)**

Brisbane will encourage residents to reduce energy use through various incentive programs:

- Energy audits and the implementation of recommendations identified by audits
- Promotion of financing for energy upgrades
- Promote existing solar hot water rebates/tax credits and streamline solar permitting per AB 2188.
- Provide a DIY Energy Toolkit available for checkout through the library.
- Encourage utilizing CaliforniaFIRST financing for home upgrades (PACE and others)
- Continue to promote Peninsula SunShares program for bulk purchase of PV solar systems for homes.

**C. Residential Green Building Ordinance (GHG savings - 8 Annual MT $CO_2e$)**

- The Green Building ordinance (GBO) was adopted in 2007 requiring new residential dwellings in developments with over 20 housing units to achieve a "green home" rating on the New Home Green Points Checklist/ Build it Green. Note: the GBO was adopted before roll out of new Title 24 codes. The 2013 edition of the California Building Standards Code (Title 24) became effective in July, 2014. Future projects will be held to both Title 24 codes and the Green Building Ordinance.

**D. Promote PG&E commercial and industrial energy efficiency/demand response programs (GHG savings - 541 Annual MT $CO_2e$)**

- City will encourage commercial energy audits and the implementation of recommendations identified by audits and will promote existing energy efficiency financing options.
- The City will encourage reduced commercial exterior lighting at night.
- The City will encourage planting of trees in commercial parking lots.
- The City will also comply with the state's Nonresidential Building Use Disclosure Program AB1103 requiring disclosure of energy use to prospective buyers of buildings sized at 10,000 square feet or above.
- The City will also promote existing solar hot water rebates/tax credits.
- City will consider passing legislation requiring that all buildings be recommissioned when changing ownership or undergoing major renovation.

**E. Voluntary Residential Energy disclosure (GHG savings - 42 Annual MT $CO_2e$)**

- Provide for voluntary disclosure of energy use information (e.g. utility bill) of a building or home at time of sale.
- Alternatively, a Residential Energy Conservation Ordinance (RECO) that would require certain energy upgrades to be installed prior to sale of residential buildings and potentially prior to new leases being signed for residential buildings may be adopted. The seller and buyer negotiate who performs upgrades. If this ordinance is not adopted at the city level, partnership with the county for adoption may be pursued.

**F. Banning gas-powered lawn equipment (GHG savings - 43 Annual MT $CO_2e$)**

- Gas powered lawn equipment would be phased out and replaced with electric powered lawn equipment when feasible. Encourage purchase of electric powered lawn equipment over gas powered. Potentially adopt an ordinance to ban gas powered lawn equipment. Potentially phased in by commercial first then residential.

**Municipal Measures**

**A. Enroll in an offset program (GHG savings - 207 Annual MT $CO_2e$)**

- The City will consider enrollment in an energy offset program to offset city GHG emissions from electricity and natural gas. The offsets will be vetted or State of California approved.

**B. Environmentally preferred purchasing policy- Energy (GHG savings - 4 Annual MT $CO_2e$)**

- The City will adopt an Environmental Procurement Policy (EPP) that emphasizes recycled materials and energy efficient equipment. The EPP will be modeled after San Mateo County's policy.[48]

**C. Energy efficient street lighting (GHG savings - 32 Annual MT $CO_2e$)**

- The City will continue to replace existing street lights with LEDs.

**D. Renewable energy installation on municipal property (GHG savings - 65 Annual MT $CO_2e$)**

- The City will explore the potential for solar PV on City Hall and other city facilities**.**

**E. Energy efficiency in municipal buildings (GHG savings - 13 Annual MT $CO_2e$)**

- The City will continue to audit city facilities for energy efficiency opportunities and implement energy efficient retrofits.
- The City participates in San Mateo County Energy Watch programs that assist with energy efficiency upgrades and also tracks energy performance through benchmarking.

[48] San Mateo County's Environmental Procurement Policy
http://green.smcgov.org/sites/green.smcgov.org/files/Environmental_Procurement_Policy.pdf

## 3.2 Water Use

In January 2015, according to the California State Water Board, the average water use per person per day in Cailfornia was 72.6 gallons.[49] Brisbane's per capita use has generally been much lower. In the billing cycle of mid-December 2014 to mid-February 2015, the average gallons per person per day used was 42. In the most recent billing cycle of mid-April to mid-June 2015, the gallon per person per day use was 39. Although these residential reductions are notable, Brisbane has made targeted efforts in additionally reducing outdoor irrigation. Significant reductions have been achieved in a short amount of time after implementing a two day a week outdoor irrigation schedule. The storage and transmission of water and wastewater is a significant source of energy use, thus water is an important element of the CAP.

### 3.2.1 Water measures

**A. Water conservation incentives (GHG savings - 24 Annual MT $CO_2e$)**

- The City adopted the Brisbane Indoor Water Conservation and Water Conservation in Landscaping Ordinances in 2010 and will continue to apply the ordinances.
- The City will continue to promote existing and/or new rebates for water efficient appliances and fixtures through BAWSCA and promote CaliforniaFIRST water efficiency project financing for drip irrigation systems.
- The City will promote information/programs for water efficient landscaping and consider providing incentives for drought-resistant plants to reduce total water footprint.

## 3.3 Solid Waste

While it may not be immediately obvious, reducing the amount of waste deposited into the landfill through material reuse, reduction, and recycling is an important action Brisbane residents can take to reduce GHG emissions.

Landfills capture as much methane as possible and combust it, in some cases for electricity generation. However, for many landfills, some methane leaks to the atmosphere. This methane leakage is one source of Brisbane's GHG emissions in the waste category.

To address the issues of escalating waste production, California AB 939 was passed in 1989, which mandated local jurisdictions to meet a solid waste diversion goal of 50 percent by the year 2000. Each jurisdiction was required to create an Integrated Waste Management Plan that

[49] California Water Boards Media Release. March 3rd, 2015
http://www.waterboards.ca.gov/press_room/press_releases/2015/pr030315_urbanwater.pdf

looked at recycling programs, purchasing of recycled products and waste minimization. These plans form the foundation of the waste programs in place today. Greenhouse gas emissions are also associated with product supply chains. Upstream from the consumer, fossil fuel energy is used to extract the raw materials, such as wood, metals, and so forth, from which products are made.

Additional energy is needed to manufacture consumer goods in factories. Petroleum is used for the transportation of raw materials to the factory, moving manufactured goods to market, and moving waste from the consumer's curbside to landfills. These emissions do not show up in Brisbane's inventory; however, it is important to be aware of them. As consumers, we each have a responsibility to support products that reduce waste and encourage manufacturers to design environmentally-friendly products.



Waste reduction and recycling are powerful tools for reducing emissions all along the consumed materials' lifecycle. Reducing the amount of materials required through re-use—for example using canvas bags instead of plastic and paper bags from the grocery store—represents the best opportunity to reduce GHG emissions in a significant way. Brisbane adopted a plastic bag ban in March 2013; the ordinance was modeled after San Mateo County's ban, and is enforced by the county. Brisbane adopted a Polystyrene, aka Styrofoam, ban in November 2014; the ordinance was also modeled after San Mateo County's ban, and is enforced by the county.

Recycling represents the second best opportunity to reduce GHG emissions. For these materials, recycling reduces energy-related carbon dioxide emissions in the manufacturing process and avoids emissions from waste management. The U.S. EPA estimates that if a city of 100,000 people with average waste generation (4.5 pounds per day per capita), recycling (30 percent), and baseline disposal in a landfill with no gas-collection system would increase its recycling rate to 40 percent, it would reduce emissions by more than 3,400 metric tons of $CO_2e$ per year.

### 3.3.1 Solid waste measures

**Community-wide Measures**

**A. Set higher diversion rate goal (GHG savings - 605 Annual MT $CO_2e$)**

- The City will promote residential waste reduction and continue offering food scrap pickup through South San Francisco Scavenger.
- The City will encourage community exchange of used items. In addition to exchange of items, the City will educate and encourage residents regarding recycling of household

items and textiles. The City will investigate offering days specific to waste type pick up or offering public bins.
- South San Francisco Scavenger to provide food composting to businesses in the future.

**B. Commercial recycling ordinance (GHG savings – N/A Annual MT $CO_2e$)**

- The City will continue to support required commercial recycling, and City staff together with waste management staff will verify compliance.

**C. Create sustainable vendor policy at public events (GHG savings - N/A Annual MT $CO_2e$)**

- The city will encourage residents to bring reusable plates, cutlery and cups to public events. The City will investigate the use of a waste attendant to promote proper recycling and composting.

**D. Yard waste ordinance (GHG savings - N/A Annual MT $CO_2e$)**

- The City will adopt an ordinance requiring that all landscapers and landscape maintenance businesses recycle/divert yard waste. A permitting system will be investigated to insure yard waste is property disposed of.

**Municipal measures**

**A. Environmentally preferred purchasing policy (GHG savings - N/A Annual MT $CO_2e$)**

- Implement a Climate Friendly purchasing policy that will serve as a guide for the city to purchase office products and services. The city's guide will be modeled after San Mateo County's policy.

**B. Establish a zero waste policy (GHG savings - 10 Annual MT $CO_2e$)**

- Investigate feasibility and cost of paperless city operations. City will compost and follow zero waste practices.

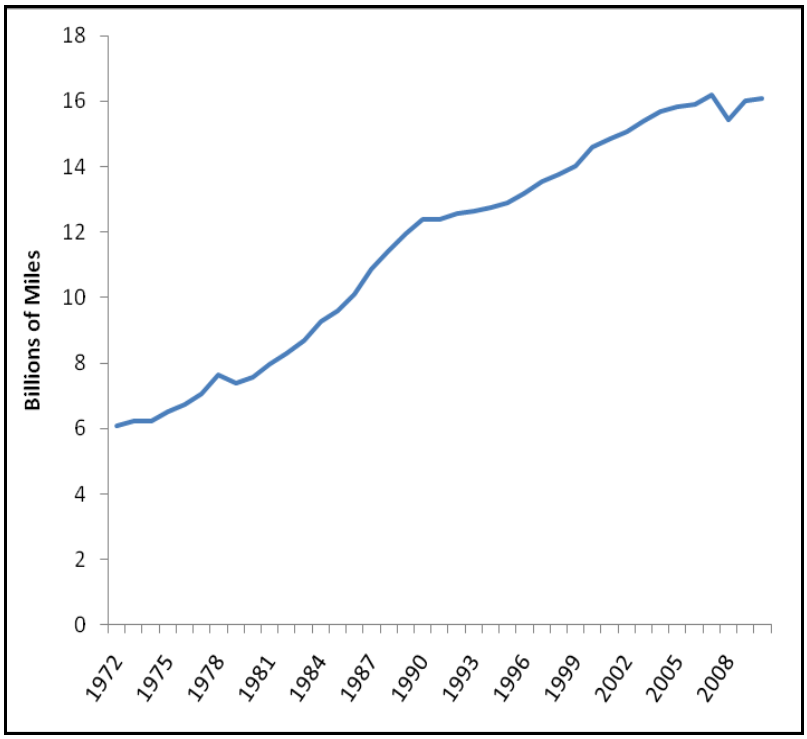
## 3.4 Sustainable Streets/Transportation

Thirty-eight percent of the California's GHG emissions stem from transportation — the cars and trucks that move people and goods throughout the state. In Brisbane, 76 percent of emissions stem from transportation.

| **Transportation- Emissions by sector (%)** | |
|---|---|
| State Highways | 59% |
| Local Roads | 13% |
| Off-Road Equipment | 4% |
| **Total** | **76%** |

Thus, reducing transportation emissions is a critical component of the climate action strategy. Reducing emissions from the transportation sector requires addressing three constituent components: reducing the carbon intensity of fuels, increasing vehicle efficiency, and reducing vehicle miles travelled (VMT). Fuel carbon intensity, defined as the amount of carbon per gallon, is addressed by the State of California's Low Carbon Fuel Standard, which mandates a 10 percent overall reduction in the carbon intensity of transportation fuels (gasoline, diesel, natural gas, electricity, and so on) by 2020. Vehicle efficiency is addressed by AB 1493, California's Clean Cars Law of 2002, which requires car manufacturers to reduce global-warming emissions from new passenger cars and light trucks beginning in 2009. First in the world to reduce global-warming pollution from cars, this law has now been adopted by 11 other states. Affecting nearly one-third of the U.S. market, this law is projected to reduce global-warming emissions in 2020 by 64 million tons per year. However, addressing the third component, reducing VMT, is considerably more difficult than the previous two. Californians have driven more and more miles per year over the past five decades. Figure 9 shows the growth in VMT from 1972 – 2010.

