

# City of Fremont Climate Action Plan

November 2012





# City of Fremont Climate Action Plan



Adopted by the City Council, November 13, 2012

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# Acknowledgements

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# Executive Summary

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Photo courtesy of Khanh Vo.

The City of Fremont’s Climate Action Plan is the culmination of efforts which began in 2008 with work done by the Green Task Force, a City Council-appointed citizen group. The development of the Plan involved the community, elected and appointed officials, other public agencies and private organizations, and staff from several City departments. The Climate Action Plan is consistent with the goals and policies in the General Plan, and reinforces the principle of sustainability which underlies the General Plan.

The overarching goals of the Climate Action Plan are twofold:

**First:** To identify specific and achievable actions for reducing greenhouse gas emissions in Fremont. The actions are organized within a three-tier implementation time frame: short term (1-3 years from Plan adoption, 61 actions); medium term (3-5 years from Plan adoption, 16 actions); and long term (5-10 years from Plan adoption, 8 actions).

**Second:** To serve as a resource for continued engagement, education, motivation and inspiration of the community and City organization as we work together on this critical initiative. The Climate Action Plan is meant to provide a roadmap, while maintaining the flexibility to respond to opportunities, such as partnerships and funding mechanisms, when they arise.



## City Council’s Goal for Reducing Greenhouse Gas Emissions

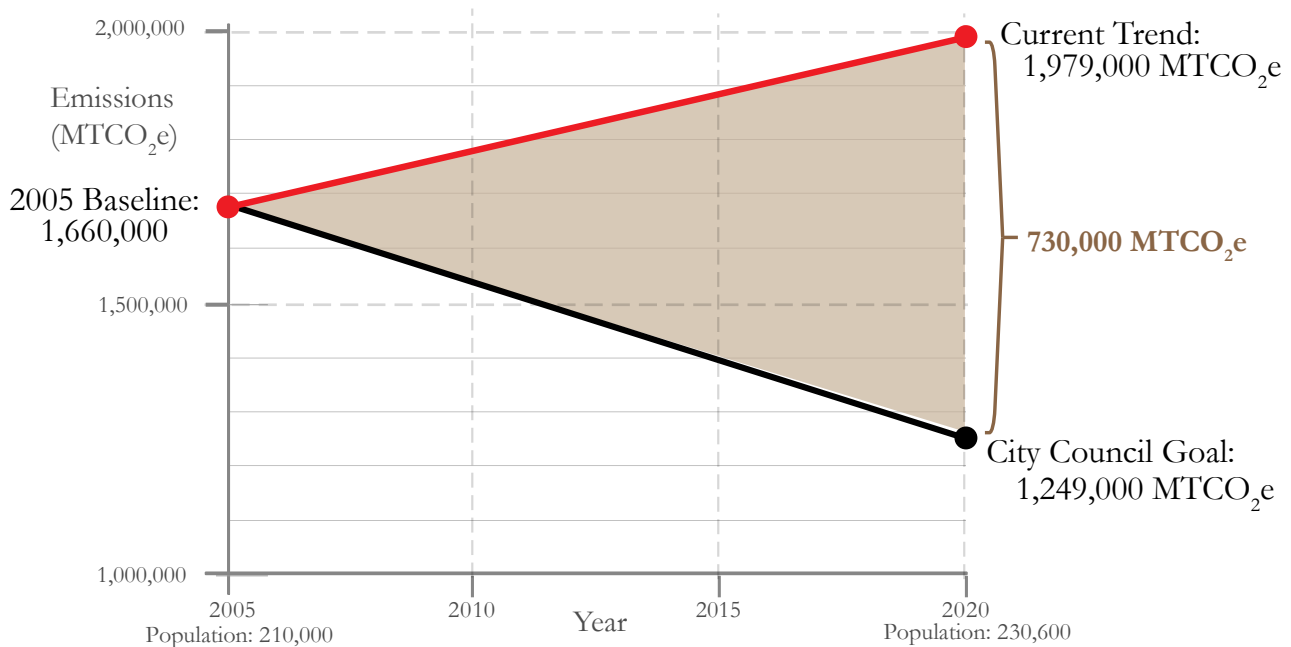
In 2008, the City Council adopted a goal to reduce greenhouse gas emissions 25% by 2020 from a 2005 baseline. This goal is consistent with the emission reduction goals of other participants in the Alameda County Climate Protection Project. The City partnered with ICLEI—Local Governments for Sustainability for completion of the 2005 baseline greenhouse gas emission inventory, which revealed that the transportation sector contributed 60% of emissions, building energy use contributed 37%, and solid waste contributed 3%. Municipal operations contributed less than 1% of overall emissions.

The quantification of the City Council’s reduction goal is illustrated in Figure E-1. The current trend figure of just under two million metric tons of carbon dioxide equivalent (MTCO<sub>2</sub>e) is calculated using population

and employment growth projections from the Association of Bay Area Governments. This figure reflects the level of greenhouse gas emissions that would result without any actions to reduce greenhouse gas emissions.

The Council’s 25% reduction goal is calculated to be 1,249,000 MTCO<sub>2</sub>e. The difference between the current trend and the City Council’s goal is approximately 730,000 MTCO<sub>2</sub>e. **This is the amount of greenhouse gas emissions that would need to be eliminated from the ‘business as usual’ projections for Fremont in the year 2020.**

**Figure E-1: Calculating Fremont’s Year 2020 Greenhouse Gas Emissions Reduction Goal**



# Opportunities and Challenges for Meeting the City Council’s Goal

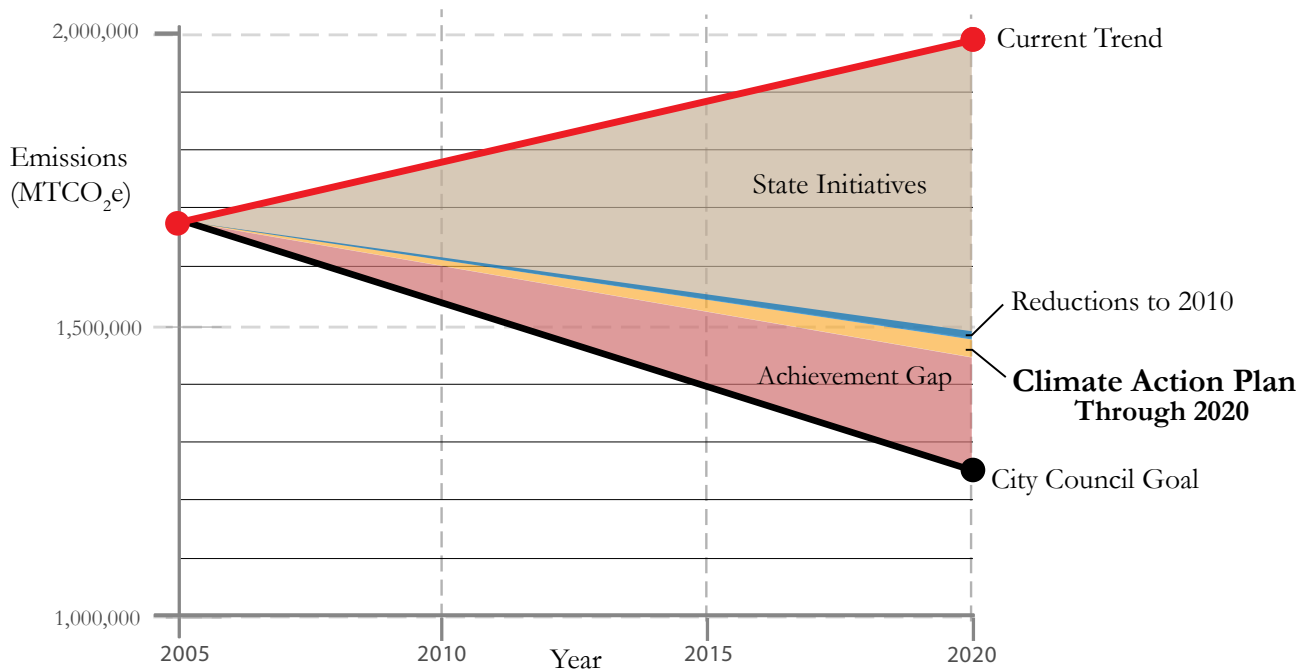
A key learning from the process of preparing the Climate Action Plan is that Fremont will rely heavily on implementation of many State and regional initiatives in order to make significant progress towards its emission reduction goal. A second key learning is that, in most cases, calculating emissions with precision is difficult; most modeling methods used for this purpose depend on numerous assumptions and are often limited by the quantity and quality of available data. Therefore, it is most useful to think about specific numbers describing greenhouse gas emissions in the Climate Action Plan as an approximation, rather than an exact value. These numbers provide a sense of the *magnitude of scale* of the challenge to reduce greenhouse gas emissions which faces the City of Fremont, and of the *opportunities* which the Plan’s proposed actions offer to help the community work towards achieving its reduction goal.

The local actions in the Climate Action Plan are estimated to reduce greenhouse gas emissions in

Fremont by around 58,900 MTCO<sub>2</sub>e in 2020. By 2010, local actions had already reduced an estimated 10,000 MTCO<sub>2</sub>e. Anticipated emission reductions from various State actions, such as vehicle fuel efficiency standards, increasingly stringent building codes, and increased use of renewable energy sources, have been calculated at around 500,000 MTCO<sub>2</sub>e in 2020, in the City of Fremont. Figure E-2 illustrates the “achievement gap” that exists between the emissions level achieved by successful implementation of the State and local actions and the City’s aspirational goal for greenhouse gas emission reductions.

At this time, it is unclear how the ‘achievement gap’ will be closed. New technologies, behavioral changes, and/or adoption of additional measures over the next several years will help narrow the gap. Occasional updates to the 2005 baseline greenhouse gas emission inventory will provide useful information to help the community and the City organization assess progress over time.

**Figure E-2: The Achievement Gap**



# Organization of the Climate Action Plan

The Climate Action Plan is organized as follows:

- **“What You Can Do!”:** A list of ideas for reducing greenhouse gas emissions, for individuals and businesses
- **Chapter One:** Introduction and Setting the Context
- **Chapter Two:** Land Use and Mobility: Moving Smarter, Improving Options and Changing Behavior
- **Chapter Three:** Energy: Maximizing Energy Efficiency and Reducing Energy Use
- **Chapter Four:** Solid Waste: How We Manage Our Material Resources
- **Chapter Five:** Water: Conservation is the Key
- **Chapter Six:** Municipal Services and Operations
- **Chapter Seven:** Adapting to Climate Change
- **Chapter Eight:** Implementation
- **Appendix A:** Names and Terms Used in the Climate Action Plan
- **Appendix B:** Emissions Reduction Quantification Methodology
- **Appendix C:** Cost Estimate Analysis Assumptions

**Chapters Two through Six** are the core chapters of the Plan, as they include the emission reduction actions which are intended to help the community and the City of Fremont make positive progress towards achieving the City Council’s adopted emission reduction goal. When possible, the Plan includes estimates of the potential emission reductions from different actions that would be achieved in the year 2020. The GHG emission reductions for some actions, such as many in Chapter 2: Land Use and Mobility, have been included in the modeling of reductions which can be achieved through the implementation of state and/or regional programs such as SB 375.

The actions are organized by the approach which most accurately characterizes the likely implementation process: advocacy, collaboration and participation, promotion and encouragement, and regulation. Some of the actions are mandated by other regulatory bodies, such as the State of California, and/or are part of

ongoing programs. For those actions listed as regulatory, the Climate Action Plan does not presuppose that the City would necessarily adopt new regulations (except when a regulatory approach is mandated by a different governmental entity). Instead, staff would undertake further analysis of the proposed regulatory actions, a process which would include stakeholders and provide the City Council with options and recommendations.

**Chapter Seven, Adapting to Climate Change,** provides a broad discussion of the topic of climate adaptation (i.e., actions that reduce the vulnerability of the built environment to the effects of climate change).

**Chapter Eight, Implementation,** is a summary of all of the emissions reduction actions included in Chapters Two through Six.

Implementation of many actions listed in the CAP will result in financial savings to individuals, businesses, and the City organization. While varying levels of financial investment will be required for some actions, the investments will yield a concomitant level of savings from, for example, reduced energy and water bills and, in the case of alternative fuel vehicles, reduced spending for transportation fuel. In some cases, reduced maintenance costs can also result in significant savings. One example for City operations is the replacement of high-pressure sodium streetlights with LED streetlights, which require less frequent replacement due to longer operating lifespan.

**Appendix A** includes definitions of names and terms used throughout the Climate Action Plan.

**Appendix B** describes the methodology used to quantify GHG emission reductions.

**Appendix C** describes the assumptions which underlie the range of potential cost savings for both the public and private sectors for many actions included in the Plan.

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# What You Can Do!

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## What Individuals Can Do to Reduce Greenhouse Gas Emissions

- 1. Drive Less.** Walk, bike, take mass transit, carpool and combine errands.
- 2. Drive Smart.** Keep your car tuned and tires properly inflated. If you pull over to the side of the road to talk on your cell phone, turn off your engine. Drive smoothly, avoiding rapid starts and stops. You'll reduce emissions and save money on fuel.
- 3. Buy Fuel Efficient.** Fuel efficient vehicles save gas and reduce emissions and costs.
- 4. Reduce, Reuse, Recycle.** Buy less, and use what you have for longer periods of time. Recycle and reuse materials whenever possible. Choose pre-owned products, products that have recycled content, and products that are sold with less packaging (for example, produce, cereals, grains and nuts sold in bulk).
- 5. Compost food scraps and food-soiled paper.**
- 6. Declutter your mailbox.** Go to [www.StopJunkMail.org](http://www.StopJunkMail.org) for useful tips on how you can reduce junk mail—and reduce the time you spend dealing with it!
- 7. Change a Light.** Replacing incandescent light bulbs with compact fluorescent lights (CFLs) and/or light-emitting diodes (LEDs) will reduce greenhouse gas emissions and save you money on your electricity bills.
- 8. Be Water Smart.** A hot water tank is the second largest user of energy in a home. To reduce your energy usage, set your tank to 120°F, take shorter showers, use water-efficient washing machines and wash full loads of clothes in cold water. You'll save energy, water and money. Look for the WATER SENSE label, an EPA rating system for water-efficient plumbing fixtures.
- 9. Be Energy Smart.** Look for the ENERGY STAR label, an EPA rating system for the most energy-efficient appliances, computers, light fixtures and many other electrical conveniences.
- 10. Turn Down, Turn Off, and Unplug.** Turn down your thermostat by at least 2°F. Turn off lights in empty rooms and unplug electronics such as televisions, DVDs and phone chargers that aren't in use.
- 11. Dry Smarter.** Air dry your laundry, and use the no-heat option on your dishwasher.
- 12. Ditch the Plastic.** Cut back on emissions and waste by bringing cloth bags to the grocery store instead of using plastic bags. Eliminate single-serving plastic beverage containers and keep yourself hydrated with a refillable bottle. Look for other ways to eliminate or reduce the use of plastic in your life.
- 13. Weatherize.** Make your home more comfortable and more energy efficient by doing things such as installing weather stripping and proper caulking around doors and windows, insulating the walls, attic and under the flooring, and ensuring that blinds, curtains, and windows are closed during the summer to help keep the house cool.

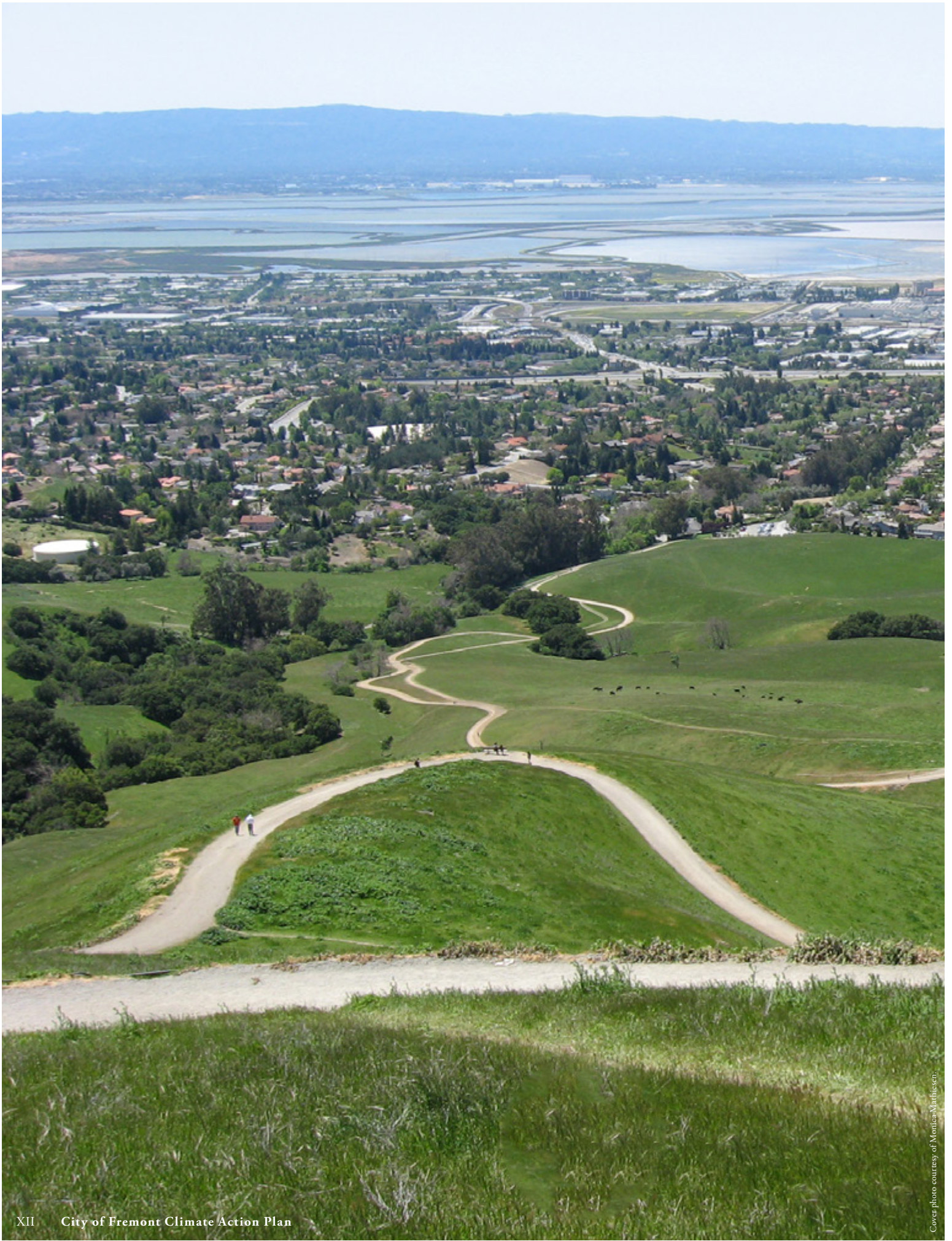
## What Businesses Can Do to Reduce Greenhouse Gas Emissions

1. **Many of the ideas described for individuals can also be implemented by businesses.**
2. **Be Smart and Stay Cool.** Make sure your air conditioning and heating system is as energy efficient as possible. Replace older HVAC systems with newer, more energy efficient systems. You will save energy and money, and reduce greenhouse gas emissions at the same time.
3. **Upgrade to ENERGY STAR.** Office equipment is one of the fastest-growing electricity uses in commercial buildings in the United States. By purchasing ENERGY STAR-qualified equipment, a business can cut its annual electricity costs and help reduce greenhouse gas emissions.
4. **Support Smart Transportation Choices.** Federal legislation passed in the late 1990's allows companies to provide their employees with tax-free incentives to ride public transportation to and from work. Providing transportation incentives is an easy way for employers to attract and keep good workers, while promoting the use of mass transit.



**GREEN BUSINESS  
PROGRAM**





# Chapter One: Introduction and Setting the Context



## Key Learning Points

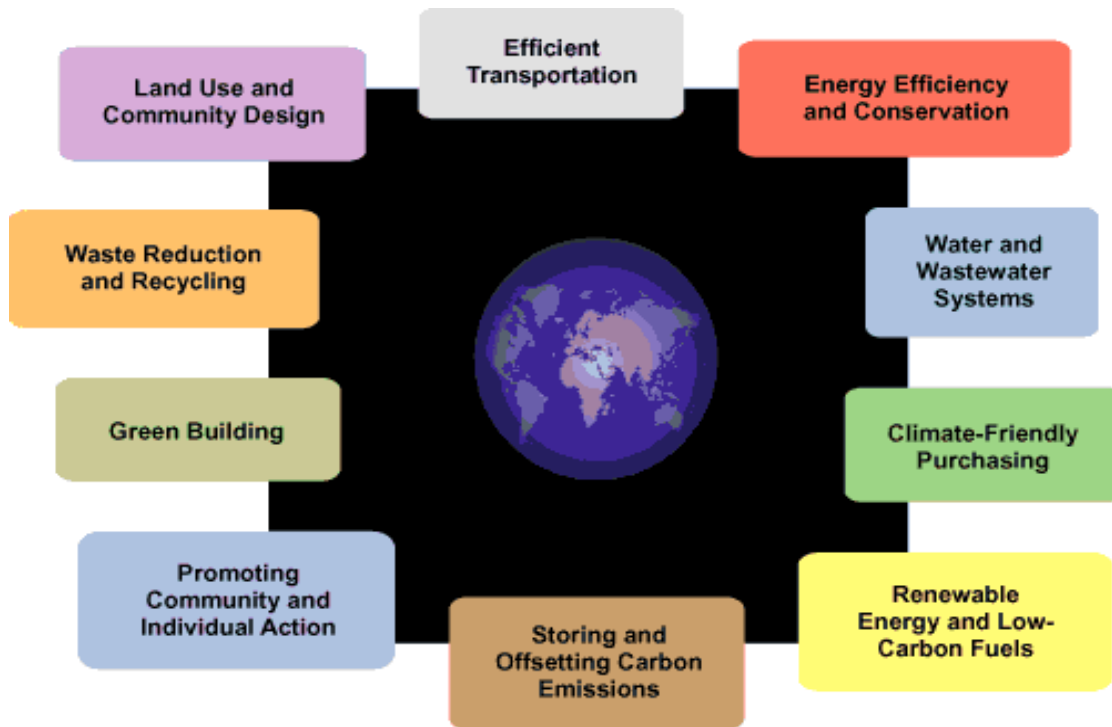
- Global warming happens when we overload the atmosphere with carbon. We're putting too much carbon where it doesn't belong.
- Fremont will rely heavily on implementation of many State and regional initiatives in order to make significant progress towards its goal for reducing greenhouse gas emissions.
- The City organization and the community at large can build on many successful achievements to date which have resulted in emission reductions.

## Introduction

The City of Fremont's *Climate Action Plan (CAP)* is the latest initiative in the City's ongoing commitment to confronting the issue of climate change, the most wide-ranging and profound challenge facing the world today. Like many other elected officials at the local level, the Fremont City Council placed a high priority on the preparation of the Climate Action Plan, the first of its kind for the City and for which research, development and writing occurred between 2009 and 2011, concurrent with the comprehensive update of the City's General Plan (adopted in December, 2011).

The ever-evolving and swiftly-changing policy and regulatory landscape concerning greenhouse gas emissions has created an exciting, while often challenging, context for preparation of the Climate Action Plan. The lack of action at the federal level continues to stymie a comprehensive, national approach to achieving emission reductions. However, California, which has a history of leadership in energy conservation, environmental regulation, and support for research and development of innovative practices and new technologies, is also a leader in combating climate change. As the 15<sup>th</sup> largest city in the state, and the fourth largest city in the San Francisco Bay Area, Fremont can look throughout California to other public agencies at all levels of government, as well as the private, not-for-profit, and educational sectors, for information

**Figure 1-1: Opportunity Areas for Reducing Greenhouse Gas Emissions**



**Source:** Institute for Local Government (image copied from the California Air Pollution Control Officer (CAPCOA) publication 'Model Policies for GHGs in General Plans', June 2009, p. 29).

exchange, advocacy, and support for maximizing limited funding and staff resources through partnerships and collaborations to achieve the ultimate desired outcome: reductions in greenhouse gas emissions.

The critical role of local government in this work has been widely acknowledged. Figure 1-1 illustrates the areas where local governments can, through planning, regulatory, and leadership actions, foster reductions in both governmental and community emissions. (While this figure includes water and wastewater systems, these services are provided to Fremont residents and businesses by agencies other than the City of Fremont).

This climate action plan includes strategies to achieve greenhouse gas emission reductions characterized along a 'continuum of actions' for intervention by the City of Fremont. This continuum positions the City to *advocate, collaborate, promote and encourage, and regulate*, as appropriate to the specific action. Of course, multiple approaches may be most effective for some initiatives; for example, the City can both *advocate for* and *regulate* various Green Building programs.

## Development of the Climate Action Plan

The development of the Climate Action Plan grew out of the work of the Green Task Force (GTF), a citizen group appointed by the City Council. On July 22, 2008, the GTF presented twenty recommendations to the City Council that focused on seven categories, including transportation, land use and community design, economic development, waste reduction and recycling, public outreach and education, energy efficiency and conservation, and storing and offsetting carbon emissions. As a follow-up, on September 13, 2008, staff hosted a well-attended Climate Action Workshop to receive public input on the GTF's recommendations. On November 18, 2008, the City Council approved staff's recommendations on the GTF's recommendations, and adopted the City's goal to reduce greenhouse gas emissions 25% by 2020 from the 2005 baseline.

Through the General Plan update process, the community provided comments, and the City Council



has provided direction, on many goals, objectives and policies which are relevant to achieving greenhouse gas emission reductions. These goals, objectives and policies are addressed in broader terms in the General Plan, and in more specific terms in the Climate Action Plan. The Climate Action Plan is required by State law to be consistent with the General Plan, and, although developed concurrently with the General Plan, can be viewed as an implementation program of the General Plan.

The City Council's role in the development of the Plan is summarized below:

- **2008:** Directed staff to prepare a climate action plan; adopted goal of reducing the community's greenhouse gas emissions by 25% from 2005 levels by the year 2020.
- **2009:** Approved work plan for climate action plan. Authorized the Mayor to sign the Bay Area Climate Collaborative Charter of the Bay Area Climate Change Compact.
- **2009:** Held joint work session with the Fremont Unified School District Board of Education, which included a staff presentation on the Climate Action Plan project.
- **2010:** Held work session to review list of proposed actions for reducing greenhouse gas emissions in the community and municipal operations.
- **2011:** Reviewed modified list of proposed actions for reducing greenhouse gas emissions, and draft chapters of the Climate Action Plan.
- **November 13, 2012:** Adopted final Climate Action Plan.