**Figure 9: California Growth in Vehicle Miles Travelled (VMT)**
***July of each year, 1972-2010***




Data: California Department of Transportation

This growth in VMT is attributable in part to the following factors:

- Growth in gross domestic product

- Lack of affordability in urban core housing causes people to live far away from where they work
- Lack of viable public transportation options
- Low cost of gasoline
- Sprawl development patterns such as bedroom communities separated from retail and commercial centers
- Streetscapes that discourage pedestrian or bicycle access

In order to reduce VMT and the associated GHG emissions, Governor Schwarzenegger signed Senate Bill 375 in 2008. SB 375 sets regional emissions targets and tasks regional planning organizations to recalibrate land use and transportation planning to meet those emissions targets. The SB 375 targets for the San Francisco Bay Area are 7 percent below 2005 levels by 2020 and 15 percent below 2005 levels by 2035. This climate action plan seeks to exceed the 2020 target.

Brisbane is fully committed to providing diverse transportation options that are convenient, safe, and affordable. Policies proposed in this climate action plan strive to maintain a quality of life that is environmentally and economically sustainable. These priorities and commitments are reflected and incorporated in this chapter on sustainable streets and transportation.

### 3.4.1 Sustainable Streets/Transportation measures

**Community-wide Measures**

**A. Public EV charging (GHG savings - N/A Annual MT $CO_2e$)**

- The City will install public EV charging stations.

**B. Incentivize local hiring (GHG savings - 60 Annual MT $CO_2e$)**

- The City will develop a plan to provide discount business license fees for companies in Brisbane that hire locally.

**Municipal Measures**

**A. Adoption of low emissions government vehicles (GHG savings - 14 Annual MT $CO_2e$)**

- Target purchase of new or conversion of existing government vehicles to more fuel efficient vehicles and vehicles with lower or zero emissions.
- Continue to publicize ZipCar for residents to use.

## 3.5 All Sectors

### 3.5.1 All Sector measures

**A. Participate in County Green Business program (GHG savings - 81 Annual MT $CO_2e$)**

- Promote San Mateo County Green Business program and set goals for participation. (Voluntary program that allows businesses to brand themselves as green by following sustainable practices).

## 3.6 Adaptation

The climate is changing rapidly, according to the World Meteorological Organization, in their news release "2000-2009, The Warmest Decade."[50]

> *The decade of the 2000s (2000–2009) was warmer than the decade spanning the 1990s (1990–1999), which in turn was warmer than the 1980s (1980–1989)… The 2000 – 2009 decade will be the warmest on record, with its average global surface temperature about 0.96 degree F above the 20th century average.* ***This will easily surpass the 1990s value of 0.65 degree F.***

Even if we stopped emitting GHGs tomorrow, the climate would still continue to change due to the length of the carbon cycle — the ability of the earth to absorb the excess carbon in the ocean and plants. Therefore, our communities must plan for adaptation to climate change.

Adaptation planning may be most effective at the state and regional levels, due to the scale of resources needed to develop and implement a coordinated plan. The 2009 California Climate Adaptation Strategy[51] was developed to guide California's efforts in adapting to climate change impacts. For more information on adaptation planning, see Appendix D.

# 4 Measures requiring future study

These goals are longer term and will require further study or investigation to determine feasibility as the plan is updated periodically.

## 4.1 Energy

**A.** Investigate district heating: District heating has been implemented in the U.K. The UNEP report[52] describes district heating as sustainable solution to heating and cooling which enables

[50] WMO 2010. *2000–2009, THE WARMEST DECADE* http://www.wmo.int/pages/mediacentre/press_releases/pr_869_en.html
[51] http://www.climatechange.ca.gov/adaptation/
[52] UNEP report- http://unep.org/energy/portals/50177/DES_District_Energy_Report_full_02_d.pdf

higher shares of renewable energy. This item is also included in a list items for which to consider collaboration with San Mateo County.

**B.** To reduce the per capita carbon footprint created from existing homes, consider rezoning properties and through a potential lottery system allow property owners to alter/remodel large homes into duplexes. Potentially limit the size of homes that could be built.

**C.** Investigate ways to promote installation of PV on buildings under commercial leases or carports. Businesses in Crocker Park could potentially form a grid of roof top PV panels. Consider legislation or a program to implement PV for commercial lease holders.

**D.** Investigate tidal power at the lagoon/bay waterway under Highway 101.

**E.** Investigate harnessing wind power without the use of windmills and use windstalks instead. Windstalks can potentially cause less harm to birds.[53]

**F.** Encourage the heating of a room with a heat grabber or cooling with a swamp cooler.[54]

**G**. Promote the use of storm windows.

**H.** Investigate generating electricity from turbines installed in-line in city water pipes.[55]

**I.** Consider aspirational goal of use of 90% renewable energy by 2025.

**J.** Require passive solar design for buildings undergoing major renovation and new construction. Passive solar designs are constructed to collect, store, and distribute solar energy throughout a building in the form of heat in the winter and is rejected during the summer.

**K.** Purchase renewable energy to supplement power supplied from utilities.[56] [57]

**L.** Decrease night lighting and light pollution from several sources such as businesses and Courts. Consider adoption of a model light ordinance such as the model lighting ordinance from the Illuminating Engineering Society. [58]

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[53] http://news.discovery.com/tech/alternative-power-sources/windpower-without-blades-101015.htm
[54] http://www.motherearthnews.com/diy/heat-with-a-heat-grabber.aspx
[55] http://magazine.good.is/articles/portland-pipeline-water-turbine-power
[56] http://epa.gov/greenpower/documents/purchasing_guide_for_web.pdf
[57] http://epa.gov/greenpower/buygp/index.htm

[58] http://www.darksky.org/assets/documents/MLO/MLO_FINAL_June2011.pdf

**M.** Free or subsidized shade tree program for homes (GHG savings - 26 Annual MT $CO_2e$). A free shade tree would be provided to applicable homes and the program would potentially be expanded to businesses. Trees will assist to reduce energy needs for buildings.

## 4.2 Water

**A.** Consider feasibility of Brisbane establishing a sewer treatment plant in partnership with neighboring cities to accommodate the growing population. The biogas produced can be captured to fuel fleet vehicles.

**B.** Consider funding a drought resistant plant giveaway from Mission Blue Nursery, incentivizing residents to plant native, drought tolerant plants for their landscaping.

**C.** Use the water savings from commercial landscaping to increase water allotments for edible gardens. Eating local will decrease the carbon footprint and water footprint of food that is consumed.

**D.** Determine the feasibility of and demand for implementing gray water systems into resident and businesses in Brisbane. Adoption of a gray water ordinance can be considered for minimum installation requirements determined by California[59].

## 4.3. Solid waste

**A.** Encourage community exchange of used items, or items that would otherwise enter the waste stream, through social media sites such as Nextdoor and Facebook.

**B.** Partner with a non-profit like Urban Ore to salvage & resell materials.[60] Urban Ore is a non-profit that assists Berkeley in diverting reusable waste from the landfill. Salvaged items are sold to the public.

**C.** Determine feasibility of paper free operations for Brisbane. The sustainable purchasing policy will lower the paper usage of city operations by encouraging paperless meeting and printing all documents double sided, etc. Further reductions to paper free could be a future goal.

**D.** Consider setting policy to achieve 95% diversion by 2020 for municipal facilities. The diversion rate was 80% for 2013, which means this goal aims for a 15% increase in diversion rate in 7 years.

[59] http://www.hcd.ca.gov/codes/state-housing-law/preface_et_emergency_graywater.pdf
[60] http://urbanore.com/

**E.** Establish days when certain materials can be disposed of in community dumpsters such as fabric recycling day, for clothing that is not in the condition to be donated. Cardboard can be reused rather than recycled. Develop a cardboard/ box reuse center.

## 4.4 Sustainable streets

**A.** Expand the hours that the Brisbane shuttle is available or implement an on-call service for residents and businesses to use.

**B.** Consider algae farms that eat pollution from the highways to reduce the GHG emissions from the highway. [61]

**C.** Incentivize local businesses to carpool or use public modes of transportation to reduce the GHG emissions from commuting.

**D.** Investigate titanium dioxide pavement to reduce $NO_x$ emissions. [62] It has been tested and shown that this formulated pavement can reduce $NO_x$ in the air from 25 to 45%, which is then transformed into nitrates.

**E.** Encourage businesses to hire locally through incentives such as lower cost of business license. The goal being: up to 50% of Brisbane residents to work in Brisbane.

**F.** Incentivize or encourage use of renewable or electric fuels where applicable, such as biodiesel trucks, hybrids, electric vehicles, etc. Increase truck hauling fees on trucks that do not use biodiesel gas. Possibly partner with a biodiesel company to create infrastructure for biodiesel vehicles.

## 4.5 Miscellaneous goals for future study

**A.** Actively work towards a diverse business community. Currently Brisbane has a significant number of auto body, restaurants and freight forwarding companies. Encourage new businesses that provide services that Brisbane currently lacks, such as a shoe repair shop, movie theater, pharmacy, fitness studio, thrift store, etc. A greater mix of local businesses could increase shopping local and decrease the need to drive out of town.

**B.** Allocate 1% of the city budget for art funds which will be made available for installations on commercial property if they are a) visible, b) include a perspective on climate change.

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[61] http://thespiritscience.net/2014/11/03/this-algae-farm-eats-pollution-from-the-highway-below/

[62] http://www.dailytech.com/Titanium+Dioxide+in+Pavement+Could+Dramatically+Reduce+NOx+in+Air/article19003.htm

**C.** Encourage incorporation of green walls where applicable. There are several benefits to green walls: increased property values, energy savings, improved aesthetics and the creation of potential corridors for birds and insects.

## 4.6 Actively create partnerships with the County to reach these goals:

- Request a San Mateo County Energy Watch Challenge energy audit program for residences such as the existing program for small businesses.
- County adopt a revolving fund program to finance energy efficiency retrofits at residences and businesses.
- Staff to do outreach and be available to answer energy/rebate related questions.
- Determine feasibility and funding of district heating through studies and looking for potential funds.
- Adopt at the county level a Residential energy conservation ordinance (RECO) requiring certain energy upgrades and disclosures upon the sale of a residential property.
- Improve usability of the San Mateo County Energy Watch website that contains rebate information.
- Actively coordinate with and provide feedback to SamTrans to ensure sustained or increased bus service.
- Pass legislation by 2016 requiring that all buildings be recommissioned when changing ownership or undergoing major renovation.
- Include green home features in the Multiple Listing Services to encourage the sale of green homes.
- Determine feasibility of getting methane mapping done from the Environmental Defense Fund and investigate how to reduce methane from hotspots.

# 5 Implementation

The preceding chapters describe the principal sources of the City of Brisbane GHG emissions and outline related goals and measures for achieving the community's target of reducing emissions to 15% below 2005 levels by 2020. This chapter outlines the main components of

the process for putting this plan into action and identifies specific actions from earlier chapters that are recommended for implementation.