During development of the Climate Action Plan, staff met twice in 2009-10 with an ad hoc citizen group which included members of the youth community, the Green Task Force, and others who had previously expressed an interest. On November 6, 2010, staff held a session on the Climate Action Plan as part of the larger General Plan Update workshop held that day. Following City Council direction on April 3, 2012, staff held a public meeting on October 17, 2012, to present the Climate Action Plan to the community.

Internal to the City of Fremont organization, a cross-departmental working group met regularly to discuss the CAP, focusing primarily on developing the lists of

recommended actions for reducing greenhouse gas emissions which form the heart of the CAP. In addition, City staff worked with representatives of other public agencies such as Union Sanitary District and the Alameda County Water District, in identifying collaborative opportunities for achieving greenhouse gas emission reductions.

## Relationship to the General Plan

The Climate Action Plan is consistent with the goals and policies in the General Plan, as required by State law. The CAP provides the specific strategies for working towards achieving the City's greenhouse gas emission reduction goal, and reinforces the principle of sustainability which underlies the General Plan: "Sustainability is generally defined as the ability to meet the needs of the current generation without compromising the ability of future generations to meet their needs. In practical terms, a sustainable approach reduces resource consumption, avoids pollution, develops in harmony with the environment, and helps people live healthier lives." (Sustainability Element, p. 1-3)

## Purpose of the Climate Action Plan

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*Scientists state unequivocally that the earth is warming. Climate change is happening, it is caused in large part by human activity, and it will have many serious and potentially damaging effects in the decades ahead.<sup>1</sup>*

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Since the early 1990s, international scientific consensus holds that greenhouse gases which are by-products of human activities, such as energy use, fossil fuel combustion, waste disposal, and land use changes, are being released faster than the Earth's natural processes can absorb them.

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<sup>1</sup> Pew Center on Global Climate Change and the Pew Center on the States. *Climate Change 101: Understanding and Responding to Global Climate Change*, January 2009.



Photo courtesy of Khanh Vo.

This is the challenge driving the preparation and implementation of the City of Fremont’s Climate Action Plan.

Changes in the earth’s temperature will have impacts for Fremont. These impacts could include:

- Increased heat waves
- Increased annual rainfall of 20 to 30 percent leading to more serious storm events
- Rising sea levels that will threaten coastal infrastructure, ecosystems, and water supplies
- Decrease in the Sierra snow pack that will affect fresh water availability
- Increase in insect-borne diseases
- Impacts to public health.

Although no one city can independently resolve the issue of climate change, Fremont can make a positive impact through leadership and cumulative local action in the areas of effective land use and transportation planning, wise waste management and water use, and the efficient use of energy, all resulting in greenhouse gas emission reductions. This Climate Action Plan, the first of its kind for the City of Fremont, includes the list of actions to guide both the City organization and the community as a whole towards the achievement of the City

Council’s adopted greenhouse gas emission reduction goal of a 25% reduction below 2005 levels by the year 2020.

The overarching goals of the Climate Action Plan are twofold:

**First:** To identify specific and achievable actions for reducing greenhouse gas emissions in Fremont. Greenhouse gases trap heat in the atmosphere and contribute to the warming of the planet. There are many reasons to reduce greenhouse gas emissions, including:

- Minimizing their negative effect on climate change
- Protecting and improving the natural environment, both flora and fauna
- Reducing dependence on fossil fuels and promoting national security
- Diversifying energy sources
- Conserving energy, thereby saving money
- Protecting and enhancing public health
- Creating new jobs and supporting a healthy economy.

**Second:** The Plan will serve as a resource for the continued engagement, education, motivation and inspiration of the community and City organization as we work together on this critical initiative.

## Overview of Climate Change Science, Global Warming, and the Greenhouse Effect: *Our Earth is heating up, and it is heating up quickly*

This section provides an overview and definition of concepts and terms relevant to the Climate Action Plan.

**Climate change** refers to long-term variation in the average weather patterns at a global or regional level, over time frames ranging from decades to millions of years. Average weather patterns include temperature (both increases and decreases), precipitation (such as rainfall and snow), and wind patterns. Climate change may result from the Earth's natural internal processes, or from 'external forcing', which refers to forces, such as volcanic eruptions, solar variations, and human activity (known as 'anthropogenic climate change') that cause a change in the climate system.

**Greenhouse gases** are so named because of the 'greenhouse' properties they exhibit: allowing sunlight to enter Earth's atmosphere, absorbing the infrared radiation (heat) which results when sunlight is reflected off the Earth's surface, and trapping this heat in the atmosphere. The Earth's surface temperature remains generally constant when, over time, there is a balance between the amount of energy sent from the sun to the Earth's surface as the amount of energy radiated back into space. The naturally occurring greenhouse effect, then, allows the Earth to be a habitable environment.

There are many gases which exhibit 'greenhouse' properties; examples include those occurring in nature, such as water vapor, carbon dioxide, and methane, and those which are exclusively human-made, such as gases used for aerosols. Since many greenhouse gases last decades or even centuries, their contribution to the enhanced greenhouse effect is a problem that cannot be quickly eliminated.

**Global warming** refers to the progressive gradual rise of the Earth's average surface temperature, and is linked to the enhanced greenhouse effect.

The **enhanced greenhouse effect** is the concentration of atmospheric greenhouse gases which leads to an increase in the amount of infrared or thermal radiation near the Earth's surface. Decades of research by scientists in a multitude of disciplines has resulted in agreement among

a majority of the scientific community that average global temperature is increasing at a rate that is unprecedented since people began measuring global temperatures. The National Oceanic and Atmospheric Administration (NOAA) notes that seven of the eight warmest years on record have occurred since 2001.<sup>2</sup> Within the past 30 years, global warming has occurred at a rate approximately three times greater than that recorded over the last century.<sup>3</sup> Figure 1-2 illustrates the greenhouse effect.

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*“Visible sunlight passes through the atmosphere without being absorbed. Some of the sunlight striking the earth (1) is absorbed and converted to heat, which warms the surface. The surface (2) emits infrared radiation to the atmosphere, where some of it (3) is absorbed by greenhouse gases and (4) re-emitted toward the surface; some of the heat is not trapped by greenhouse gases and (5) escapes into space. Human activities that emit additional greenhouse gases to the atmosphere (6) increase the amount of infrared radiation that gets absorbed before escaping into space, thus enhancing the greenhouse effect and amplifying the warming of the earth.”<sup>4</sup>*

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It is important to emphasize, however, that global warming is about more than just temperature; it is also about weather patterns that make up our climate, including rainfall patterns, storms, and wind. The stability of these patterns affect every aspect of life, and “if the climate shifts, it is like the ground shifting with very dramatic consequences.”<sup>5</sup>

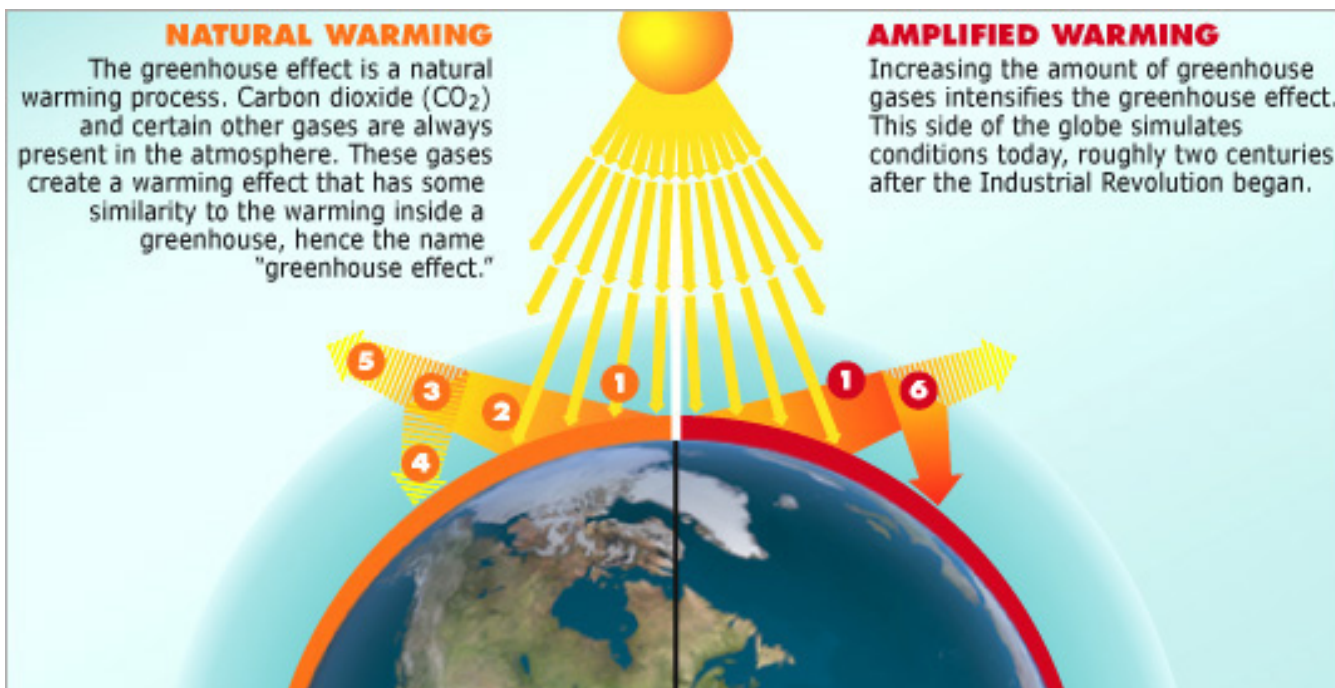
<sup>2</sup> U.S. EPA, “Frequently Asked Questions about Global Warming and Climate Change: Back to Basics”, April 2009, p. 2.

<sup>3</sup> Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report, 2007.

<sup>4</sup> California Climate Change Portal ([www.climatechange.ca.gov](http://www.climatechange.ca.gov))

<sup>5</sup> Cara Pike, Bob Doppelt, and Meredith Herr, *Climate Communications and Behavior Change: A Guide for Practitioners*. The Climate Leadership Initiative, 2010, p. 12.

Figure 1-2: The Greenhouse Effect



Source: The National Academy of Sciences

## Regulatory Context

This section provides an overview of the regulatory context at the federal, state, and regional levels relevant to the City of Fremont's actions towards reducing greenhouse gas emissions.

### Federal Context

The Center for Climate and Energy Solutions (formerly the Pew Center on Global Climate Change) describes the United States' role in the production of global greenhouse gas emissions in the following:

- The United States, with 5 percent of the world's population, is responsible for 18 percent of global greenhouse gas emissions ... On a per capita basis, U.S. emissions are roughly twice as high as those of the EU (European Union) and Japan (and four times the world average)...
- Emissions are rising fastest in developing countries. China's and India's emissions are projected to grow 71 percent and 68 percent, respectively, by 2020. Annual emissions from all developing countries surpassed those of developed countries in 2004. Their per capita emissions, however, will remain much lower than

those of developed countries. Looking at emissions on a cumulative basis, the United States accounts for 30 percent of energy-related carbon dioxide emissions since 1850, while China accounts for 7 percent.

*Cumulative emissions are an important measure because of the long-lasting nature of greenhouse gases in the atmosphere. Although developing country emissions are rising, their cumulative emissions are not projected to reach those of developed countries for several more decades.*<sup>6</sup>

At the time of the preparation of this Climate Action Plan, the United States Congress has yet to pass a mandatory climate bill, despite efforts by some senators and representatives from both major political parties. Nonetheless, many states across the nation have taken the initiative in developing and implementing a wide range of regulations, policies and programs aimed at reducing greenhouse gas emissions. These strategies can also help achieve economic, environmental and public health co-benefits.

<sup>6</sup> Pew Center on Global Climate Change, *Climate Change 101: Understanding and Responding to Global Climate Change*, January 2009, p. 9.

## State Context

California is the nation's most populous state, with a 2010 U.S. Census count of over 37 million people, and is third largest in land area (after Alaska and Texas). The state produces roughly 6.2 percent of the country's, and 1.4 percent of the world's, greenhouse gases. Fremont is the State's 15<sup>th</sup> largest incorporated city, with a July 2011 population of 216,916.

In spite of the absence of strong leadership at the federal level concerning climate change, State, regional and local leaders in California are continuing California's history of enacting environmental regulations, supporting innovative practices and the development of new technologies, and enhancing the penetration of these technologies into the market. The State has been working on climate change impacts for over two decades, culminating with the landmark California Global Warming Solutions Act of 2006 (AB 32) that directed the California Air Resources Board to establish the world's first comprehensive program of mechanisms (both regulatory and market-based) aimed at achieving greenhouse gas emission reductions in multiple sectors. This program is known as the Climate Change Scoping Plan.