Although significant GHG reduction policies and initiatives are already in place, the actions proposed in this Plan, by necessity, far surpass the scale of existing efforts. Implementing the Plan and ensuring that it results in real GHG emissions reductions will require increased coordination across sectors and institutionalized climate protection efforts across the community.

There are a large number of measures and programs that Brisbane may implement to reduce GHG emissions. A cost-benefit analysis and prioritization methodology is presented below to assist the City in developing a phased implementation plan.

## 5.1 Prioritizing measures for action

Measures have been selected based on ability to readily implement within a few years. The second criteria for choosing measures were the GHG reductions each would potentially yield. Lastly, some measures were chosen particularly for their direct benefit to the community.

Measures that required future study were placed in Section 4 for further study and analysis.

Implementation of measures will be prioritized based upon and coordinated with the availability of local, county, regional and other funding sources and resources.

## 5.2 Results of measure prioritization

**Summary of Measures**

A summary of all the emission reduction measures is provided in Table 8 below.

**Table 8: Summary of Measures**

| Measure Category | Description of Measure | Emission Reductions ($MTCO_2E$) | Short Term/ Medium Term/ Long Term | Additional Information (Responsible City department or funding strategy) |
|---|---|---|---|---|
| **Energy** | | | | |
| **Community** | Community Choice Aggregation/Energy | 1,407 | Medium | San Mateo County |
| | Participate in Energy Upgrade programs | 72 | Short | Public Works |
| | Residential Green Building Ordinance | 8 | Medium | Planning |
| | Energy efficiency/demand response programs | 541 | Long | |
| | Voluntary residential energy disclosure | 42 | Medium | |
| | Ban gas powered lawn equipment | 43 | Medium | |
| **Municipal** | Enroll in an offset program | 207 | Medium | |
| | Environmentally Preferred | 4 | Medium | |

| | | | | |
|---|---|---|---|---|
| | purchasing policy | | | |
| | Energy efficient street lighting | 32 | Short | Public Works |
| | Renewable energy installation on municipal property | 65 | Medium | Public Works |
| | Energy efficiency in municipal buildings | 13 | Medium | Public Works |
| **Water use** | | | | |
| **Community** | Water conservation incentives | 24 | Short | Public Works |
| **Solid Waste** | | | | |
| **Community** | Set higher diversion rate goal | 605 | Medium | |
| | Commercial recycling ordinance | N/A | Long | |
| | Sustainable vendor policy | N/A | Medium | |
| | Yard waste ordinance | N/A | Long | |

| | | | | |
|---|---|---|---|---|
| **Municipal** | Environmentally friendly purchasing policy | N/A | Medium | |
| | Establish a zero waste policy | 10 | Long | |
| **Sustainable streets/ transportation** | | | | |
| **Community** | Public EV charging | N/A | Short | |
| | Incentivize local hiring | 60 | Medium | |
| **Municipal** | Adoption of low emissions government vehicles | 14 | Long | Multiple departments |
| **All Sector** | | | | |
| **Community** | Participate in the Green County Business program | 81 | Short | |

## 5.3 Meeting the emission targets

**Table 9: Meeting the 2020 Target**

| State Initiative | Sector | % Reduction from 2020 GHG Inventory | Reduction in City's Emissions |
|---|---|---|---|
| AB 1493 (Pavley) | Transportation | 19.7% | 7,250 |
| LCFS | Transportation | 7.2% | 2,650 |
| 33% RPS | Electricity (Energy) | 21% | 2,967 |
| A. Total Statewide Initiative Emissions Reductions (ER1 + ER2 + ER3) | | | 12,867 |
| B. Total City Climate Action Plan Reductions Measures | | | 3,228 |
| C. Total Expected Emissions Reductions by 2020 (A+B) | | | 16,011 |
| D. City of Brisbane's Emissions Reduction Requirement for 2020 | | | -710 |
| E. Meets/exceeds state goals? (C > D) | | | Yes |

## 5.4 Management of GHG Reduction Strategy

Support will be needed to direct the implementation of the Plan measures. This section details how the city will organize itself to put this plan into action.

- Establish a Climate Action Task Force (CATF). The task force will include OSEC members, community members, city staff, and possibly other commission members. The task force will develop a process to implement and update the climate action plan.

## 5.5 Public Participation and Community Engagement

**Community engagement**: Create a citizen implementation subcommittee. This body will contain of underrepresented portions of the community. Possibly students can be given community service hours for participation.

**Education and outreach**:
Various forms of outreach can be used to educate the public on climate change.

- A sea level rise display at City Hall and/or other community locations can display various impacts of sea level rise over time.
- Flags on Visitacion Avenue can display information about climate change, such as facts or visual representations.
- Letter from Council to residents can convey information about climate change and how important it is to adapt individual lifestyles.

- Organize the sharing of information at community events by people that have installed energy efficient and renewable energy systems in their homes with interested parties (such as at Day in the Park).
- At public events and on social media, educate people regarding currently available rebates (programs in appendix C).
- Work with the school district on implementing age appropriate climate curriculum in classrooms that are also cross disciplinary: sciences, socio-cultural, etc.[63]
- Organize youth to conduct a community survey to inform/gather opinion about rebates and policies of Brisbane, including composting and energy savings.
- Outreach through Chamber of Commerce regarding the financial benefits of green businesses.
- Videos on city and/or chamber website about businesses that have successfully implemented green business actions/energy savings programs.

**Behavior change**:
The citizen implementation committee shall study and recommend the most effective methods of outreach to encourage behavior change.

- Education on consumption and how to lower your carbon footprint.
- Support active modes of transportation and travel, such as Bike to Work day.

The City can play a substantial role in generating awareness and educating residents about ways to reduce emissions. While the City can help initiate a movement that emphasizes sustainable practices, it is crucial that other members of the community, such as residents and businesses, are engaged in the process in order to achieve the reduction targets mentioned in this plan, while minimizing costs. The target will only be achieved by building a movement that achieves sustained action and coordination across all stakeholders and sectors.

As mentioned previously, there are significant opportunities for the City to leverage existing programs funded by the State of California, PG&E, and others to support community efforts to improve energy efficiency, install renewable energy technologies, facilitate transit/biking/walking initiatives, and support households and businesses in taking other actions. The City of Brisbane seeks to distribute information more widely on funding opportunities for residents and local businesses. Actions may include more information posted on the City website and marketing materials posted at key locations, including City Hall and libraries. Additional actions may include partnering with agencies such as PG&E and C/CAG to further develop marketing presentations and workshops for the community.

Specific actions that community members can take today are included in Appendix B of this climate action plan. Funding opportunities are listed in Appendix C.

[63] http://www.cooltheearth.org/pages/our-programs/faqs-page

## 5.6 Timeline

The following timeline lists the major milestones in the climate action plan implementation process. Progress and updates to this schedule should be submitted to City Council and the public as part of an annual Plan Implementation Report.

**Table 10. Climate Action Plan Implementation**

| Milestone | Target Date |
|---|---|
| 2010 GHG Inventory Completed | 03/2015 |
| Draft CAP prepared | 06/2015 |
| Community Comment Period (OSEC meetings) | 06/2015 – 09/2015 |
| Council Review | 09/2015 |
| CAP Adoption goal | 09/2015 |
| Begin Implementation | 10/2015 |
| 1st Annual CAP Implementation Report | 10/2016 |
| Community Comment Period | 10/2016 |
| 2015 GHG Inventory Completed | 01/2017 |
| 1st CAP Update | 01/2018 |

# 6 Monitoring and Improvement

Monitoring progress is a critical component to ensure that the emissions targets are met. Should monitoring efforts find that the Climate Action Plan is falling short of its goals, the City will add additional voluntary and mandatory measures to the Plan in order to meet the Plan's GHG reduction target. Ongoing monitoring is critical in order to demonstrate that the Plan is achieving its goals, thereby maintaining its status as a GHG Reduction Strategy over time. The implementation and monitoring of the Plan will be critical to the ability of subsequent projects to tier their GHG analysis under CEQA.

The following describes the monitoring and improvement program.

- Every year, an Annual Climate Action Plan Implementation Report (ACAPIR) will be prepared, to update the City Council, residents, and other interested stakeholders as to the progress implementing the Plan measures. The ACAPIR will detail lessons learned and make recommendations for changes to the implementation strategy or the Plan itself. Following the release of the ACAPIR, a 30 day public comment period is suggested to allow for community input on the implementation of the Plan.

- Staff will track the emissions, resource savings, and any other effects of each implemented measure as well as estimate costs to government, residences, and businesses. Each measure will be summarized in the ACAPIR and made available for public review.

- A full GHG inventory will be conducted every 5 years according to the ICLEI community emissions protocol. The inventory will allow the city to understand how emissions levels are tracking in a top-down manner. PG&E can provide annual updates on electricity and natural gas usage to track associated GHG emissions.

- This Plan may need to be updated based on the results of the GHG inventory. Brisbane may modify and/or add new measures to ensure that the city is on track to meeting its greenhouse gas reduction goals.

# 7 Conclusion

Climate change is a global problem and only through local solutions designed to meet the needs of our community can we mitigate and adapt to its impacts and protect the environment. While the challenge of climate change is unprecedented, local-level solutions can reduce emissions, increase efficiency, promote economic development, and improve quality of life for residents.

Together, we can conserve our scarce resources, thereby saving our families and companies money, increasing the resilience of our economy and emergence of new markets that prioritize green technologies. The City of Brisbane has taken a significant step toward a more sustainable future with this climate action plan. This Plan has identified areas and opportunities to reduce GHG emissions within the community and City operations, that along with statewide efforts, can achieve our environmental goals. The City of Brisbane is poised to reap the benefits of a clean energy economy, with policies that can increase the demand for local green jobs.

These are difficult issues. As you can see, when reviewing this Plan, the proposed efforts of Brisbane are small when compared to the collective action of our citizenry. What can a single individual do? Appendix B provides 10 ways that individuals can reduce their GHG footprint and help safeguard our environment for future generations.

While an important first step, this plan will remain a living document, to be updated as technology and policies progress, to support the City's efforts to manage GHG emissions for a sustainable future for all.

# Appendix A. Glossary of Terms

| | |
|---|---|
| AB32 | The California Global Warming Solutions Act of 2006 |
| ARB | California Air Resources Board |
| BAAQMD | Bay Area Air Quality Management District |
| CAP | climate action plan |
| CAPPA | Climate and Air Pollution Planning Assistant |
| CEC | California Energy Commission |
| CEQA | California Environmental Quality Act |
| $CO_2$ | carbon dioxide |
| $CO_2e$ | carbon dioxide equivalent |
| CPUC | California Public Utilities Commission |
| EIR | environmental impact review |
| GHG | greenhouse gas |
| ICLEI | Local Governments for Sustainability |
| kWh | kilowatt hour |
| MFD | multifamily dwelling |
| MPO | metropolitan planning organization |
| MT | metric ton |
| PACE | property-assessed clean energy |
| PG&E | Pacific Gas and Electric Company |
| ppm | parts per million |
| PV | photovoltaic |
| RPS | renewable portfolio standard |
| U.S. EPA | United States Environmental Protection Agency |
| TOD | Transit-oriented development |

# Appendix B. 10 Steps to Reduce Your Carbon Footprint

Modified from CoolClimate.org

**1. Change your commute**

Did you know that one third of the CO2 produced in the U.S. is from the transportation of people or goods? Pick one day a week to walk, bike, take public transportation or carpool to work or when you are running errands. Silicon Valley Bicycle Coalition (http://bikesiliconvalley.org/) has great resources and can help you plan your bike commute. Another resource for planning trips via public transportation is 511.org. If possible, live close to your workplace and talk to your employer about working from home or subsidizing the costs of public transportation. When driving, remember to combine several car trips into one trip and avoid idling. Additionally, you can get better fuel efficiency by following the speed limit. Exceeding the speed limit by just 5 mph during highway travel results in an average fuel economy loss of 6 percent.