In July 2012, the Public Policy Institute of California, a nonprofit, nonpartisan research institution, published its 12<sup>th</sup> annual statewide survey titled *Californians and the Environment*. Among the survey's findings were the following:

- ***California is a pioneer in addressing global warming:*** California has a history of enacting environmental policies that are more stringent than national policies. "About six in 10 Californians (63%) and likely voters (57%) favor the state making its own policies ... Solid majorities of Californians (71%) and likely voters (62%) support the principle behind the Global Warming Solution Act (also known as Assembly Bill 32 or AB 32)." (p. 15).
- ***Californians see global warming as a threat to their daily lives.*** "Three in four Californians think that global warming is a serious threat (45% very serious, 30% somewhat) to the economy and quality of life in California's future, while one in four say it is not too (11%) or not at all serious (12%)." (p. 14)
- ***In order to deal with global warming, Californians prefer a mix of regulating the private market and local government action.*** "Just over half of

Californians (55%) and likely voters (53%) say the federal government is not doing enough to address global warming. . . In contrast, 48 percent of Californians and 42 percent of likely voters say that the state government is not doing enough to address global warming ... Half of Californians (49%) say their local government is not doing enough on global warming, while 33 percent say just enough and 12 percent say more than enough." (p. 20)

"Strong majorities of Californians, including majorities of votes across party lines, favor various ways to address global warming that are being discussed by officials in state and federal governments. More than three in four favor requiring an increase in energy efficiency for residential and commercial buildings and appliances (77%); requiring industrial plants, oil refineries, and commercial facilities to reduce their emissions (82%); and encouraging local governments to change land use and transportation planning so that people could drive less (77%)." (p. 16)

- ***The majority of Californians wants immediate state action to reduce global warming, and believe that state action to reduce global warming would affect the job market in a beneficial or neutral way.*** "Fifty-six percent of Californians think the state government should act right away on its plans for reducing greenhouse gas emissions, while 40 percent say it should wait until the state economy and job situation improve ... When asked what impact California's efforts to reduce global warming in the future would have on jobs, four in ten say there would be more jobs (42%), 25 percent say fewer jobs, and 25 percent say there would be no effect on the number of jobs". (p. 15)

There are several take-away messages from this study for the community of Fremont. Clearly, citizens understand that there is no one answer to dealing with global warming, and that a cross-sector approach will be vital to success. The various actions for reducing greenhouse gas emissions in the Climate Action Plan are consistent with this approach. As an initiative of local government, the most-trusted level of government by citizens looking for action on reducing greenhouse gas emissions, the Climate Action Plan is an important step in framing the City's approach to addressing global warming.

The State of California has adopted executive orders and enacted legislation for the purpose of reducing greenhouse gas emissions statewide. These actions address issues such as vehicle efficiency standards (AB 1493), fuel efficiency (Low Carbon Fuel Standard), changes in land use patterns to reduce vehicle miles traveled (SB 375), transforming the State's power supply to increasing levels of renewable energy sources (Renewables Portfolio Standard), and reducing urban per capita water use (SBx7-7). These are not the only strategies which will be pursued, nor can any one strategy, on its own, allow California to reach its reduction goals. Some strategies, such as the State-sponsored "Just Check It" program addressing proper vehicle tire inflation, rely on individuals' behaviors for their success.

Examples of key State actions pertaining to greenhouse gas emissions include:

### **Assembly Bill (AB) 1493 (Pavley) (2002)**

This 2002 bill, named after its author, California State Senator Fran Pavley, directed the California Air Resources Board (ARB) to adopt regulations requiring the maximum feasible and cost-effective reduction of greenhouse gas emissions from new light duty vehicles, beginning with model year 2009. As the implementing agency, ARB is responsible for identifying approaches, such as engine design specifications and devices that reduce aerodynamic drag and rolling resistance, which would accomplish tailpipe emission reductions. Lawsuits brought by automakers and delays caused by the U.S. Environmental Protection Agency resulted in a May 19, 2009 agreement among the parties, and the granting of a waiver on June 30, 2009. It is now expected that the implementation of regulations developed by ARB, as directed by AB 1493, will reduce greenhouse emissions from passenger cars, light trucks and sport utility vehicles by about 22 percent in 2012 and about 30 percent in 2016, with the additional benefits of improving fuel efficiency and reducing drivers' costs.

### **Renewables Portfolio Standard (RPS) (2002)**

California's Renewables Portfolio Standard was first established in 2002 under Senate Bill 1078, and then accelerated in 2006 under Senate Bill 107. This program originally required the State's seven investor-owned utilities (including PG&E, which provides power to the



Photo courtesy of AECOM.

City of Fremont), electric service providers (non-utility entities that offer electric service to customers within the service territory of an electric utility), and community choice aggregators (which allows cities and counties to aggregate the buying power of individual customers within a defined jurisdiction in order to secure alternative energy), to increase procurement from eligible renewable energy resources by at least 1% of their retail sales annually, until they reach 20% by 2010. Renewable energy sources include solar, geothermal, wind, biomass and small-scale hydroelectric.

Under Executive Order S-14-08, signed by Governor Schwarzenegger in November 2008, the standard was raised to 33% by 2020. The standard was codified by SB2X (originally SBX 1-2), approved by the Legislature on March 30, 2011 and signed into law on April 12, 2011 by Governor Jerry Brown.

### **Executive Order S-3-05 (2005)**

Executive Order S-3-05, signed by Governor Arnold Schwarzenegger in June 2005, established the statewide target for reducing greenhouse gas emissions to 1990 levels by 2020, and to 80 percent below 1990 levels by 2050.

## **The California Global Warming Solutions Act of 2006 (Assembly Bill (AB) 32)**

The *California Global Warming Solutions Act of 2006*, commonly known as Assembly Bill 32 (AB 32), was signed into law by Governor Schwarzenegger in September 2006. AB 32 requires California to reduce statewide GHG emissions to 1990 levels by 2020. AB 32 directed the California Air Resources Board to accomplish the following core tasks:

- Establish the State-wide goal of reducing GHG emissions.
- Establish a mandatory reporting system to track and monitor emissions levels.
- Develop various compliance options and enforcement mechanisms.

In response, in December 2008, ARB adopted a Climate Change Scoping Plan that outlines how it will guide California in efforts to reduce greenhouse gas emissions. The Scoping Plan encourages local governments to align land use, transportation, and housing plans to minimize vehicle trips. Already underway, the Scoping Plan employs a range of approaches, such as voluntary, regulatory, and incentive-based, to achieve targeted reductions in various sectors.

## **Executive Order S-01-07: The Low Carbon Fuel Standard (LCFS) (2007)**

Executive Order S-01-07, signed by Governor Arnold Schwarzenegger in January 2007, established the statewide goal for reducing the carbon intensity of California's transportation fuels by at least 10 percent by 2020. The *Low Carbon Fuel Standard* (LCFS) is the world's first greenhouse gas standard for transportation fuels, and is another example of California's leadership in greenhouse gas emission reductions and the development and deployment of alternative fuel sources to meet transportation needs.

As noted by ARB in December 2008: "With close to 16 billion gallons of gasoline and approximately 4 billion gallons of diesel sold per year, sales of petroleum-based fuels make up approximately 96 percent of all transportation fuel sold in California. The LCFS is a key part of the State's strategy to reduce GHG emissions from the transportation sector and is being developed to reduce the carbon intensity of the State's transportation fuels by at least 10 percent by 2020."<sup>7</sup>

## **Senate Bill 375 (SB 375) (2008)**

Governor Schwarzenegger signed Senate Bill 375 into law in 2008. SB 375 builds on the existing regional transportation planning process to connect the reduction of greenhouse gas emissions from cars and light trucks to land use and transportation policy. The City of Fremont's updated General Plan reflects these principles in many goals, objectives and policies.

Implementation of SB 375 is underway. On September 23, 2010, the Air Resources Board adopted targets for reducing greenhouse gas emissions associated with passenger vehicle travel (which are a major emissions source) by the years 2020 and 2035. ARB also adopted targets for the state's 18 Metropolitan Planning Organizations; the Bay Area's targeted reductions of 7 percent (2020) and 15 percent (2035) were among the most aggressive. For the nine-county San Francisco region, the bill requires the Metropolitan Transportation Commission (MTC), the regional transportation planning agency, and the Association of Bay Area Governments (ABAG), the regional planning agency, to adopt a *Sustainable Communities Strategy* (SCS) which integrates MTC's Regional Transportation Plan (RTP) with ABAG's *Regional Housing Needs Allocation* process. Adoption of the SCS/RTP is anticipated to occur in 2013.

## **SB 97 and California Environmental Quality Act Guidelines (2007)**

California Senate Bill SB 97 was enacted in 2007. This bill directed the adoption of amendments to the California Environmental Quality Act (CEQA) Guidelines for greenhouse gas emissions. In June 2010, the Bay Area Air Quality Management District adopted updated CEQA guidelines which, for the first time, addressed greenhouse gases. The overall goal is to ensure that new development projects implement appropriate and feasible emission reduction measures to mitigate significant air quality impacts. The guidelines establish greenhouse gas thresholds to support the Bay Area's efforts to meet the State's goals addressing climate change.

<sup>7</sup> Climate Change Scoping Plan, Appendices Volume I: Supporting Documents and Measure Detail, p. C-64.

## SBx7-7: The Water Conservation Act of 2009

California Senate Bill 7 (SBx7-7), *The Water Conservation Act of 2009*, was enacted in November, 2009. SBx7-7 requires the state to reduce per capita water consumption by 20% by the year 2020, regardless of the sufficiency of existing water systems. The state would also be required to make incremental progress towards this goal by reducing per capita water use by at least 10% on or before December 31, 2015.

Many of these bills and regulations are discussed in more detail in relevant chapters of the Climate Action Plan.

## City of Fremont's Approach to the Climate Action Plan: Five Milestones

In 2008, the City of Fremont joined ICLEI—Local Governments for Sustainability (formerly named 'International Council for Local Environmental Initiatives'), and agreed to participate in the Alameda County Climate Protection Project. The Climate Protection Project was launched by ICLEI in partnership with StopWaste.Org (the Alameda County Waste Management Authority and the Alameda County Source Reduction and Recycling Board operating as one public agency), and the Alameda County Conference of Mayors. In committing to the project, the City of Fremont embarked on an ongoing, coordinated effort to reduce greenhouse gas emissions, improve air quality, reduce waste, cut energy use and save money.

Similar to other cities in California and across the nation, Fremont's approach to climate action planning is based on ICLEI's 'Five Milestone' process:

- **Milestone 1:** Conduct a baseline greenhouse gas emissions inventory and forecast
- **Milestone 2:** Adopt an emissions reduction target
- **Milestone 3:** Develop a Climate Action Plan for reducing emissions
- **Milestone 4:** Implement policies and measures
- **Milestone 5:** Monitor and verify results

Milestones 1 and 2 are discussed in the section that follows. This document is the realization of Milestone 3. Milestone 4 and Milestone 5 will occur following adoption of the Climate Action Plan.

## Milestone 1: 2005 Baseline Inventory of Greenhouse Gas Emissions

The purpose of the baseline emissions inventory is to determine the levels of greenhouse gas emissions that the City of Fremont emitted in its base year, 2005, on a municipal operations level and a community-wide level. The city chose 2005 as the base year for the inventory, in order to be consistent with other cities in Alameda County which were preparing emissions inventories. The city partnered with ICLEI—Local Governments for Sustainability for completion of the inventory, which used the Clean Air and Climate Protection (CACP) software package developed by ICLEI<sup>8</sup>. This software package is a tool used by hundreds of cities and counties around the country to develop a sector-based emissions inventory. However, it is worth noting that calculating emissions with precision is difficult, and that the final inventory will not 'tell the whole story' of a jurisdiction's emissions. The model depends on numerous assumptions and is limited by the quantity and quality of available data.

Therefore, **it is most useful to think about any specific numbers describing greenhouse gas emissions in the Climate Action Plan as an approximation, rather than an exact value.** These numbers provide a sense of the *magnitude of scale* of the challenge to reduce greenhouse gas emissions which faces the City of Fremont, and of the *opportunities* which the Plan's proposed actions offer to help the City work towards achieving its reduction goals. The Climate Action Plan includes estimates of potential greenhouse gas emission reductions for several actions. The City's consultant developed the greenhouse gas emission reduction estimates using industry accepted quantification methodologies. Appendix B of this document describes the specific calculations and assumptions used.

The baseline inventory provides information on the Fremont's emissions from several sectors—residential, commercial, industrial, transportation and waste—as well as for City of Fremont municipal operations. This information will allow the City to assess its progress in reducing greenhouse gas emissions in both City operations and in the community as whole, when future updates to the emissions inventory are completed. The Baseline Greenhouse Gas Emissions Inventory Report

<sup>8</sup> The CACP software was developed by ICLEI in partnership with the State and Territorial Air Pollution Program Administrators, the Association of Local Air Pollution Control Officers, and Torrie Smith Associates.



can be found on the City's website ([www.fremont.gov/climateplan](http://www.fremont.gov/climateplan)). The inventory will be updated periodically and the most current version will be posted on the City's website when it becomes available.

**A note about numbers:** Fremont's Climate Action Plan includes numbers expressing quantities of greenhouse gas emissions in four key areas: 1) the 2005 Baseline Inventory of Greenhouse Gas Emissions; 2) the modeling of projected future emissions and the City's adopted emissions reduction goal; 3) the quantification of some of the proposed actions for reducing greenhouse gas emissions; and 4) the quantification of the potential greenhouse gas emissions resulting from the implementation of various state initiatives, such as the Renewables Portfolio Standard.