**2. Be a better consumer**

Did you know that the average American generates about 4.4 lbs of trash each day? To reduce the amount of trash you generate, follow these few easy steps. Use re-usable coffee mugs and shopping bags. If you forget your mug or bag at the store, buy a new reusable mug or bag and keep the extra one in your purse or car for use the next time you are out. Alternatively, set aside $1 each time you forget your mug or bag; depending on your memory, you will have enough funds to purchase a reusable item sooner or later. Also, reuse as many things as possible and recycle at home, work, and school. Compost pick-up is now available in more parts of San Mateo County.

**3. Shop local**

The shorter the distance your food travels to your plate or that product travels to your home, the fewer greenhouse gases are produced. Declare one day a week to be a "buy local day" and eat foods produced within 50 miles of your house. Participate in community-supported agriculture and community-supported fishery programs and shop at farmers markets.

Buy produce and fish labeled “As Fresh As It Gets,” signifying that it was grown or harvested in San Mateo County. Support restaurants and businesses accredited by the “As Fresh As It Gets” campaign, signifying that they use county-grown produce, fish, and other products. For a list of in-season produce and fish, farmers market locations, and accredited businesses and restaurants, visit www.asfreshasitgets.com.

**4. Dry-up Household Water Consumption**

Did you know that water-related energy use consumes 19 percent of California's electricity, 30 percent of its natural gas, and 88 billion gallons of diesel fuel every year? To reduce your water consumption at home, turn off your water when it's not being used, take shorter showers, stop unseen leaks by reading your meter, install low-flow shower heads and aerators on your faucet, install and use water-efficient landscaping and irrigation methods (for example, plant drought tolerant plants and/or install permeable surfaces and drip irrigation systems), and use EnergyStar appliances. The Bay-Friendly Gardening Program (http://www.stopwaste.org/) provides resources for selecting plants, conserving water and fostering soil health.

**5. Unplug it**

Did you know that appliances, chargers, home theater equipment, stereos, and televisions use electricity even when their power is off? Eliminating this "leaking" electricity could save you 6–26 percent on your average monthly electricity bill. Take a walking tour of your home, unplug seldom-used appliances, and install power strips so that the power to frequently used items can be easily turned off.

**6. Change the lights**

Replace any incandescent light bulbs that remain in your home with compact fluorescent lights (CFLs). Replacing one incandescent light bulb with a CFL can save $30 or more in electricity costs over the bulb‘s lifespan.

**7. Set your Thermostat for the Season**

Set your thermostat in winter to 68°or less during the daytime, and 55° before going to sleep (or when you are away for the day), to save 5 to20 percent of your space-heating costs. During the summer, set thermostats to 78° degrees or more to save 5 to20 percent of your cooling costs. For an easy fix, purchase an inexpensive programmable thermostat that makes these changes for you.

**8. Increase Energy Efficiency at Home**

Did you know that you can save up to 350 pounds of $CO_2$ and $150 per year at home by simply keeping air filters clean? To determine more ways to increase energy efficiency, take advantage of subsidized home energy audits offered through Energy Upgrade California. When you are ready to purchase an appliance, ensure that you purchase an EnergyStar appliance. To reduce carbon emissions associated with energy use, install or purchase alternative energy for your electricity needs.

**9. Stop Unwanted Services**

Did you know that junk mail production in the U.S. consumes as much energy as 2.8 million cars? Stop your junk mail at www.directmail.com/junk_mail. Stop unwanted catalogs at www.catalogchoice.org.

**10. Get your friends and families to reduce their carbon emissions**

# Appendix C. Summary of Funding Sources

For implementation of the Climate action plan, Brisbane must evaluate strategies for financing climate protection actions and provide adequate, reliable, and consistent long-term program funding. This appendix provides an overview of available funding sources to help determine appropriate potential program funding sources and funding levels to support existing and new programs outlined in this plan. Other funding sources may be available that are not listed here.

## C.1 Federal Funding

**American Reinvestment and Recovery Act (ARRA) Loan Program**
http://www.energy.ca.gov/efficiency/financing/index.html

Low-interest loans (with an interest rate of 1%) are available through the California Energy Commission for municipal energy saving projects. The maximum loan amount is $3 million per application and $20 million to $25 million is available as of 2011. Loans must be repaid from energy cost savings within approximate 13 years simple payback. Eligible projects include improving lighting systems, replacing streetlights or traffic signals with LEDs, installing automated energy management systems/controls and building insulation, energy generation including renewable and combined heat and power projects, heating and air conditioning modifications, and upgrading waste-water-treatment equipment. Swimming pools and golf courses are not eligible for funding under this program. All projects financed using this program must be completed and fully disbursed on or before March 31, 2012.

**Federal Transportation Investment Generating Economic Recovery (TIGER) Grant**
http://www.dot.gov/recovery/ost/.

The Federal Transportation Investment Generating Economic Recovery (TIGER) grant program was created by the American Investment and Recovery Act (ARRA) of 2009. Cities can apply for a TIGER grant to fund parking garages, and infrastructure to support electric battery-swap station and parking for electric vehicles. Information about the TIGER program is available at

## C.2 State Funding

**California Solar Initiative (CSI)**
http://www.gosolarcalifornia.ca.gov/csi/index.php

The California Solar Initiative (CSI) is the solar rebate program for California consumers that are customers of the investor-owned utilities - Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E). Together with the rebate program for

New Solar Homes and rebate programs offered through the dozens of publicly owned utilities in the state— the CSI program is a key component of the Go Solar California campaign for California.

A solar rebate program for customers in PG&E, SCE, and SDG&E territories, this program funds solar on existing homes as well as existing, or new commercial, agricultural, government and non-profit buildings. This program funds both solar photovoltaics (PV), as well as other solar thermal generating technologies. This program is sometimes referred to as the CSI general market program and consists of the following components:

- *CSI-Thermal.* A solar hot-water rebate program for customers in PG&E, SCE, and SDG&E territories. This program funds solar hot water (solar thermal systems) on homes and businesses.

- *Single-family Affordable Solar Homes (SASH).* A solar rebate program for low-income residents that own their own single-family home and meet a variety of income and housing eligibility criteria. .

- *Multifamily Affordable Solar Housing* (MASH). A solar rebate program for multifamily affordable housing.

- *CSI Research, Development and Demonstration (RD&D).* A solar grant program to fund grants to explore solar technologies and other distributed generation technologies.

The CSI offers solar customers different incentive levels based on the performance of their solar panels, including such factors as installation angle, tilt, and location rather than system capacity alone. This performance framework ensures that California is generating clean solar energy and rewarding systems that can provide maximum solar generation.

The CSI program has a total budget of $2.167 billion between 2007 and 2016 and a goal to install approximately 1,940 MW of new solar generation capacity.

**Energy Conservation Assistance Account Program (ECAA)**
http://www.energy.ca.gov/efficiency/financing/index.html

Projects that are not eligible for funding under the ARRA Loan Program may be eligible for funding through the ECAA, which offers loans with three percent interest to finance energy-efficiency improvements.

**Energy Upgrade California**
https://energyupgradeca.org/overview

The Energy Upgrade California program helps residential and commercial consumers and the building industry to access available rebate programs and financing options for energy efficiency and renewable energy projects. The program is a partnership among California counties, cities, non-profit organizations and the state's investor-owned utilities (Pacific Gas & Electric, Southern California Edison, Southern California Gas Company and San Diego Gas & Electric Company), and publicly owned utilities. Funding for this effort comes from the American Recovery and Reinvestment Act (ARRA, also known as federal stimulus funds).

## C.3 Utility Rebate Programs

Pacific Gas and Electric (PG&E) offers a full suite of energy efficiency rebates programs to support its customers in saving energy and money.

- Rebates for households: http://www.pge.com/myhome/saveenergymoney/
- Rebates for businesses: http://www.pge.com/mybusiness/energysavingsrebates/

Below, we provide some specific examples of PG&E programs available to the community.

**PG&E San Mateo County Energy Watch Program**
http://www.smcenergywatch.com

San Mateo County Energy Watch provides energy efficiency services and retrofits and assists businesses and moderately low-income households to identify cost-effective projects. The program's services include energy audits, special rebates and incentives

**PG&E Residential Appliance Rebates**
http://www.pge.com/myhome/saveenergymoney/rebates/appliance/

PG&E offers rebates to customers who purchase qualifying energy efficient appliances, including dishwashers, hot-water heaters, and room air conditioners. Rebates range from $30 to $75 for qualifying appliances. PG&E and American Water are also currently offering a combined rebate of up to $250 for installing high-efficiency clothes washers. More information on these programs is available at

**PG&E LED Streetlight Replacement Program**
http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ref/lighting/lightemittingdiodes/incentives/index.shtml

The City of Brisbane may be eligible for PG&E's LED streetlight replacement program which provides rebates to cities that replace existing streetlights with more energy efficient LED fixtures (up to $125 per fixture). More information on this program is available at

**PG&E Commercial Appliance Rebates**
http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ref/index.shtml

PG&E offers rebates to business customers on hundreds of products including refrigeration units, lighting fixtures, heating systems, food service appliances, boilers and water heaters, and insulation. More information and a complete list of products eligible for rebates is available online at

**PG&E Home Energy Efficiency Improvements Rebates**
http://www.pge.com/myhome/saveenergymoney/rebates/remodeling/

PG&E offers rebates to customers who make energy efficiency improvements when remodeling their homes. Currently PG&E offers a rebate of up to $0.20 per square foot for cool roof installations and $0.15 per square foot of attic and wall installation installed. Additionally, PG&E has rebates for homeowners who upgrade their home's heating and cooling systems. Rebates are available for installing energy efficient furnaces (up to $300), air conditioning units (up to $50) and whole house fans (up to $100). Finally, PG&E will provide up to $400 in rebates to customers who test and seal their home's duct system. More information on this program is available at

## C.4 Local Energy Programs

**Acterra's High Energy Homes Project**
http://www.acterra.org/programs/highenergy/index.html

Acterra's High Energy Homes project helps residents in homes with high PG&E bills to analyze and identify costly energy "leaks" that provide little or no value. Through a free on-line analysis of your PG&E bill data, the program creates an energy profile for your home and highlights low-cost energy-saving opportunities that can significantly reduce your bills and conserve energy. The audit starts online via a secure website. A home visit may be scheduled if the data from your home's energy profile presents an unusual pattern.

**California Youth Energy Services**
http://www.risingsunenergy.org

Since 2000, Rising Sun Energy Center has run CYES, a summer youth employment and community efficiency retrofit program in the Bay Area. CYES hires young people (ages 15-22) and trains them to become Energy Specialists, serving their communities with a FREE Green

House Call. Energy Specialists install free energy and water saving devices, and provide personalized recommendations and education for further savings in homes. CYES provides services to all community members regardless of income. However, it was designed to serve hard-to-reach residents including renters, non-English speaking households, and low-moderate income households. It provides youth with opportunities for training and meaningful employment; which are often not adequately available to them. CYES youth receive employability skills training, paid summer employment, and the foundation for a green career. The program is operating in the City of San Mateo in Summer 2011, and will be expanding further into San Mateo County in 2012.

**Green@Home HouseCalls**
http://www.acterra.org/programs/greenathome/index.html

Green@Home HouseCalls help fight climate change by saving residents energy, money and CO2. Trained volunteers meet with residents in their homes to install simple energy-saving devices and create home energy conservations plans. Volunteers demonstrate environmentally friendly choices and foster a deeper awareness of the need for change. HouseCalls are available to all residents of participating cities whether you rent or own.