## Key Findings from the 2005 Emissions Inventory

Community-level emissions for 2005 totaled approximately 1,660,000 metric tons of carbon dioxide equivalent (MTCO<sub>2</sub>e)<sup>9</sup>. At that time, Fremont had just over 70,000 households and a total population of approximately 210,000, as well as many millions of square feet of commercial, industrial and institutional buildings used by employees and customers – all contributing to the community's greenhouse gas emissions. City of Fremont (municipal) operations generated approximately 7,400 MTCO<sub>2</sub>e, or less than 1% of total emissions throughout the City. Completing separate emissions inventories for community and municipal operations has advantages for future priority-setting and program implementation. Since the City of Fremont has a higher degree of control over the municipal activities and facilities that create greenhouse gas emissions than it does over those within the community at large, it can show leadership and commitment while monitoring progress against the municipal baseline inventory as emission reduction initiatives are implemented. However, since community-wide emissions comprise over 99% of all

<sup>9</sup> CO<sub>2</sub>e, or 'carbon dioxide equivalent', is a measurement that allows for the direct comparison of the impacts of different greenhouse gases. Some gases are more potent than others, meaning they have a higher global warming potential than others. For example, methane is 21 times more potent than carbon dioxide, and hydrofluorocarbons, used in air conditioning systems for cars and trucks, are 1,300 times more potent than carbon dioxide. The international reporting standard for carbon dioxide emissions is in "metric tons" (MT). Therefore, figures for greenhouse gas emissions in the Climate Action Plan will be expressed in metric tons of carbon dioxide equivalent, or MTCO<sub>2</sub>e.

### Figure 1-3: What One Ton of CO<sub>2</sub> Looks Like



Source: The National Academy of Sciences

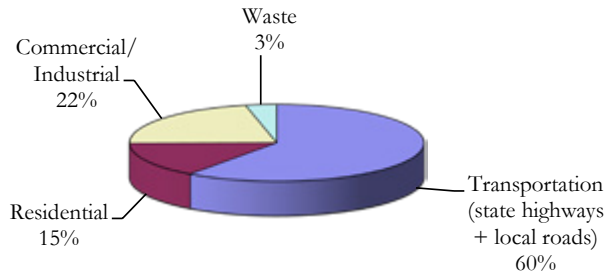
emissions in Fremont, the community at large, including other agencies, will need to play an active role in finding and implementing solutions.

Figure 1-3 provides a visual representation of the volume occupied by one ton of an atmospheric gas, such as carbon dioxide.

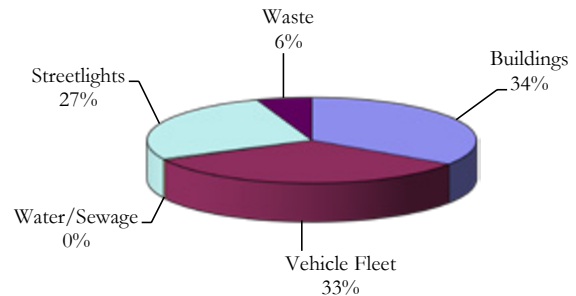
Since one U.S. ton (2,000 pounds) is equivalent to 0.91 metric tons, this image can be considered an accurate representation of the volumes of greenhouse gases in the atmosphere, and may be useful to the reader for visualizing quantities of greenhouse gas emissions as discussed in this Climate Action Plan and elsewhere. Annually, each Fremont citizen emits about 10 of these 'cubes' in greenhouse gas emissions.

Figure 1-4 reflects data from the 2005 baseline inventory, and shows three sectors' contributions to the community's inventory of nearly 1.7 million metric tons of carbon dioxide equivalent. ("Commercial/industrial" and "residential" are both in the 'energy' sector). The use of fossil fuels in vehicles and for energy use in buildings and other facilities (for heating, cooling, lighting, office equipment, water and wastewater) is the major contributor to Fremont's greenhouse gas emissions inventory. The transportation sector is the single largest contributor at 60%, with building energy use contributing 37%, and solid waste contributing approximately 3% of the total.

**Figure 1-4: Community Emissions: Total Greenhouse Gas Emissions by Sector (including State Highways), 2005**



**Figure 1-5: Municipal (Government) Operations: Total Greenhouse Gas Emissions by Source, 2005**



## Municipal (Government) Operations: Greenhouse Gas Emissions Inventory

Greenhouse gas emissions inventories for municipal operations can vary significantly between jurisdictions. A key distinction derives from the provision of public services such as water, wastewater, solid waste collection, and transportation. In Fremont, Union Sanitary District provides wastewater services; Alameda County Water District provides water services; and Allied Waste provides solid waste services. While the operations of these organizations generate greenhouse gas emissions, those emissions will not be reflected in the City of Fremont’s municipal inventory. In addition, unlike other cities, Fremont does not have an airport or port to account for in either the municipal or community inventory. Therefore, direct comparison of emissions inventories between jurisdictions should be undertaken with caution.

Figure 1-5 reflects data from the 2005 baseline inventory for municipal operations.

The City of Fremont’s strategies for reducing greenhouse gas emissions in government operations are described in Chapter 6 of the Climate Action Plan.

## Milestone 2: Adopt an Emissions Reduction Target

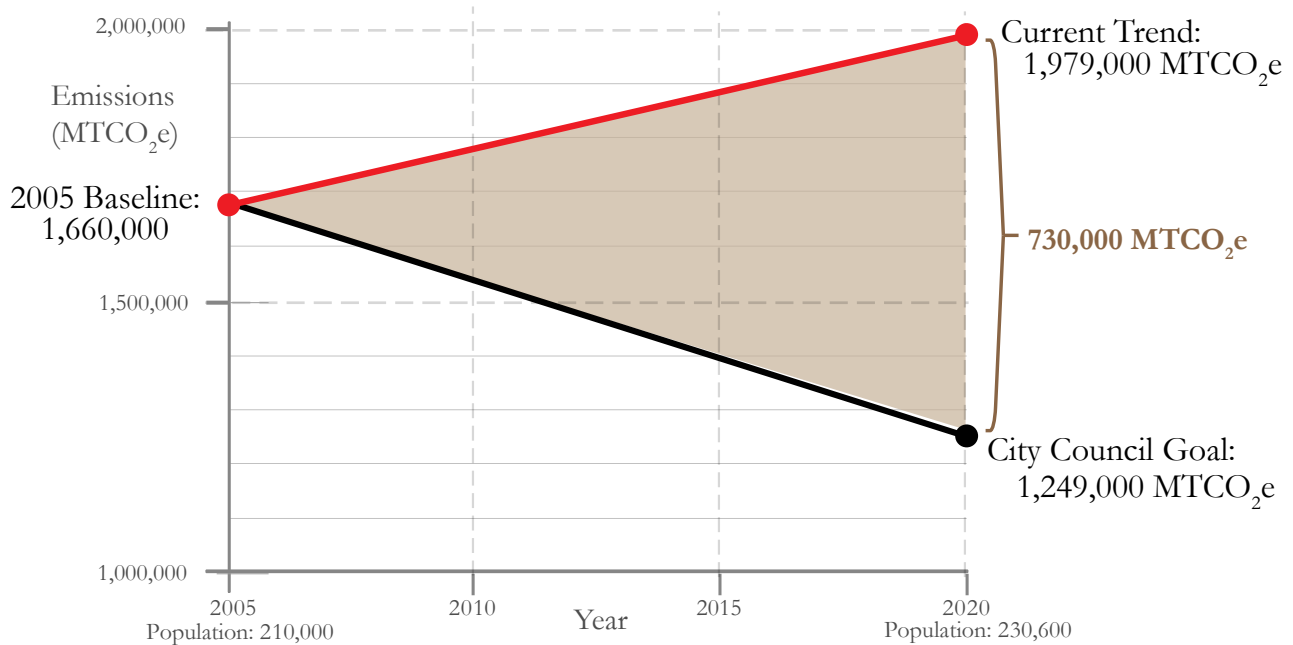
The second milestone in ICLEI’s ‘Five-Milestone’ process is the adoption of a greenhouse gas emission reduction target. On November 18, 2008, the City Council adopted a goal to reduce greenhouse gas emissions 25% by 2020 from a 2005 baseline. By way of context, the State of California’s emissions reduction targets, as adopted in AB 32 and Governor Arnold Schwarzenegger’s Executive Order S-3-05, are as follows:

- By 2010, reduce greenhouse gas (GHG) emissions to 2000 levels;
- By 2020, reduce GHG emissions to 1990 levels (equivalent to a 12% reduction below 2005 levels); and
- By 2050, reduce GHG emissions to 80% below 1990 levels (equivalent to 83% below 2005 levels).

(Equivalency source: City of Hayward Climate Action Plan, June 2, 2009, p. xii).

The City of Fremont’s adopted goal of a 25% reduction in the City’s greenhouse gas emissions by 2020, from a 2005 baseline, is more ambitious than the State’s goal. With the adoption of this goal, the City Council wished to express consistency with the emission reduction goals of other participants in the Alameda County Climate Protection Project and to reflect the City’s aspirations for achieving significant reductions in emissions. The City Council has not adopted a longer-term emission reductions goal, such as the 2050 target in AB 32.

**Figure 1-6: Calculating Fremont’s Year 2020 Greenhouse Gas Emissions Reduction Goal**



The quantification of the City Council’s reduction goal is illustrated in Figure 1-6. The current trend figure of just under two million MTCO<sub>2</sub>e in 2020 is calculated using population and employment growth projections from the Association of Bay Area Governments. This figure reflects the level of greenhouse emissions that would result without any actions to reduce greenhouse gas emissions<sup>10</sup>.

The Council’s 25% reduction goal is calculated to be 1,249,000 MTCO<sub>2</sub>e. The difference between the current trend and the City Council’s goal is approximately 730,000 MTCO<sub>2</sub>e. This is the amount of greenhouse gas emissions that would need to be eliminated from the “business as usual” projections for the year 2020.

<sup>10</sup> The ‘current trend’ projection also assumes no change in the 2005 PG&E emissions factor of 0.49 lbs/kWh for electricity and 53.05 kg/MMbtu for natural gas. See Chapter 3 for an explanation of the relationship between emissions factors and greenhouse gas emissions.

## Emissions Reductions from State Actions

State of California legislation, regulations, and programs will greatly assist Fremont in reducing both its community-wide and municipal emissions. Table 1-1 describes the emission reductions anticipated to occur as a result of implementation of these State actions. The largest reductions are expected to come from State-required fuel efficiency improvements to passenger vehicles and light-duty trucks (Pavley). Other State vehicle efficiency initiatives in the AB 32 Scoping Plan, including the Tire Inflation Program, Tire Tread Standard, Low Friction Engine Oil, Solar Reflective Automotive Paint and Window Glazing Standard, will further reduce fuel consumption. California’s low carbon fuel standard will reduce transportation-related emissions by creating a transition away from using fossil fuels (i.e., gasoline and diesel) toward lower-carbon bio-fuels (e.g., ethanol). Implementation of the regional Senate Bill 375 Sustainable Communities Strategy in the Bay Area will reduce vehicle emissions through development of effective

transit and other alternative transportation systems and encouragement of development which supports reduced generation of greenhouse gas emissions. California law also requires all utilities, including PG&E, to obtain 33% of their electricity from renewable energy sources by 2020. In 2005, about 12% of PG&E’s portfolio was generated from renewable sources. This increase in renewable electricity will reduce the community electricity-related emissions. Assembly Bill 1109’s light bulb efficiency requirements and strengthened California Energy Code (Title 24) requirements for new construction will create important community-wide emission reductions. SBx7-7 urban water conservation requirements will also contribute a small, but still important, reduction.

**Table 1-1: Anticipated Emission Reductions from State Actions (in 2020)**

State Action	Greenhouse Gas Emission Reduction in MTCO <sub>2</sub> e
Pavley I & II—Vehicle Fuel Efficiency Standards	(177,800)
Low Carbon Fuel Standard	(87,900)
Other Scoping Plan Directed Vehicle Efficiency Measures	(31,200)
SB 375—Sustainable Communities and Climate Protection Act	(36,600)
Renewable Portfolio Standard (33% by 2020)	(129,800)
AB 1109—Lighting Efficiency Standards	(27,400)
2008 & 2013 California Title 24—Building Energy Code	(8,000)
SBx7-7—Urban Water Conservation (20% by 2020)	(1,000)
<b>Total</b>	<b>(499,700)</b>

State actions that reduce emissions in Fremont will make it easier for the community to achieve the 2020 emission reduction goal. As shown in Table 1-1, implementation of State actions will reduce community-wide emissions by approximately 500,000 MTCO<sub>2</sub>e in 2020.

The local actions contained within this plan are anticipated to reduce greenhouse gas emissions by an additional 58,900 MTCO<sub>2</sub>e/year in 2020. By 2010, local actions have already reduced an estimated 10,000

MTCO<sub>2</sub>e. Implementation of the Climate Action Plan will ensure the community and the City organization continue to reduce emissions and contribute to climate protection efforts.

Figure 1-7 illustrates the gap that exists between the emissions level achieved by implementation of the State and local actions and the City’s aspirational goal for greenhouse gas emission reductions.