**RightLights Program**

The RightLights Program provides subsidized energy efficiency upgrades of lighting and refrigeration systems, with free professional assistance to help businesses lower energy bills and boost cash flow. RightLights is available Generally,any commercial PG&E customer who receives electric service on the A1, A6, A10, or E19-v rate schedules is eligible for the program. Property owners as well as businesses who lease their space are encouraged to apply. Multi-family residential properties are eligible for RightLights in their common-use areas only.

**Sustainable San Mateo County's Energy Ambassador Program**
http://sustainabilityhub.net/contest/ea-parties/

Sustainable San Mateo County's *Energy Ambassador* Program educates homeowners on home energy efficiency as it relates to behaviors, electricity usage, and the building envelope. In order to do this, Sustainable San Mateo County (SSMC) takes a "top-down" approach to make sure homeowners recognize all aspects of home energy efficiency. The program has three components we use to engage homeowners; a Personal Energy Review, invitation to attend an Energy Ambassador Party, and hosting an Energy Ambassador Party. The ultimate goal of the program is for homeowners to take steps in each area of energy efficiency while helping to educate their friends and neighbors through the Energy Ambassador party.

At *Energy Ambassador Parties*, Sustainable San Mateo County uses the host's home as a case study. Guests have a chance to enjoy some refreshments, mingle with some like-minded

people, and learn about the value of getting a home energy assessment and making energy efficiency improvements.

**Sustainable San Mateo County's Personal Energy Review Program**
http://sustainabilityhub.net/contest/per

With a *Personal Energy Review*, or PER, Sustainable San Mateo County (SSMC) customizes a free one-on-one evaluation for each homeowner. It is a chance to learn about the three aspects of home performance (behavior, electricity usage, and the building envelope). An SSMC staff member or volunteer will visit your home. During the visit, SSMC will analyze how your home is performing and what it is costing you. In other words, SSMC helps identify the issues in your home and what your utility bill is. Once we all understand your home, we can help you create a plan for curing those symptoms.

## C.5 Other Funding Opportunities

**American Forests Global ReLeaf Grant Program**
http://www.americanforests.org/global_releaf/

American Forests is a non-profit organization founded in 1875 that promotes forest conservation. American Forest's Global ReLeaf Program provides grants to fund tree-planting projects in urban and natural areas.

**California ReLeaf Urban Forestry Grant Program**
http://californiareleaf.org/programs/grants

The California ReLeaf Urban Forestry grant program provides funding to assist nonprofit and community-based groups throughout California with urban forestry projects. The program is funded through a contract with the California Department of Forestry and Fire Protection (CAL FIRE).

**Large Landscape Audit**

BAWSCA and its participating member agencies offer this audit program to select large landscapes within the service area free of charge. This program includes the development and monthly distribution of landscape water budgets for selected accounts and actual large landscape surveys to assess landscape watering needs. A key component of the program is ongoing monitoring/tracking of actual water use and estimated water savings for the sites surveyed. If you have water conservation related questions, please call 650-349-3000 or send an email to bawsca@bawsca.org. You can also check with your local water company; some offer water audits for no charge.

**Waste Audits by Recology**

Recology offers a free waste audit to its business customers. A Waste Zero Specialist will come to your facility to advise you on the size/type of bins you could use and make other recommendations to help you reduce the amount of waste generated. To make an appointment, call (650) 595-3900.

# Appendix D. Adaptation Planning for Climate Impacts

Effective adaptation planning and management entails dealing with uncertainty. It is a long-term process that should allow immediate action when necessary and adjust to changing conditions and new knowledge. Brisbane plans to initiate an inclusive planning process that ensures the resulting actions are feasible and widely accepted. Adaptation will likely be an ongoing process of planning, prioritization and specific project implementation.

Five important steps to effective adaptation planning are summarized below:

1. **Increase Public Awareness; Engage and Educate the Community**

   It is critical that the public understand the magnitude of the challenge and why action is needed. The planning process should be inclusive of all stakeholders. Local outreach campaigns are needed to promote awareness of the dangers of heat exposure and recommend low-cost and low-GHG adaptation strategies. These efforts should leverage similar efforts undertaken at the regional, state, and federal levels.

2. **Assess Vulnerability**

   Understanding vulnerability to sea level rise and other climate change impacts is critical to developing adaptation effective strategies. A detailed vulnerability analysis should be performed to assess potential climate change impacts to infrastructure and natural systems. Future vulnerability of assets and infrastructure can then be assessed using conceptual models of shore response to sea level rise. Shore response models can be applied for one or more climate change scenarios and planning horizons, and a strategy for adapting can be developed with due consideration to priorities and time frames. Both short-term and long-term adaptation strategies should be identified. Level of risk can be categorized in terms of likelihood of damage within the forecasting period and the severity of the damages. This allows planners to prioritize their response to sea level rise. The vulnerability assessment can also provide a framework for agency and community education and participation, feed into other planning documents, and identify funding needs.

3. **Establish Goals, Criteria and Planning Principles**

Engage with stakeholders to establish planning priorities, determine decision criteria, and build community support for taking action. Rank physical and natural assets for preservation efforts. Where possible, look for situations where a mitigation action has adaptation co-benefits (e.g., planting trees to reduce urban heat islands while sequestering carbon and providing habitat).

4. **Develop Adaptation Plan**

   Identify specific strategies, develop actions and cost estimates, and prioritize actions to increase local resilience of City infrastructure and critical assets, including natural systems like wetlands and urban forests. Look for synergies between natural processes and engineering solutions. There is a continuum of strategies available to manage sea level rise, ranging from coastal armoring (levees, seawalls, etc.) to elevated development to a managed retreat or abandonment of low-lying development. An adaptation plan should include a prioritized list of actions (e.g. projects) with a timeline, capital expenditure plan, and framework for monitoring and adaptive management.

5. **Ongoing Monitoring and Adaptive Management**

   Reassess climate change vulnerabilities on a regular basis and modify actions accordingly. This includes monitoring the effectiveness of current policies, strategies and actions, and keeping up with changing science, funding opportunities, and regulatory actions.

A menu of potential adaptation strategies and measures is provided in the table below.

**Table 7. Adaptation Strategies and Measures**

| Climate Change Impacts | Sample Adaptation Measures |
|---|---|
| **Sea Level Rise**<br><br>Risks to existing facilities, natural systems, private property and public infrastructure | • Educate and engage the community on the need for long-range planning<br>• Partner or collaborate with other jurisdictions and agencies to increase awareness and build community support for action<br>• Identify funding mechanisms and seek public-private partnerships where interests converge<br>• Use natural backshore wave-buffering processes to reduce wave erosion and run-up on levees<br>• Increase or maintain the buffering capacity of tidal wetlands to protect against storm surges and keep pace with sea-level rise<br>• Move levees further inland to allow marshes and mudflats to naturally transgress landward<br>• Protect and restore wetlands that provide vital habitat and carbon storage, and allow for landward migration of habitat over time<br>• Make modifications to low-lying wastewater treatment facilities. Consider opportunities for integrating wastewater treatments and wetlands |

| | |
|---|---|
| | • Avoid new development in areas at risk based on sea level projections<br>• Do coastal armoring with levees and seawalls to protect vital infrastructure from erosion, inundation, and flooding |
| **Extreme Heat Events**<br><br>Risks to public health and infrastructure | • Identify vulnerable communities and develop emergency preparedness plan<br>• Establish cooling centers, especially for vulnerable populations<br>• Reduce urban heat islands through use of cool roofs and other reflective surfaces<br>• Do targeted tree planting and enact new requirements for shading in new parking lots and other large paved areas<br>• Reduce risk of wildfires through fuels reduction in the urban-wild land interface |
| **Regional Drought**<br><br>Risks to reliable water supply, and potential conflicts between urban and agriculture users | • Increase capacity for community water storage<br>• Promote local water conservation<br>• Make water conservation a top priority for agriculture in the region<br>• Do water reclamation and reuse projects |
| **Increased Flooding and Severe Weather Events**<br><br>Risks to public health, private property, public infrastructure, and ecosystems | • Integrate local flood management plans with adaptation planning<br>• Identify vulnerable communities and develop emergency preparedness plans<br>• Establish local land use policies that decrease flood risk; avoid building in high-risk areas<br>• Make modifications to storm water system routing and storage. Develop storage areas for peak flows<br>• Maximize use of bioswales and permeable surfaces in both greenscape and hardscape areas to improve aquifer recharge and mitigate flooding from stormwater |
| **Air Quality and Other Public Health Concerns** | • Restrict use of fireplaces and open fires on high-risk days<br>• Monitor potential threats to public health, including new diseases, and develop public awareness |
| **Threats to Species, Ecosystems, and Ecosystem Services** | • Design urban forest program to improve biodiversity, provide heat relief, and sequester carbon<br>• Preserve wetlands, salt marshes, and other critical coastal habitats |
| **Risks to Local Agriculture and Food Supply** | • Promote conservation of local agricultural land<br>• Promote the use of public and private land and rooftops for producing food<br>• Promote the planting of fruit and nut trees<br>• Support local farmers markets by providing incentives such as reduced costs for permits and support in attaining electronic benefit transfer (EBT) point-of-sale terminals<br>• Provide incentives and remove regulatory obstacles to encourage animal husbandry and local food production and distribution<br>• Provide and promote educational opportunities for residents at all levels of the educational system (preschool through college) to gain skills in organic gardening; fruit production; animal husbandry; food preservation and cooking; and affordable, healthy eating |

| | |
|---|---|
| | • Develop a city-run or city-supported food gleaning program that organizes volunteers or compensates workers to collect food from trees and shrubs on land owned by cities or within cities to distribute through food banks and other local distribution channels<br>• Reduce food waste by implementing a local composting where all food scraps, food-soiled paper, waxed cardboard, wood crates and landscape trimmings from markets, restaurants, homes, hotels, and schools, would be collected and made available for distribution to rural or urban gardeners |

# Appendix E. Future Opportunities for Emissions Reductions

Additional measures that the city may implement are in the following sections of this document: Measures requiring future study and Public Participation and Community engagement: Actively create partnerships with the county to reach these goals.

# Appendix F. Baseline GHG Inventory and Forecast

EACH city to insert their Baseline GHG Inventory Report and GHG Forecast, clearly showing technical details such as data sources, methodologies, and assumptions.
The data table below was taken from the Brisbane 2010 Community Inventory report. In the table the baseline data for 2005 is displayed. The GHG emission data was gathered using the ICLEI common protocol for determining in-boundary GHG emissions from transportation. The in-boundary method takes into account vehicles that stop in Brisbane and not those that pass by on state highways or drive through.

**Table 4: 2010 Community Emissions by Sector**

| Sectors Included in the Baseline Inventory | 2005 GHG Emissions (metric tons $CO_2e$) | 2010 GHG Emissions (metric tons $CO_2e$) | Increase or Decrease in GHG Emissions (metric tons $CO_2e$) | Percentage of 2010 GHG Emissions |
|---|---|---|---|---|
| Residential | 5,711 | 5,847 | +136 | 4.0% |
| Commercial/Industrial | 23,588 | 19,976 | -3,612 | 13.5% |
| Transportation – Local roads | 21,463 | 21,076 | -387 | 14.2% |
| Transportation – State highways | 95,352 | 82,113 | -13,239 | 55.5% |
| Transportation – Off-road equipment | 6,287 | 6,635 | +348 | 4.5% |
| Solid Waste – Landfills | 4,212 | 6,111 | +1,899 | 4.1% |
| Solid Waste – Generated Waste | 1,483 | 1,084 | -399 | 0.7% |
| **SUBTOTAL** | **158,096** | **142,843** | **-15,291** | **96.5%** |
| **New Sectors (not included in the Baseline Inventory)** | **2005 GHG Emissions (metric tons $CO_2e$)** | **2010 GHG Emissions (metric tons $CO_2e$)** | **Increase or Decrease in GHG Emissions (metric tons $CO_2e$)** | **Percentage of 2010 GHG Emissions** |
| Stationary Sources | Not available | 2,449 | Not applicable | 1.7% |
| Transportation – CalTrain | | 2,280 | | 1.5% |
| Transportation – Freight Trains | | 301 | | 0.2% |
| Wastewater | | 72 | | 0.0% |
| Water | | 82 | | 0.1% |
| **SUBTOTAL** | | **5,183** | | **3.5%** |
| | | | | |
| **Total of 2010 Emissions*** | | **142,843** | **metric tons CO2e** | |
| **Total of 2005 Baseline Emissions**** | | **158,096** | **metric tons CO2e** | |
| **Total Decrease** | | **-15,253 -10%** | **metric tons CO2e** | |

* Total 2010 emissions only include sectors and sources that were included in the original 2005 baseline inventory. As shown in Table 1, new sectors and sources accounted for an additional 5,183 MT $CO_2e$. These new sectors and sources were not included when making comparisons between 2005 baseline and 2010 emissions levels.

**Total 2005 baseline emissions exclude previously-reported Direct Access natural gas. The Direct Access natural gas consumption was erroneously double-counted in the baseline 2005 inventory.

For a GHG emission forecast refer to section 2.2.5 Emissions and Forecast for 2020 and 2035.

# Appendix G. Emission Reduction Measures: Calculations

EACH city to insert their version of the Manual of Calculations, clearly showing technical details such as data sources, methodologies, and assumptions.

# City of Brisbane: List of Climate Action Plan Measures and GHG Savings

## Table 1. Energy Measures

| Code | Measure Name | Detailed Description | Assumptions | GHG Emissions Savings by 2020 (MTCO2e) |
|---|---|---|---|---|
| **Community-wide measures** | | | | |
| EC1 | Commercial green building ordinance | The City has implemented a Commercial Green Building Ordinance which requires new commercial construction over 10,000 square feet to achieve a LEED Silver rating on the Green Building Project Checklist | Ordinance applies to 15% of new commercial construction by 2020 and results in 15% energy savings. | **4** |
| EC2 | Residential green building ordinance | The City implemented a Residential Green Building Ordinance that requires new single family dwellings in developments with over 20 housing units to achieve a "green home" rating on the New Home Green Points Checklist. | Ordinance applies to 20% of new residential construction by 2020 and results in 5% energy savings. | **8** |
| EC5 | Promote PG&E commercial and industrial energy efficiency/demand response programs | City will encourage commercial energy audits and the implementation of recommendations identified by audits and promote existing energy efficiency financing options, encourage. The City will encourage reduced commercial exterior lighting at night. The City will encourage planting of trees in commercial parking lots. The City will also comply with the state's Nonresidential Building Use Disclosure Program. The City will also promote existing solar hot water rebates/tax credits and comply with AB 2188 by the deadline to streamline solar permitting. | 20% of non-residential properties upgraded by 2020 and achieving 20% energy savings. | **541** |
| EC6 | Implement program for shade trees | City program to provide free shade trees for houses with eastern, western or southern exposure that heat up during the summer. | 1,934 housing units in Brisbane with 10% of homes participating in program with a resulting 5% energy savings for homes that participate | **26** |

| Code | Measure Name | Detailed Description | Assumptions | GHG Emissions Savings by 2020 (MTCO2e) |
|---|---|---|---|---|
| EC9 | Voluntary Residential Energy Disclosure | Voluntary disclosure of energy use information at time of home sale | 55.2 homes and condos sold per year with 30% of sold homes/condos participating in program with a resulting 10% energy savings for homes/condos that participate. | **42** |
| EC10 | Community Choice Aggregation (CCA) | The City will continue to participate in and support the feasibility study of a Community Choice Aggregation (CCA) Program. Enabled by California legislation (AB117), Community Choice Aggregation (CCA) allows local governments to purchase and generate power to sell to residential and business customers. Energy transmission, distribution, repair and customer service remain the responsibility of PG&E. | 50% of customers purchasing 50% renewable energy option and 1% of customers purchasing 100% renewable energy option by 2020. | **1,407** |
| | Ban gas powered lawn equipment | Gas powered lawn equipment would be phased out and replaced with electric powered lawn equipment when feasible. Encourage purchase of electric powered lawn equipment over gas powered. Potentially adopt an ordinance to ban gas powered lawn equipment. Potentially phased in by commercial first then residential. | Baseline gas-powered lawn and garden equipment annual emissions pulled from Brisbane's 2010 community inventory (85 MT CO2e). Assumes conversion of all lawn and garden equipment to electric equipment. | **43** |
| **Municipal measures** | | | | |
| EM1 | Energy efficient street lighting | The City will continue to replace existing street lights with LEDs. | Historic rate of replacing high pressure sodium and incandescent bulbs continues. | **32** |
| EM2 | Environmentally preferred purchasing policy - Energy | That City will adopt an Environmental Procurement Policy that emphasizes recycled materials and ENERGY STAR equipment. | 15% of devices replaced with ENERGY STAR devices by 2020 | **4** |
| EM4 | Renewable energy installation on municipal property. | The City will explore the potential for solar PV on City hall and other facilities. | Solar on all municipal buildings | **65** |
| EM5 | Energy efficiency in municipal buildings | The City will continue to audit city facilities for energy efficiency opportunities and implement energy efficient retrofits. City participates in San Mateo County Energy Watch and leveraged benchmarking to identify opportunities for EE upgrades and track energy performance. Leverage other programs that provide funding. | Historic rate of auditing/upgrading municipal buildings. | **13** |

| Code | Measure Name | Detailed Description | Assumptions | GHG Emissions Savings by 2020 (MTCO2e) |
|---|---|---|---|---|
| EM7 | Enroll in offset program | The City will consider enrollment in an energy offset program to offset city GHG emissions from electricity and natural gas | The City will offset 50% of its emissions resulting from electricity and gas purchases by 2020. | **207** |

## Table 2. Sustainable streets/ transportation measures

| Code | Measure Name | Detailed Description | Assumptions | GHG Savings by 2020 |
|---|---|---|---|---|
| **Community-wide measures** | | | | |
| TL5 | Public EV Charging | The City will install public EV charging stations. | Not quantified. | **N/A, Supporting Measure** |
| TL6 | Incentivize Local Hiring | The City will provide discount business license fees for companies in Brisbane that hire locally. | Policy will reduce outside residents commuting into Brisbane by 0.5%. | **60** |
| **Municipal measures** | | | | |
| TM4 | Adoption of low emission government vehicles | Target purchase of new or conversion of existing government vehicles to more efficient vehicles. | Replace 4 public works vehicles with alternative fuel vehicles by 2020 | **14** |

## Table 3. Solid Waste Measures

| Code | Measure Name | Detailed Description | Assumptions | GHG Savings by 2020 |
|---|---|---|---|---|
| **Community-wide measures** | | | | |
| WC1 | Set higher diversion rate goal. | The City will promote residential waste reduction and continue offering food scrap pickup through Waste Management. Additionally, the City will encourage community exchange of used items. | Raise diversion rate from 75% to 85% | **605** |

| | | | | |
|---|---|---|---|---|
| WC2 | Commercial recycling ordinance | The City will continue to support required commercial recycling and City staff/waste management staff will verify compliance. | Supporting measure, not quantified | **Supporting measure** |
| WC3 | Create Sustainable Vendor Policy for public events | The City will encourage residents to bring reusable plates, etc. to public events and require a waste attendant at public events to promote recycling and composting. | Supporting measure, not quantified | **Supporting measure** |
| WC4 | Yard waste ordinance | The City will adopt an ordinance requiring that all landscapers and landscape maintenance businesses recycle/divert yard waste. Provide residents and businesses with food scraps collection. Explore a ban on these organics from landfill. | Supporting measure, not quantified | **Supporting measure** |
| **Municipal measures** | | | | |
| WM1 | Environmentally preferred purchasing policy - Waste Reduction | Implement a sustainable purchasing policy that emphasizes recycled materials | Supporting measure, not quantified | **Supporting measure** |
| WM2 | Establish a zero waste policy | Government policy to achieve 95% diversion by 2020. | Increase municipal diversion rate from 75% to 95% by 2020 | **10** |

## Table 4. Water Measures

| Code | Measure Name | Detailed Description | Assumptions | GHG Savings by 2020 |
|---|---|---|---|---|
| EW1 | Water conservation incentives | The City adopted the Brisbane Indoor Water Conservation and water Conservation in Landscaping Ordinances in 2010 and will continue to apply the ordinances. The city will continue to promote existing and/or new rebates for water efficient appliances and fixtures through BAWSCA and promote CaliforniaFIRST water efficiency project financing for drip irrigation and artificial turf. The City will promote information/programs for water efficient landscaping and consider providing incentives for drought-resistant plants. | 20% of households achieve 10% water savings | **24** |

## Table 5. All Sector Measures

| Code | Measure Name | Detailed Description | Assumptions | GHG Savings by 2020 |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| A1 | Participate in County Green Business program | Promote San Mateo County Green Business program and set goals for participation. (Voluntary program that allows businesses to brand themselves as green by following sustainable practices. | 20% of businesses participating in Green Business Program by 2020 | **81** |