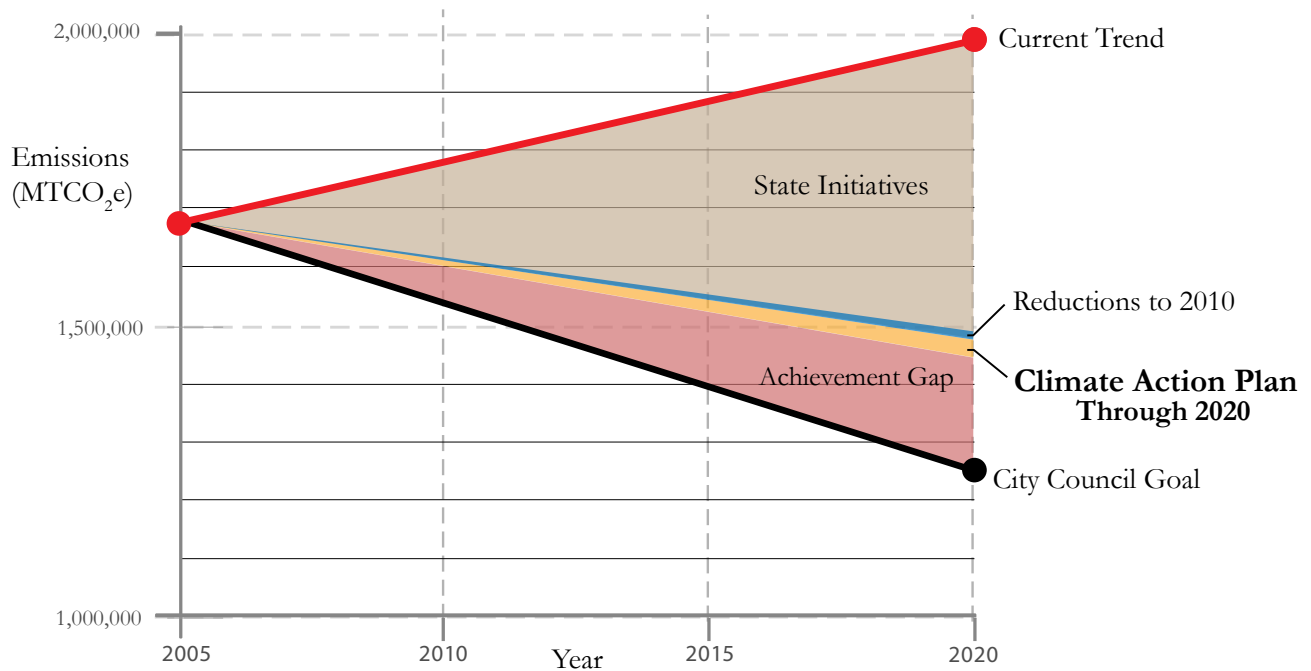
**Table 1-2: The Achievement Gap**

	Greenhouse Gas Emission Reduction in MTCO <sub>2</sub> e
City Council 2020 reduction goal	730,000
State actions	(499,700)
Emission reductions 2005–2010	(10,000)
Climate Action Plan actions through 2020	(48,900)
<b>The Achievement Gap remaining</b>	<b>171,400</b>

The “Achievement Gap” of 171,400 MTCO<sub>2</sub>e, illustrated within the figure shows the importance of initiatives that are outside of the control of the City (both the organization and the community at large) in achieving meaningful emission reductions. State initiatives comprise the majority of anticipated emission reductions. Although the estimates of emission reductions from local action (shown as “Emission reductions 2005–2010” and “Climate Action Plan” through 2020) are conservative, it is evident that the scale of Fremont’s challenge is much greater than what can be achieved through local initiatives. This underscores the importance of collaborative efforts, community involvement, and advocacy by the City’s leadership at the regional and State levels in support of large-scale initiatives.

At this point, it is unclear how the “Achievement Gap” will be closed. However, the City’s aspirations, as expressed by the adopted reduction goal, are intended to motivate and inspire action, as they reflect the community’s values and desired outcomes.

**Figure 1-7: The Achievement Gap**



## Climate Change Mitigation and Adaptation

When used in the context of climate change and global warming, the term “mitigation” means taking actions to reduce greenhouse emissions or to enhance greenhouse gas sinks (which remove carbon from the atmosphere) in order to reduce the *extent* of global warming, and the term “adaptation” means taking action to reduce the *vulnerability* (or susceptibility) of the built environment to the actual or expected effects of climate change, or by increasing *resiliency* (that is, the ability to ‘bounce back’ once the changes are felt). Some actions, such as restoring tidal marshes that both sequester carbon and provide flood protection, serve as both adaptation and mitigation strategies. On the other hand, some actions may be favorable for climate mitigation but unfavorable for adaptation, and vice versa. These contradictions are described in more detail in Chapter 7. Just as greenhouse gas reduction measures apply to a range of sectors (transportation, energy, waste), so do adaptation actions apply to all climate-sensitive systems of human society and the natural environment, including human health,

ecosystems and wildlife, energy, coastal areas and sea level rise, water resources, and agriculture and forestry.

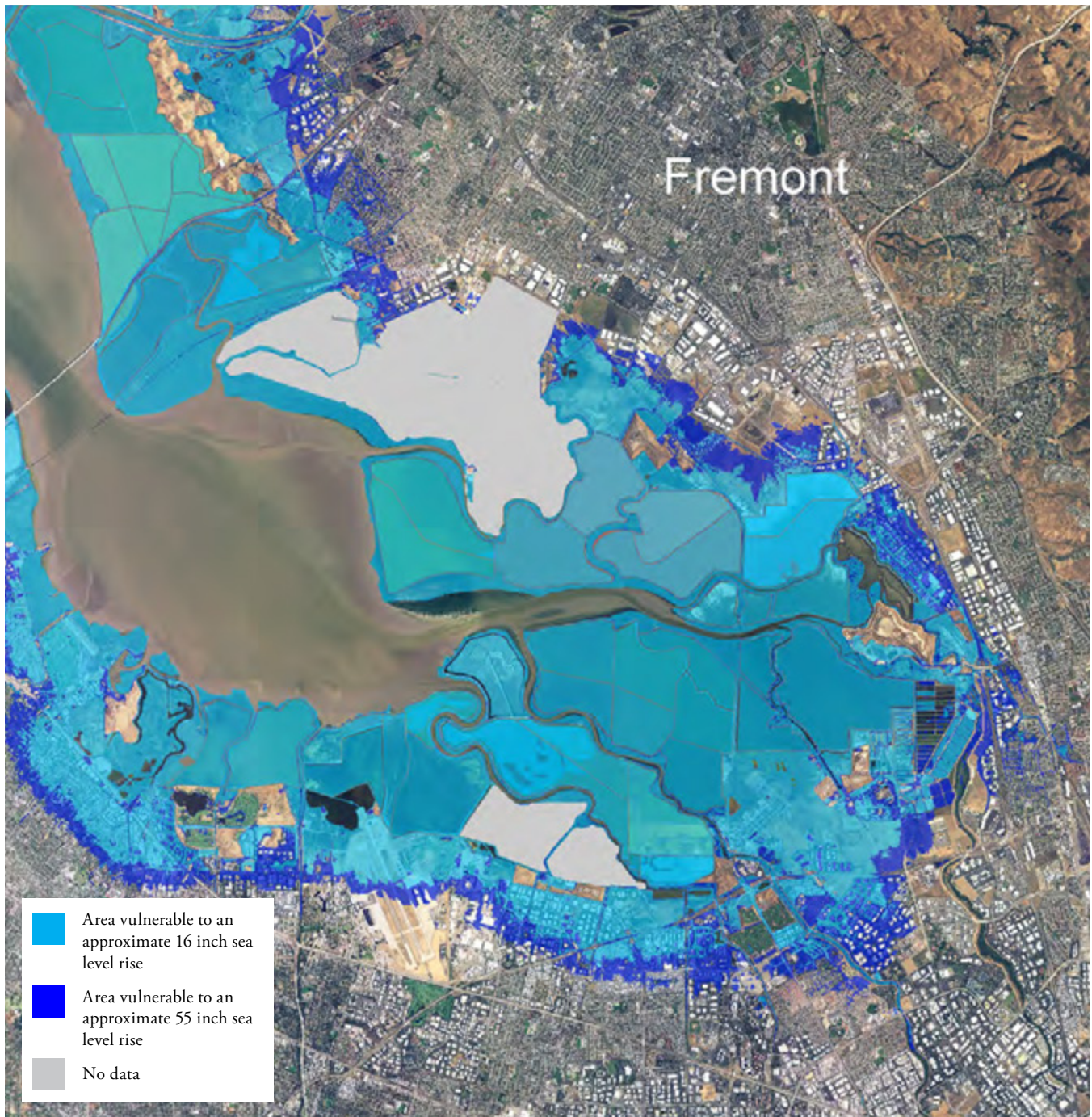
The Climate Action Plan, with its focus on identifying and implementing actions for reducing greenhouse gas emissions, is primarily a “mitigation” strategy. Chapter 7 includes a discussion of the issue of adaptation in a broad, high-level manner, similar to the approach taken in the Climate Action Plans prepared by the cities of Hayward and Berkeley. It should be noted that one of the Action Area Goals of the Bay Area Climate Change Compact, to which the City is a signatory, calls for the completion of adaptation plans by San Jose, San Francisco and Oakland by 2013. If these communities complete those plans, the City of Fremont would be positioned to benefit from their work.

In addition, Alameda County, from Emeryville to Union City, was selected in early 2011 as the *Adapting to Rising Tides (ART) Subregion* by the sponsoring agencies—the San Francisco Bay Conservation and Development Commission (BCDC) and the National Oceanic and Atmospheric Administration Coastal Services Center (NOAA CSC) to begin planning for sea level rise and other climate change impacts. The City of

Fremont, along with other Bay Area and California jurisdictions, will benefit from the research findings and lessons learned from the project. Figure 1-8 indicates the areas in Fremont which have been identified as vulnerable to sea level rise by the Bay Conservation and Development Commission (BCDC).

In the interim, individual development projects proposed in areas that may be affected by sea level rise will be evaluated for potential impacts and mitigation measures as part of the environmental review process required by the California Environmental Quality Act.

**Figure 1-8: Shoreline Areas Vulnerable To Sea Level Rise: Central Bay South**



Source: Bay Conservation and Development Commission.

## Accomplishments to Date

The City of Fremont's commitment towards achieving greenhouse gas emission reductions, improvements in energy efficiency and energy conservation, cost savings, and support for the adoption of innovative technologies are reflected in the range of accomplishments described below.

### Energy Efficiency and Energy Conservation in City Operations

- Through the “East Bay Energy Watch” program, a partnership of Pacific Gas & Electric and the Association of Bay Area Governments that provides assistance to local governments in reducing their energy usage, the City completed lighting retrofits at City Hall, the Development Services Center, the Police Building; and the Family Resource Center. Energy-conserving window film was also installed at the Police Building and the Development Services Center.
- The retrofit of a City-owned building on Joseph Street, leased to the Tri-City Volunteers, included natural lighting and energy efficient fixtures.
- City staff instituted electronic distribution of employee paychecks in lieu of paper copy and established double-sided copying as the default print choice for most printers used throughout the organization. Both initiatives reduce paper use and operational expenses.
- The City reduced the number of its computer servers from 82 to fewer than 20. This project is expected to pay for itself in 15 months and will save the City an estimated \$60,000 annually in utility and maintenance costs.
- In 2010, the City installed a new “cool” roof at the Fremont Main Library. The new roof is designed to reflect the heat of the sun away from the building, which helps keep the building cooler and reduces the use of air conditioning.
- City staff installed several solar-powered trash compactors at various parks, lowering staff and fuel costs for the reduced number of trips needed to collect the waste.
- Through the “Flex Your Power” program, the City voluntarily reduces energy usage at PG&E's request (primarily by raising thermostat settings and reducing air conditioning usage in City buildings) during heat waves.



- The City completed the conversion of incandescent traffic signals to light emitting diode (LED) technology, which has reduced energy consumption and greenhouse gas production by about 85%.
- The City continued its efforts to replace fossil-fuel powered fleet vehicles and maintenance equipment with alternative fuel vehicles and equipment. The fleet includes hybrid vehicles and natural gas-powered street sweepers, among others. More details about the City's fleet can be found in Chapter 6.
- In 2011, the City was awarded grant funding from the Metropolitan Transportation Commission for the purchase of two all-electric vehicles for the City's fleet, along with two charging stations. The City was part of a consortium of Bay Area government agencies committed to the transition of government fleets away from fossil-fuel burning vehicles.

### Community Initiatives

- During the summers of 2009 through 2012, the City sponsored the *California Youth Energy Services* program in Fremont. Each summer, local youths performed free energy audits in over 200 residences and installed simple efficiency measures like fluorescent bulbs and low-flow shower heads, saving money for residents and reducing greenhouse gas emissions. In 2011, the City expanded the program to include both the summer and fall seasons, resulting in upgrades to over 500 Fremont households.
- Consistent with the recommendations of the Green Task Force, the City worked with PG&E to implement the “Be Green, Save Green” program. This program provided small businesses in the Irvington District with free energy audits and low-cost upgrades.

- Using federal economic stimulus funds, the City is partnering with the school district and several non-profit agencies to achieve energy conservation goals and reduce greenhouse gas emissions. The following projects received funding in 2011: Installation of solar hot water systems at the Sunrise Village homeless shelter and the Carnales Unidos Reformado Adictos (CURA) residential chemical dependency treatment facility; energy efficiency upgrades at Redwood Lodge affordable housing property; replacement of low-efficiency parking lot lights at six Fremont Unified School District facilities with high-efficiency fluorescent lights; expansion of the California Youth Energy Services program to include the Fall 2011 program, and purchase of energy efficient kitchen appliances and installation of new “cool” roof at Irvington Presbyterian Church, site of the Tri-City Free Breakfast Program.
- Based on the results of a pilot test, which included public input provided through the City’s website, the City began installing new, energy efficient light-emitting diode (LED) streetlights on major streets in 2011.
- More than 20 Fremont businesses have received recognition for their efforts to conserve resources, minimize waste, and reduce their carbon footprint by becoming a “Certified Bay Area Green Business”.