# SELECTION OF MEASURES INCLUDED IN THE RICAPS MENU OF MEASURES

| Emissions Category | Code | Measure Name | Detailed Description | SELECTED? | IS THIS MEASURE ALREADY IMPLEMENTED OR BEING IMPLEMENTED NOW? |
|---|---|---|---|---|---|
| Energy (Community) | EC1 | Commercial green building ordinance | Update building code to mandate higher building performance in commercial buildings. Mandate achievement of CALGreen Tier 1 energy performance. Include additional mandatory requirements such as solar hot water or cool roofs. Seek to harmonize with regional Green Building Ordinances. | No | Yes |
| Energy (Community) | EC2 | Residential green building ordinance | The City will implement a Residential Conservation Ordinance that will require certain energy upgrades to be installed prior to sale or residential buildings and potentially prior to new leases being signed for residential buildings. | Yes | Yes |
| Energy (Community) | EC3 | Incentivize solar energy installation | Provide financial incentives for solar PV and hot water system installation. Meet with local banks and discuss creative ways to partner for low cost financing of RE and EE projects. Provide free assistance for project developers through the PPA and interconnection process. Encourage bulk purchases such as the Portola Valley Bulk purchase through Solar City | No | Yes |
| Energy (Community) | EC4 | Participate in Energy Upgrade Program and similar residential rebate/incentive programs as they become available and promote existing rebates (PG&E, State, Federal) | City will encourage residential energy audits and the implementation of recommendations identified by audits and promote existing energy efficiency financing options. The City will encourage the use of window curtains and reduced exterior lighting at night. The City will also. provide a DIY Energy Toolkit through the library. The City will also promote existing solar hot water rebates/tax credits and comply with AB 2188 by the deadline to streamline solar permitting. | Yes | Yes |
| Energy (Community) | EC5 | Promote PG&E commercial and industrial energy efficiency/demand response programs | City will encourage commercial energy audits and the implementation of recommendations identified by audits and promote existing energy efficiency financing options; encourage. The City will encourage reduced commercial exterior lighting at night. The City will encourage planting of trees in commercial parking lots. The City will also comply with the state's Nonresidential Building Use Disclosure Program. The City will also promote existing solar hot water rebates/tax credits and comply with AB 2188 by the deadline to streamline solar permitting. | Yes | Yes |
| Energy (Community) | EC6 | Implement program for shade trees | Program to provide free shade trees for houses with eastern, western or southern exposure that heats up during the summer. | No | No |
| Energy (Community) | EC7 | Funding for energy efficiency and renewable energy | Establish revolving funds to finance energy-efficiency retrofits at residences | No | No |
| Energy (Community) | EC8 | Funding for energy efficiency and renewable energy | Establish revolving funds to finance energy-efficiency retrofits at businesses | No | No |
| Energy (Community) | EC9 | Voluntary Residential Energy Disclosure | Voluntary disclosure of energy use information at time of home sale | No | No |
| Energy (Community) | EC10 | Community Choice Aggregation (CCA) | Participate in and support County of San Mateo in implementing Community Choice Aggregation (CCA) or similar energy mix. | Yes | No |
| Energy (Municipal) | EM1 | Energy efficient street lighting | The City will continue to replace existing street lights with LEDs. | Yes | No |
| Energy (Municipal) | EM2 | Environmentally preferred purchasing policy - Energy | That City will adopt a Environmental Procurement Policy that emphasizes recycled materials and ENERGY STAR equipment. | Yes | Yes |
| Energy (Municipal) | EM3 | Municipal green building policy | Mandate all new municipal buildings achievement of CALGreen Tier 1 energy performance. Consider achieving LEED Silver or Gold status. | No | Yes |
| Energy (Municipal) | EM4 | Renewable energy installation on municipal property. | The City will explore the potential for solar PV on City hall and other facilities. | Yes | Yes |
| Energy (Municipal) | EM5 | Energy efficiency in municipal buildings | The City will continue to audit city facilities for energy efficiency opportunities and implement energy efficient retrofits. City participates in San Mateo County Energy Watch and leveraged benchmarking to identify opportunities for EE upgrades and track energy performance. Leverage other programs that provide funding. | Yes | No |
| Energy (Municipal) | EM6 | Funding for energy efficiency and renewable energy | Establish revolving funds to finance energy-efficiency retrofits at public buildings | No | No |
| Energy (Municipal) | EM7 | Enroll in offset program | The City will consider enrollment in an energy offset program to offset city GHG emissions from electricity and natural gas | Yes | No |
| Transportation and Land Use | TL1 | Smart growth development | Establish a Smart Growth Policy that prioritizes infill, higher density, transportation oriented and mixed use development; increase density; and increase destination accessibility. | No | No |
| Transportation and Land Use | TL2 | Walkable/bikeable street landscape | Remake urban landscape to make walking and biking more desireable. Bike lanes, bike parking, traffic calming, beautification, etc. | No | Yes |
| Transportation and Land Use | TL3 | Bike and car sharing | Incentivize City Car Sharing Companies to open pods in town. Explore Bike Share program. | No | No |
| Transportation and Land Use | TL4 | Parking Policies | Establish parking policies to increase use of walking, public transit and bicycling; unbundle parking costs from property costs; and implement market price public-parking (on-street). | No | |
| Transportation and Land Use | TL5 | Public EV Charging | The City will install public EV charging stations. | Yes | No |
| Transportation and Land Use | TL6 | Incentivize Local Hiring | The City will porovide discount business license fees for companies in Brisbane that hire locally. | Yes | No |
| Transportation (Municipal) | TM1 | Efficient fleet policy | The City will prioritize the purchase of hybrid and electric vehicles when feasible. | No | No |
| Transportation (Municipal) | TM2 | Flexible schedules | Establish alternative work schedules and telecommuting to reduce employee commute | No | No |
| Transportation (Municipal) | TM3 | Implement Public Employee Commuting Program | Establish commute alternatives program to promote and incentivize public transportation, carpooling, biking, etc. | No | No |
| Transportation (Municipal) | TM4 | Adoption of low emission government vehicles | Target purchase of new or conversion of existing government vehicles to more fuel efficient vehicles. | Yes | Yes |
| Waste (Community) | WC1 | Set higher diversion rate goal. | The City will promote residential waste reduction and continue offering food scrap pickup through Waste Management. Additionally, the City will encourage community exchange of used items. | Yes | Yes |
| Waste (Community) | WC2 | Commercial recycling ordinance | The City will continue to support required commercial recycling and City staff/waste management staff will verify compliance. | Yes | No |
| Waste (Community) | WC3 | Create Sustainable Vendor Policy at Public Events | The City will encourage residents to bring reusable plates, etc. to public events and require a waste attendent at public events to promote recycling and composting. | Yes | No |
| Waste (Community) | WC4 | Yard Waste Ordinance | The City will adopt an ordinance requiring that all landscapers and landscape maintenance businesses recycle/divert yard waste. Provide residents and businesses with food scraps collection. Explore a ban on these organics from landfill. | Yes | No |
| Waste (Municipal) | WM1 | Environmentally preferred purchasing policy - Waste Reduction | Implement a sustainable purchasing policy that emphasizes recycled materials. | Yes | Yes |
| Waste (Municipal) | WM2 | Establish a zero waste policy | Government policy to achieve 95% diversion by 2020. | Yes | No |
| Water | EW1 | Water conservation incentives | The City adopted the Brisbane Indoor Water Conservation and water Conservation in Landscaping Ordinances in 2010 and will continue to apply the ordinances. The city will continue to promote existing and/or new rebates for water efficient appliances and fixtures through BAWSCA and promote CaliforniaFIRST water efficiency project financing for drip irrigation and artificial turf. The City will promote information/programs for water efficient landscaping and consider providing incentives for drought-resistant plants. | Yes | Yes |
| Water | EW2 | Water conservation ordinance | Adopt Bay Area Water Supply and Conservation Agency (BAWSCA) Indoor Ordinance and Outdoor Ordinance if haven't already and enhance BAWSCA Outdoor Ordinance (all cities required to adopt). | No | Yes |
| All Sectors | A1 | Participate in County Green Business program | Promote San Mateo County Green Business program and set goals for participation. (Voluntary program that allows businesses to brand themselves as green by following sustainable practices.) | Yes | Yes |
| All Sectors | A2 | Green Lease Program | Covert all leased property to "green" lease by either working with landlords or moving facilities to locations supported by systems such as solar, close to transportation, and energy efficiency and water conservation. | No | No |

## SCORING OF MEASURES INCLUDED IN THE RICAPS MENU OF MEASURES

| Emissions Categor | Code | Selected | Measure Name | Total Scor |
|---|---|---|---|---|
| All Sectors | A1 | Yes | Participate in County Green Business program | 2.98 |
| All Sectors | A2 | No | Green Lease Program | 0.00 |
| Energy (Community) | EC1 | No | Commercial green building ordinance | 0.00 |
| Energy (Community) | EC2 | Yes | Residential green building ordinance | 2.88 |
| Energy (Community) | EC3 | No | Incentivize solar energy installation | 0.00 |
| Energy (Community) | EC4 | Yes | residential rebate/incentive programs as they become available and promote existing rebates (PG&E, State, Federal) | 3.36 |
| Energy (Community) | EC5 | Yes | Promote PG&E commercial and industrial energy efficiency/demand response programs | 3.64 |
| Energy (Community) | EC6 | No | Implement program for shade trees | 0.00 |
| Energy (Community) | EC7 | No | Funding for energy efficiency and renewable energy | 0.00 |
| Energy (Community) | EC8 | No | Funding for energy efficiency and renewable energy | 0.00 |
| Energy (Community) | EC9 | No | Voluntary Residential Energy Disclosure | 2.59 |
| Energy (Municipal) | EM1 | Yes | Energy efficient street lighting | 3.91 |
| Energy (Municipal) | EM2 | Yes | Environmentally preferred purchasing policy - Energy | 4.05 |
| Energy (Municipal) | EM3 | No | Municipal green building policy | 0.00 |
| Energy (Municipal) | EM4 | Yes | Renewable energy installation on municipal property. | 3.42 |
| Energy (Municipal) | EM5 | Yes | Energy efficiency in municipal buildings | 3.61 |
| Energy (Municipal) | EM6 | No | Funding for energy efficiency and renewable energy | 0.00 |
| Energy (Municipal) | EM7 | Yes | Enroll in offset program | 2.94 |
| Water | EW1 | Yes | Water conservation incentives | 3.39 |
| Water | EW2 | No | Water conservation ordinance | 0.00 |
| Transportation and Land Use | TL1 | No | Smart growth development | 0.00 |
| Transportation and Land Use | TL2 | No | Walkable/bikeable street landscape | 0.00 |
| Transportation and Land Use | TL3 | No | Bike and car sharing | 0.00 |
| Transportation and Land Use | TL4 | No | Parking Policies | 0.00 |
| Transportation and Land Use | TL5 | Yes | Preferred Parking Policy | 0.00 |
| Transportation (Municipal) | TM1 | No | Efficient fleet policy | 0.00 |
| Transportation (Municipal) | TM2 | No | Flexible schedules | 0.00 |
| Transportation (Municipal) | TM3 | No | Implement Public Employee Commuting Program | 0.00 |
| Transportation (Municipal) | TM4 | Yes | Adoption of low emission government vehicles | 3.50 |
| Waste (Community) | WC1 | Yes | Set higher diversion rate goal. | 3.67 |
| Waste (Community) | WC2 | Yes | Commercial recycling ordinance | 3.42 |
| Waste (Community) | WC3 | Yes | Create Sustainable Vendor Policy at Public Events | 3.13 |
| Waste (Community) | WC4 | Yes | Yard Waste Ordinance | 2.94 |
| Waste (Municipal) | WM1 | Yes | Environmentally preferred purchasing policy - Waste Reduction | 2.86 |
| Waste (Municipal) | WM2 | Yes | Establish a zero waste policy | 3.10 |

# WEIGHING OF BENEFIT COST MEASURES

| Overall Weighting of Categories | | |
|---|---|---|
| **Category 1: Benefits** | **Category 2: Costs** | **Category 3: Implementation and Feasibility** |
| 33% | 33% | 33% |

| **Category 1: Benefits** | **Default weighting within category (Community measures)** | **Default weighting within category (Municipal measures)** |
|---|---|---|
| 1. Annual GHG Reduction (Metric Tons CO2e) | 20% | 25% |
| 2. Annual Resource Savings (units) | 20% | 25% |
| 3. Annual government dollar savings estimate | 20% | 25% |
| 4. Enter annual community dollar savings estimate | 20% | N/A |
| 5. Are there co-benefits? | 20% | 25% |
| | 100% | 100% |

| **Category 2: Costs** | **Default weighting within category (Community measures)** | **Default weighting within category (Municipal measures)** |
|---|---|---|
| 1. Government Capital Costs | 17% | 17% |
| 2. Additional Government Annual Operating Costs | 17% | 17% |
| 3. Does the measure require significant government staff time? | 17% | 17% |
| 4. What is the effect on residential costs? | 17% | 17% |
| 5. What is the effect on business costs? | 17% | 17% |
| 6. Estimated Payback Period | 17% | 17% |
| | 100% | 100% |

| **Category 3: Implementation and Feasibility** | **Default weighting within category (Community measures)** | **Default weighting within category (Municipal measures)** |
|---|---|---|
| 1. Implementation time requirements | 20% | 20% |
| 2. Probability of Community Support or Opposition | 20% | 20% |
| 3. Requirements for establishing enabling codes and ordinances | 20% | 20% |
| 4. Synergies with existing initiatives and partnerships | 20% | 20% |
| 5. Outside Funding Availability | 20% | 20% |
| | 100% | 100% |