### **Green Buildings, Bay Friendly Landscaping and Trees**

- Fire Station #6 received Leadership in Energy and Environmental Design (LEED™) Certification in 2009, and was the first City building to achieve this standard. LEED™ is a system developed by the U.S. Green Building Council (USGBC) to categorize the level of environmentally sustainable construction in buildings. In 2011, Fire Station #2 received LEED™ Silver Certification and Fire Station #11 received LEED™ Gold Certification.
- The new sign shop at the Leon J. Mezzetti Maintenance Center was constructed using recycled materials in the flooring, walls, and ceiling, and the HVAC system is higher-efficiency than required by the building code.
- The City installed a new “cool” roof and HVAC system at the Senior Center in Central Park. Fremont is the first jurisdiction in the Bay Area to use this



roofing product, which is designed to reflect the heat of the sun away from the building, which helps keep the building cooler and reduces the use of air conditioning. The project is expected to reduce heating and cooling energy consumption by 30%.

- The City Council adopted a policy requiring all municipal projects with over 10,000 square feet of landscaping to achieve a 60-point score on the Bay Friendly Landscaping checklist and to utilize all nine mandatory measures, as well as a policy requiring private projects (other than single-family homes) to meet at least seven of the nine mandatory measures. Bay Friendly Landscaping requirements help achieve greenhouse gas emission reductions by requiring the use of plant materials that require less (or no) maintenance and irrigation, thereby reducing energy and water use.
- Between 2007 and 2009, the net gain of the City’s Urban Forestry Program (trees planted less trees removed) was 984 trees. Planting activities on Arbor Day 2008 and 2009 expanded the city’s tree inventory by 105 trees. Trees sequester carbon from the atmosphere and help to reduce the City’s level of greenhouse gas emissions.
- Two affordable housing projects significantly supported by public funding, *Eden Housing and Main Street Village*, received City approvals and scored over 100 points on the GreenPoint Rated scale, far exceeding the 50-point minimum that the City requires as a standard condition of approval.
- The City adopted the California Green Building Code (CalGreen) and adopted enhanced “Tier 1” standards for residential development, effective January 2011.





Fremont BART Bike Lockers



### Improvements to Support Walking and Bicycling

- The City received a \$342,000 grant from the Alameda County Transportation Commission for pedestrian improvements in the Irvington District. The funds were used at six intersections along Fremont Boulevard between Grimmer Boulevard and Washington Boulevard. This segment of Fremont Boulevard is categorized in the County Strategic Pedestrian Plan as a “High Priority Transit Corridor” and as an area of significance for the commercial district. Construction was completed in 2012.
- Sixteen bicycle lockers were installed at the Centerville Train Depot, the Park-and-Ride lot at Mission San Jose Community Park, and the Fremont Family Resource Center. Eighty-one bicycle racks were installed at 21 locations throughout the City, including the County libraries, city parks, community centers, and other heavily used facilities.
- Installation of 36 electronic bicycle lockers at the Fremont BART Station was completed at the end of 2011.
- The City completed improvements to Bay Street in Irvington, including a new parking lot of porous asphalt concrete underlain by a two-foot thick infiltration bed, providing on-site retention and percolation of stormwater. The project was partially funded with a \$1.6 million grant from the Metropolitan Transportation Commission’s *Transportation for Livable Communities* program, which is aimed at creating walkable neighborhoods near transit.

- The City received a \$1.2 million Proposition 50—California Rivers Parkways grant to improve public access along Sabercat Creek with a 1,250-foot trail connection under Paseo Padre Parkway. In addition to improvements to the natural habitat, the project, completed in 2012, extended the trail connecting two pedestrian pathways, thereby increasing opportunities for people to walk.

### Materials Management: Waste Reduction, Reuse and Recycling, Composting, and Diversion from the Landfill

- The City’s annual pavement management program has utilized street surfacing products made from recycled waste tires. The use of these products diverts tires from landfills and provides smooth street surfaces which help maximize vehicle fuel efficiency by reducing rolling resistance.
- The City’s Graffiti Abatement Program uses recycled paint to eradicate graffiti, helping to create a market for recycled products.
- The City collects food scraps at many City buildings, including City Hall, the Development Services Center, the Family Resource Center, the Maintenance Center, the Senior Center, and all fire stations. The food scraps are then composted, which diverts waste and decreases methane emissions from the landfill.
- City staff has been implementing the Environmentally Preferable Purchasing policy since 2006, which promotes purchasing of recycled products and products that reduce waste, toxics and pollution.

- On the Washington Boulevard Grade Separation Project, approximately 15,000 cubic yards of asphalt concrete (about 1,000 truckloads) generated from removal of road surfaces were reused as sub-ballast, structural backfill, and in roadway embankments. By reutilizing the asphalt concrete, the City diverted substantial amounts of waste from the landfill, and also minimized air pollution and greenhouse gas emissions that would have been generated from trucking the material to the landfill and importing replacement material.
- The City Council adopted an ordinance, effective January 1, 2009, mandating recycling of construction and demolition debris.
- The City diverted 73% of waste from landfill in 2011, drawing closer to the goal set in 1999 to divert 75% by 2010.

### **Incentives to Businesses and Residents**

- In July 2009, Council adopted a Clean Technology Business Tax Exemption as an incentive to attract green employers into Fremont.
- The City Council approved new building permit fee categories for solar photovoltaic panel installations in single-family residences in October 2006 and for multi-family and commercial installations in April 2008. In most cases, the new fees are lower than the previous fees, thereby making solar, a renewable energy source, a more cost-effective option for Fremont residents and businesses.
- The City participates in the *Commuter Check Program*, which allows City of Fremont employees who use BART, ACE, AC Transit and other Bay Area transit systems for their work commute to realize tax saving by buying vouchers accepted by transit operators for the purchase of transit tickets.

### **Leadership through Collaboration and Advocacy**

- In 2005, Fremont's Mayor signed the U.S. Conference of Mayors Climate Protection Agreement which urges local actions in municipal operations to reduce global warming pollution.
- In 2007, with the financial support of StopWaste.Org, Fremont joined ICLEI, Local Governments for Sustainability and the Alameda County Climate Protection Project. The Project was launched by the Alameda County Conference of Mayors in partnership



with StopWaste.Org. Alameda County, along with representatives from the 14 city governments within the county, collaborate on projects that are best addressed on regional scale and that aim to reduce emissions, reduce waste and energy use, and save money.

- On September 8, 2009, the City Council unanimously adopted a resolution which demonstrated its continued leadership on climate change by agreeing to become a signatory to the Bay Area Climate Change Compact and a participant in the Bay Area Climate Collaborative. The Silicon Valley Leadership Group, in association with Joint Venture Silicon Valley, initiated these strategies as a model for regional collaboration and information sharing aimed at reducing the region's greenhouse gas emissions, and to better position the region to qualify for outside funding for future initiatives.

The ongoing implementation of the actions identified in the Climate Action Plan will build on the partnerships, collaborations, innovations and strategies, and experience and successes represented by these achievements, bringing a multitude of benefits to the community and the region as a whole.

## California Environmental Quality Act and BAAQMD Guidelines for Qualified Climate Action Plans

The City incorporated the Climate Action Plan into the analyses in the Environmental Impact Report (EIR) for the General Plan Update. On December 13, 2011, the City Council adopted a resolution certifying the final EIR for the General Plan Update, thereby procuring California Environmental Quality Act clearance for the Climate Action Plan. It should be noted that the CAP does not adhere to the Bay Area Air Quality Management District's (BAAQMD) Air Quality Guidelines for a qualified climate action plan. Rather, the CAP includes implementation actions for guiding

the community and the City organization in efforts to reduce greenhouse gas emissions. Some actions will be implemented in the near term (one to three years following CAP adoption), some in the medium term (three to five years), and some in the long term (beyond five years). The CAP is intended to be updated and refined every five years as best practices evolve and quantitative approaches to the preparation of greenhouse gas inventories and modeling of emission reduction actions become more sophisticated.



Fremont Performance Pavilion



# Chapter Two: Land Use and Mobility

## Moving Smarter, Improving Options and Changing Behavior



### Key Learning Points

- The goal of transportation is *access*, not movement or mobility per se. Movement is a means, not the end.
- We need to drive less, and we need to drive smarter.
- There is no quick fix: success will rely on behavior change, new technologies, and transformation of development patterns.
- The largest percentage of greenhouse gas emission reductions will result from State-and regional-level initiatives.

### *How does gasoline consumption translate into greenhouse gas emissions?*

*1 gallon of gasoline = approximately 20 pounds CO<sub>2</sub>e*

*You can use this information to calculate the greenhouse gas emissions you create by driving.*

### Introduction

Fremont is a geographically large city, covering approximately 90 square miles. Fremont's land use pattern is defined by the city's topography, its agricultural past, its early settlement patterns, its transportation network, and its central location within the nation's fourth largest major metropolitan area. In addition to the local street network, two interstate highways—Interstate 880 and Interstate 680—connect Fremont to the Greater Bay Area and beyond. Three State highways—State Route (SR) 84, SR 262, and SR 238—also pass through the city.

In general, industrial uses are concentrated in the south and southwestern portions of the city. Commercial uses are clustered in the five original districts—Centerville, Irvington, Niles, Mission San Jose, and Warm Springs—in shopping centers along arterial streets, around freeway interchanges, and in the city center. Residential uses occur throughout the city, with low-density single family neighborhoods and garden apartment complexes predominating. Public facilities such as fire stations and parks are located in all parts of the city, serving surrounding neighborhoods and, in some cases, the city as a whole.

Fremont's well defined road hierarchy, characterized by high-volume arterials, moderate-volume collector streets, and low-volume local streets serving residential neighborhoods, was built in part to link the five original districts to one another and to facilitate the development of the city as a whole. Zoning regulations separated various land uses from one another and required ample parking at destinations, which precluded the installation of parking meters citywide. The overall goal was to make driving, and parking, as convenient as possible.

Now, more than half a century after Fremont's 1956 incorporation, the City Council has articulated a new vision for the future of the city as part of the updated General Plan: "*Fremont will serve as a national model of how an auto-oriented suburb can evolve into a sustainable, strategically urban, modern city.*" A key component of this evolution is the policy emphasis on locating the city's highest-intensity employment and residential development near transit centers, such as BART stations (existing and planned) and the Centerville Train Station (served by the Altamont Commuter Express (ACE) train and Amtrak) and also along major transit corridors, such as Fremont Boulevard.

The linkage of land use and transportation is a key strategy for reducing vehicle miles traveled and lowering greenhouse gas emissions in the transportation sector. As urban designer Peter Calthorpe notes: "... the goal of transportation is access, not movement or mobility per se; movement is a means, not the end. So, bringing destinations closer together is a simpler, more elegant solution than assembling a new fleet of electric cars and the acres of solar collectors needed to power them. Call it 'passive urbanism.'"<sup>1</sup>

While Fremont is relatively well served with commute service to other employment centers throughout the Bay Area,<sup>2</sup> the viability of local transit service by AC Transit and Valley Transportation Authority (VTA) is hampered by population and employment densities lower than the minimum needed to support regular bus service in many areas of the city. This barrier to increased bus service can be addressed, in part, by encouraging denser development in targeted locations served by transit.

The City's approach to achieving its vision is consistent with Senate Bill (SB) 375, the 2008 legislation aimed at

<sup>1</sup> Calthorpe, Peter. *Urbanism in the Age of Climate Change*. 2011, Island Press, p. 18.

<sup>2</sup> See, however, the discussion later in this chapter of Fremont's commute patterns and the low level of use of public transit.

linking transportation planning with land use planning and reducing greenhouse gas emissions, largely by promoting development density near urban cores and transit centers. Also, as mentioned in Chapter One of this Plan, the Public Policy Institute of California's 2012 report *Californians and the Environment* found that 77% of Californians favor encouraging local governments to change land use and transportation planning so that people can drive less. As part of the Fremont General Plan Update, the community was asked in an on-line survey where new population growth should be accommodated; the most popular response was 'in higher intensity development near transit.' At both the statewide and local levels, the public's preference is clear.

Fremont's strategies are also consistent with goals identified by California's *Health in All Policies Task Force* of the Strategic Growth Council (SGC). The SGC was created in 2010 by Governor Arnold Schwarzenegger and charged with identifying strategies for improving community health and advancing other SGC goals. These goals include encouraging infill and compact development, improving air quality and transportation, and assisting local and state entities in planning sustainable communities and meeting the goals of AB 32. In their December 2010 report, the Task Force included the aspirational goal that "All California residents have the option to safely walk, bicycle, or take public transit to school, work, and essential destinations."

The General Plan identified the following trends which have direct influence on the City's goal of reducing greenhouse gas emissions from vehicles:

- **Economic:** Over time job growth has outpaced housing growth, resulting in increases in housing costs and an imbalance between housing and jobs. ABAG projects this trend to continue. As a result, the General Plan establishes policies which will ensure adequate housing is provided near jobs, services, and transit.
- **Land availability:** Due to the limited supply of large parcels of vacant land, the majority of development activity will be infill projects on smaller vacant and underutilized parcels.
- **Traffic congestion:** Traffic congestion has increased on roads within the city and throughout the region. This congestion is caused by daily commuting into and out of the city, and by trips to meet daily life needs.