# FINAL ANALYSIS FOR THE BENEFIT-COST MEASURES INCLUDED IN THE RICAPS MENU

| Code | Measure Name | Detailed Description | Selected ? | Total Measure Score | Total FTE Needed | Measure GHG Savings (Annual MT CO2e) | Already Being Implemented? | Year Implemented (for new measures): |
|---|---|---|---|---|---|---|---|---|
| TL5 | Public EV Charging | The City will install public EV charging stations. | Yes | 2.77 | 0.10 | NA | No | 2017 |
| WM1 | Environmentally preferred purchasing policy - Waste Reduction | Implement a sustainable purchasing policy that emphasizes recycled materials. | Yes | 2.86 | 1.00 | NA | Yes | NA |
| EC10 | Community Choice Aggregation (CCA) | Continue to participate in feasibility study of a Community Choice Aggregation (CCA) Program. Enabled by California legislation (AB117), Community Choice Aggregation (CCA) allows local governments to purchase and generate power to sell to residential and business customers. Energy transmission, distribution, repair and customer service remain the responsibility of PG&E. Participation in the PDAC in no way binds or otherwise obligates participating jurisdictions to participate in CCA beyond: gathering and analyzing information, determining financial and technical feasibility, and assessing levels of public support for establishing CCA in the Monterey Bay Region. | Yes | N/A | 0.00 | 1,407 | No | 2013 |
| WC1 | Set higher diversion rate goal. | The City will promote residential waste reduction and continue offering food scrap pickup through Waste Management. Additionally, the City will encourage community exchange of used items. | Yes | 3.67 | 0.00 | 855 | Yes | NA |
| EC4 | Participate in Energy Upgrade Program and similar residential rebate/incentive programs as they become available and promote existing rebates (PG&E, State, Federal) | City will encourage residential energy audits and the implementation of recommendations identified by audits and promote existing energy efficiency financing options. The City will encourage the use of window curtains and reduced exterior lighting at night. The City will also. provide a DIY Energy Toolkit through the library. The City will also promote existing solar hot water rebates/tax credits and comply with AB 2188 by the deadline to streamline solar permitting. | Yes | 3.36 | 0.50 | 92 | Yes | NA |
| EM7 | Enroll in offset program | The City will consider enrollment in an energy offset program to offset city GHG emissions from electricity and natural gas | Yes | 2.94 | 0.10 | 83 | No | 2017 |
| TL6 | Incentivize Local Hiring | The City will porovide discount business license fees for companies in Brisbane that hire locally. | Yes | N/A | 0.00 | 60 | No | 2013 |
| TM4 | Adoption of low emission government vehicles | Target purchase of new or conversion of existing government vehicles to more fuel efficient vehicles. | Yes | 3.50 | 0.00 | 30.6 | Yes | NA |
| EC2 | Residential green building ordinance | The City will implement a Residential Conservation Ordinance that will require certain energy upgrades to be installed prior to sale or residential buildings and potentially prior to new leases being signed for residential buildings. | Yes | 2.88 | 0.00 | 28 | Yes | NA |
| EM2 | Environmentally preferred purchasing policy - Energy | That City will adopt a Environmental Procurement Policy that emphasizes recycled materials and ENERGY STAR equipment. | Yes | 4.05 | 0.00 | 23 | Yes | NA |
| EM1 | Energy efficient street lighting | The City will continue to replace existing street lights with LEDs. | Yes | 3.91 | 0.00 | 20 | No | 2013 |
| EC5 | Promote PG&E commercial and industrial energy efficiency/demand response programs | City will encourage commercial energy audits and the implementation of recommendations identified by audits and promote existing energy efficiency financing options, encourage. The City will encourage reduced commercial exterior lighting at night. The City will encourage planting of trees in commercial parking lots. The City will also comply with the state's Nonresidential Building Use Disclosure Program. The City will also promote existing solar hot water rebates/tax credits and comply with AB 2188 by the deadline to streamline solar permitting. | Yes | 3.64 | 0.00 | 16 | Yes | NA |
| EM4 | Renewable energy installation on municipal property. | The City will explore the potential for solar PV on City hall and other facilities. | Yes | 3.42 | 0.50 | 11 | Yes | NA |
| WM2 | Establish a zero waste policy | Government policy to achieve 95% diversion by 2020. | Yes | 3.10 | 0.00 | 7 | No | 2015 |
| EW1 | Water conservation incentives | The City adopted the Brisbane Indoor Water Conservation and water Conservation in Landscaping Ordinances in 2010 and will continue to apply the ordinances. The city will continue to promote existing and/or new rebates for water efficient appliances and fixtures through BAWSCA and promote CaliforniaFIRST water efficiency project financing for drip irrigation and artificial turf. The City will promote information/programs for water efficient landscaping and consider providing incentives for drought-resistant plants. | Yes | 3.39 | 0.00 | 6 | Yes | NA |
| A1 | Participate in County Green Business program | Promote San Mateo County Green Business program and set goals for participation. (Voluntary program that allows businesses to brand themselves as green by following sustainable practices.) | Yes | 2.98 | 0.00 | 5 | Yes | NA |
| EM5 | Energy efficiency in municipal buildings | The City will continue to audit city facilities for energy efficiency opportunities and implement energy efficient retrofits. City participates in San Mateo County Energy Watch and leveraged benchmarking to identify opportunities for EE upgrades and track energy performance. Leverage other programs that provide funding. | Yes | 3.61 | 0.00 | 1.4 | No | 2013 |
| WC2 | Commercial recycling ordinance | The City will continue to support required commercial recycling and City staff/waste management staff will verifiy compliance. | Yes | 3.42 | 0.00 | 0 | No | 2015 |
| WC3 | Create Sustainable Vendor Policy at Public Events | The City will encourage residents to bring reusable plates, etc. to public events and require a waste attendent at public events to promote recycling and composting. | Yes | 3.13 | 0.50 | 0 | No | 2015 |
| WC4 | Yard Waste Ordinance | The City will adopt an ordinance requiring that all landscapers and landscape maintenance businesses recycle/divert yard waste. Provide residents and businesses with food scraps collection. Explore a ban on these organics from landfill. | Yes | 2.94 | 0.00 | 0 | No | 2017 |

# COMMON ASSUMPTIONS USED IN THE BENEFIT-COST ANALYSIS INCLUDED IN THE RICAPS MENU OF MEASURES

**Residential Energy Intensity**

| | | | |
|---|---|---|---|
| Electric Use Intensity = | 3.5 | kwh/ square foot/ year | Average electric use intensity for residential buildings in kWh/sq ft. (RASS). Used data for CEC Climate Zone 5. |
| Natural Gas Use Intensity= | 0.31 | therms/ square foot/ | Average natural gas usage intensity for residential buildings in therms/sq ft (RASS). Used data for CEC Climate Zone 5. |

**Commercial Energy Intensity**

| | | | |
|---|---|---|---|
| Electric Use Intensity = | 13.63 | kwh/square foot/year | Average electric use intensity for commercial buildings in kWh/sq ft. (2005 California End Use Survey). Used data for CEC Climate Zone 5. |
| Natural Gas Use Intensity= | 0.26 | therms/square foot/year | Average natural gas usage intensity for commercial buildings in therms/sq ft (2005 California End Use Survey). Used data for CEC Climate Zone 5. |

**Future GHG Emissions Factors**

| | |
|---|---|
| 0.13 | = projected PG&E emissions factor in Metric Ton per MWh |
| 53.06 | = average emissions factor for natural gas (kg CO2/MMBtu) |

**Projected 2020 Energy Costs - Residential**

| | | |
|---|---|---|
| $/kwh in 2020= | $ 0.21 | 2020 rates are calculated based on information provided in the CEC's Report, California Energy Demand 2010-2020, Adopted Forecast. See Table 7, and also Form 2.3-CED 2009 Natural Gas Rates, and Form 2.3: Electricity Prices (2007 cents/kwh) - PG&E. Percentage increases for rates (Found in Table 7 of the CEC report and reflected in the Form 2.3 for natural gas and electricity) are shown below. |
| $/therm in 2020= | $ 1.28 | |

**Projected 2020 Energy Costs - Commercial/Industrial**

| | | |
|---|---|---|
| $/kwh in 2020= | $ 0.21 | 2020 rates are calculated based on the percentage of growth in rates provided in the CEC's Report, California Energy Demand 2010-2020, Adopted Forecast. See Table 7, and also Form 2.3-CED 2009 Natural Gas Rates, and Form 2.3: Electricity Prices (2007 cents/kwh) - PG&E. Percentage increases for rates (Found in Table 7 of the CEC report and reflected in the Form 2.3 for natural gas and electricity) are shown below. |
| $/therm in 2020 = | $ 1.02 | |

**2010 and 2015 Energy Costs**

| Sector | $/kwh | $/therm | |
|---|---|---|---|
| Residential - 2010 | $ 0.18 | $ 1.16 | 2015 rates are calculated based on the percentage growth in rates shown in the table below. 2015 rates are also used to calcualte 2020 rates shown above. |
| Residential - 2015 | $ 0.19 | $ 1.22 | |
| Commercial/Industrial - 2010 | $ 0.18 | $ 0.93 | |
| Commercial/Industrial - 2015 | $ 0.19 | $ 0.98 | |

2010 rates were taken from the PG&E website. (http://www.pge.com/tariffs/rateinfo.shtml). Used the PG&E natural gas forecast rates for small commercial for the Commercial/Industrial category. Used rates for January 2010. For commercial electricity rates, used the A-1 rate schedule (basic general service rate).

**Percentage Growth in Rates by Scenario and Fuel Type**

| Time Period | Electricity | Natural Gas |
|---|---|---|
| 2010-2015 | 5.0% | 4.9% |
| 2015-2020 | 9.5% | 4.9% |

Source: CEC's Report, California Energy Demand 2010-2020, Adopted Forecast. Table 7 of the CEC report, reflected in the Form 2.3 for natural gas and electricity. These rate increases are based on the mid-rate scenario.

**Transportation: Projected Future Emissions Factor**

| | | |
|---|---|---|
| Where: Cef = | 0.000501 | Composite emission factor; MT C02 per VMT (EMFAC 2007) |

Water Measures Assumptions

| | |
|---|---|
| 174,000 | Average household water consumption (174,000 gallons/year, as per AWWA) |
| 0.00115 | = therms saved per gallon of water reduced. |
| 0.0023 | = kwh saved per gallon of water reduced |

Notes: 200 therms/year are used on heating hot water in every household (UC Irvine reference) and each household uses 174,000 gallons of water/year (AWWA reference). Thus, on average, 200/174000 = therm usage per gallon of water usage in a typical household (0.00115 therm used / gallon of water used)

| Data Description | Data | Units | Source |
|---|---|---|---|
| Total Population | 4282 | People | 2010 Census |
| Total Households | 1821 | Housholds | 2010 Census |
| Total Housing Units | 1934 | Housing Units | 2010 Census |
| Average Price/Square Foot | $561 | $/Square Foot | Trulia |
| Average House Listing Price | $911,250 | $/House | Trulia |
| Average Square Footage of House | 1,624 | Square Feet | Trulia |
| Total Residential Square Footage | 3,141,457 | Square Feet | Trulia + Census |
| Municipal Vehicle Fleet Emissions | 239.51 | MT CO2e | 2010 Municipal Inventory |
| Total Community Waste Disposal Tonnage (2005) | 7,981 | Short Tons | 2005 Community Inventory |
| Total Community Alternative Daily Cover Tonnage (2005-Estimated) | 1,286 | Short Tons | 2005 Community Inventory |
| Total Community Waste Disposal Emissions (2005) | 1,457 | MT CO2e | 2005 Community Inventory |
| Total Community ADC Emissions (2005) | 26 | MT CO2e | 2005 Community Inventory |
| Total Community VMT (2005) | 239,258,595 | VMT | 2005 Community Inventory |
| | | | |

| Municipal Operations Energy Use (from 2010 Municpal GHG Inventory) | | |
|---|---|---|
| | Electricity | Natural Gas |
| | kWh Consumed | Therms Consumed |
| Buildings and Facilities | 1,202,730 | 32,485 |
| Public Lighting | 442,718 | 0 |
| Water and Stormwater Services | 192,244 | 0 |
| Wastewater Services | 14,243 | 0 |
| Solid Waste Facilities | 0 | 0 |
| Power Generation | 0 | 0 |
| All Included Accounts | 1,851,935 | 32,485 |