Flickr photo courtesy of John K.

Interstate 680 as it winds between Sunol and Fremont

- **Technology:** Driven in part by State and/or federal mandates, a wide range of technological innovations are currently deployed or under development. Examples include cleaner transportation fuels; advanced-technology vehicles (such as electric, hybrid, and plug-in electric) for personal and commercial use, as well as for public and transit agency fleets; and Intelligent Transport Systems, which use communication and electronic technologies to monitor traffic flow and enhance roads and freeways to help reduce congestion.

The Climate Action Plan provides specific strategies that acknowledge these trends in transportation. The Plan also acknowledges that ongoing regional planning efforts, state-level initiatives, and private-sector innovations are linked to the *synergy of strategies*—vehicle fuel economy, fuel carbon content, vehicle miles traveled, and optimization of the transportation system—to achieve GHG emission reductions in this sector, as discussed later in this chapter.

**State of California:** Statewide, the transportation sector uses about half of the energy consumed in the state, and produces nearly 40 percent of the state’s greenhouse gas emissions.<sup>3</sup> While per capita electricity-related greenhouse gas emissions are significantly lower in California than the nationwide average, vehicle-related emissions are generally comparable. As a result, the transportation sector has been the primary focus of statewide efforts to reduce dependence on petroleum fuels, develop and deploy cleaner energy sources and cleaner vehicles, and lower greenhouse gas emissions. Major co-benefits of these goals are a reduced dependence on imported oil, cleaner air, and improved public health.

Three key pieces of State legislation driving many of the approaches to reducing greenhouse gas emissions in the transportation sector (as well as others) are Assembly Bill (AB) 1493, Assembly Bill 32, and Senate Bill (SB) 375. Each is referenced in greater detail in this chapter (as well as other chapters of the Climate Action Plan).

<sup>3</sup> California Energy Commission, 2011. *2011 Integrated Energy Policy Report*. Publication Number: CEC-100-2011-001-CMF, p. 12.

## 2005 Baseline Inventory of Greenhouse Gas Emissions from the Transportation Sector

Fremont's 2005 baseline inventory found that, when including vehicles on state highways and local roads, the transportation sector is responsible for about 60% of Fremont's greenhouse gas emissions. Motor vehicles driven within the City's geographical boundaries on both local and state roads emitted approximately 1,005,300 metric tons of CO<sub>2</sub>e in 2005. About 66% of the emissions were from traffic on the state highways and about 34% resulted from traffic on local roads.

The methodology used for Fremont's baseline inventory reflected the current state-of-the-art in emissions modeling in the transportation sector, and by necessity included various assumptions about the vehicles whose miles were being counted. Despite the challenges of modeling emissions from transportation, the inventory results are useful for illustrating the relative emissions from different sources. While Fremont will continue to face challenges in measuring the effectiveness of policies and actions due to the limitations of emissions modeling techniques, it will seek to make use of the best available methods and models in this ongoing process.

## The Synergy of Multiple Strategies: *There is No Quick Fix*

Greenhouse gas emission reductions in the transportation sector cannot be successfully mitigated through any single public policy or technological innovation. Similar to the metaphor used to describe California's approach to energy efficiency, many studies describe transportation-related emission reductions as a *three-legged stool* of **vehicle fuel economy** (the common metric expressed in *miles per gallon*, or MPG), the **carbon content of the fuel itself** (the lower the carbon content, the lower the greenhouse gas emissions produced); and the **amount the vehicle is driven** (referred to as *vehicle miles traveled*, or VMT). To these can be added a fourth leg, or strategy, of **optimization of the transportation system**, which addresses ways that roads, traffic signals and other elements of the system can be built, operated and maintained for maximum efficiency and functional capacity.

For transportation-related emissions, it is important to understand the synergistic relationship of the four strategies described above. Several examples of synergies include the following:

- While the reduction of VMT helps lower greenhouse gas emissions, it also helps reduce both traffic congestion and the frequency of pavement maintenance.
- Well-maintained road surfaces and efficient traffic flows maximize fuel efficiency.
- Improved fuel economy and the increasing use of alternative fuels reduce greenhouse gas emissions, while also decreasing air pollution, improving public health, and improving energy security.

The City can directly influence the third and fourth strategies of achieving reductions in vehicle miles traveled (through its authority over local land use decisions and other areas of influence) and optimizing the system (through the development, operation and maintenance of transportation infrastructure), whereas the first two strategies are within the purview of the federal and state governments and are implemented by utilities and vehicle manufacturers. In order to meet the City of Fremont's greenhouse gas emission reduction goals, each strategy must be addressed. If VMT continues its historical growth, the increase in driving could neutralize the environmental benefits garnered from lower-carbon fuels and an increasing number of lower-emission vehicles on the road.

## Strategy One: *Better Cars with Increased Fuel Economy and Other Efficiencies*

**Federal-level policy and regulation:** The Corporate Average Fuel Economy (CAFE) standards are the foundation of U.S. policy addressing fuel economy of cars and light trucks<sup>4</sup>. These standards were first created by the Energy Policy Conservation Act in 1975, and were enacted by Congress in response to the Arab Oil

<sup>4</sup> The light-duty vehicle class is defined by the Environmental Protection Agency as smaller vehicles (less than 8,500 pounds gross vehicle weight) ranging from subcompact cars and sedans to minivans, sport utility vehicles, and smaller (1/2 ton) pickup trucks. Medium-duty passenger vehicles are those between 8,500 and 10,000 lbs. GVW if they are designed and used primarily for transporting people.



**Table 2-1: Carbon Dioxide Emissions and Miles per Gallon of Light Duty Vehicles Under CAFE Regulations**

	1975	1987	1998	2008	2009	2010	2016 (projected)
Adjusted CO <sub>2</sub> emissions (grams /mile)	681	405	442	424	397	395	250
Adjusted Fuel Economy (miles per gallon)	13.1	22.0	20.1	21.0	22.4	22.5	34.1

**Source:** U.S. Environmental Protection Agency, *Light-Duty Automotive Technology, Carbon Dioxide Emissions, and Fuel Economy Trends: 1975 Through 2010, Executive Summary*, p. iii. Nov. 2010. Table modified to include 2016 projected emissions and fuel economy data.

Embargo and resulting tripling of fuel prices in 1973-74. The purpose of the CAFE standards, which are administered by the National Highway Traffic Safety Administration (NHTSA), is to reduce energy consumption by increasing the fuel economy of cars and light trucks. The standards are expressed as miles per gallon (mpg) figures.

In 2010, for the first time since the establishment of the CAFE standards, the NHTSA and the EPA jointly released requirements addressing both fuel mileage and greenhouse gas emissions for light duty vehicles, model years 2012 through 2016. This is an historic step in addressing the oil consumption and greenhouse gas emission contributions of the largest contributor (about 60% nationwide) in the transportation sector. By model year 2016, the average industry-wide compliance levels are projected to be 250 grams per mile carbon dioxide (CO<sub>2</sub>) and 34.1 miles per gallon. Table 2-1, which includes calculated historic CO<sub>2</sub> emissions corresponding to the fuel economy standards of each year listed, illustrates the relationship between fuel economy and CO<sub>2</sub> emissions and the progress achieved since the program began.

The NHTSA and EPA have begun addressing standards, expected to be in place by 2014, for medium- and heavy-duty trucks, which are the nation’s second-largest contributor to petroleum consumption and greenhouse gas emissions in the transportation sector.

**State-level policy and regulation:** At the State level, in 2002, California once again showed its national leadership by signing into law AB 1493, which directed the Air Resources Board (ARB) to adopt regulations requiring the maximum feasible and cost-effective reduction of greenhouse gas emissions from new light duty vehicles, beginning with model year 2009. This action pre-dated the federal government’s 2010 inclusion of greenhouse gas emission requirements in the CAFE

standards and was the first in the nation<sup>5</sup> to set GHG standards for passenger vehicles. In response, in September 2004, ARB approved standards (known as Pavley I<sup>6</sup>) for model years 2009 through 2016, targeting 30 per cent reductions by 2016 (from a 2002 baseline). Pavley I took effect for model years starting in 2009 to 2016. Pavley II, which is referred to as LEV (Low Emission Vehicle) III, was adopted by ARB on January 27, 2012 and will cover model years 2017 to 2025. The LEV III program reflects ARB’s newly-adopted regulatory approach of combining the control of both greenhouse gas emissions and smog-causing pollutants from cars and light trucks into a coordinated package of standards.

In 2008, ARB issued a report<sup>7</sup> comparing the federal CAFE program and the State’s Pavley standards. This report revealed that California’s rules are more stringent than the federal regulations, and will result in substantially greater greenhouse gas emission reductions than would have occurred under CAFE standards only. For example, ARB estimates that between 2009 and 2016, the California standards will prevent emissions of 55 million metric tons of CO<sub>2</sub>e (MMTCO<sub>2</sub>e) statewide—more than twice the 22 MMTCO<sub>2</sub>e prevented if only the new federal CAFE standards were implemented. By 2020, ARB estimates that the California rules will prevent 158 MMTCO<sub>2</sub>e statewide, double the 79 MMTCO<sub>2</sub>e reductions expected if only the federal standards were implemented.

The State of California utilizes a variety of approaches and programs to increase the use of alternative fuel sources and the number of zero- and low-emission

<sup>5</sup> To date, fourteen other states have adopted California’s standards.

<sup>6</sup> The standards are named after State Senator Fran Pavley (D-Santa Monica), who sponsored AB 1493.

<sup>7</sup> California Air Resources Board, *Comparison of Greenhouse Gas Reductions for the United States and Canada Under U.S. CAFE Standards and California Air Resources Board Greenhouse Gas Regulations: An Enhanced Technical Assessment*. February 25, 2008, pp. vi-vii.

vehicles driven in California. Examples include regulations and standards; funding for research, development and deployment; incentives for production of low-carbon alternative and renewable fuels; incentives to consumers for purchase of the vehicles; and a public outreach campaign showcasing the benefits and availability of the vehicles.

One important point in this discussion concerns vehicles that utilize electricity as a power source, such as all-electric vehicles, gas-electric hybrids, and plug-in electric hybrids. While driving these vehicles generates fewer emissions than gasoline-powered vehicles, some of the emission reductions are offset by the emissions which result from the production of the electricity which provides their power. Therefore, in order for these vehicles to achieve the **maximum potential reductions** in greenhouse gas emissions, **the electricity needs to come from renewable and/or low-carbon energy sources**. This highlights another synergy of California's efforts to reduce greenhouse gas emissions – in this case, the synergy between the Renewables Portfolio Standards (and other efforts aimed at reducing the carbon content of energy sources, described in Chapter Three) and the new technology vehicles which will maximize the potential emission reductions which can be achieved.

In addition to increased fuel economy, there are other ways to reduce greenhouse gas emissions. Collectively known as *vehicle efficiency measures*, these include aerodynamic and lighter-weight vehicle design, low rolling-resistance tires, low friction engine oils, proper tire inflation, and solar-reflective automotive paint and window glazing (to keep cars cooler and reduce air conditioner use). The AB 32 Scoping Plan includes measures addressing several of these areas, and automobile manufacturers are currently marketing vehicles with innovative design strategies<sup>8</sup> which increase mile-per-gallon performance and reduce emissions at the same time.

The City of Fremont is actively engaged in increasing the number of alternative fuel vehicles in the City's fleet and retiring gasoline-powered vehicles whenever possible. These efforts, which help reduce greenhouse gas emissions from City operations and model leadership and commitment to the community, are described in more detail in Chapter Six.

<sup>8</sup> One example of an innovative strategy is the Chevrolet Cruze Eco's lower grill air shutters that use sensors to sense wind and temperature conditions. Electric motors hooked to the sensors close them at high speeds to reduce drag, and open them at lower speeds to let in air to cool the engine – a design feature that increases fuel economy by nearly ½ mile per gallon.

## Strategy Two: *Cleaner Fuels*— Shift to Fuels That Produce Low or Zero Carbon Dioxide Emissions

The second strategy aimed at reducing greenhouse gas emissions from the consumption of fossil fuels addresses the carbon content of the fuel itself: the lower the carbon content, the lower the level of greenhouse gas emissions produced. For every gallon of gasoline consumed from driving, about 19 pounds of carbon dioxide are emitted into the air.<sup>9</sup> For every gallon of diesel fuel consumed, about 22.2 pounds of carbon dioxide are released. The EPA estimates the annual greenhouse gas emissions for a light-duty vehicle averaging approximately 20 miles per gallon and driven 12,000 miles per year to be 5.5 metric tons CO<sub>2</sub>e. As noted in the State Alternative Fuels Plan (which identifies strategies to increase the use of alternative fuels): “California's transportation sector is more than 95 percent dependent on a single fuel source, petroleum, and over 60 percent of the nation's petroleum consumption comes from foreign sources... The state and the nation are extremely vulnerable to petroleum price and supply disruptions at a time when crude oil prices exceed \$90 per barrel.”<sup>10</sup> Given that, in 2010, Californians consumed about 16 billion gallons of gasoline and 4 billion gallons of diesel fuel, the opportunities and the challenges for reducing the use of fossil fuels and lowering greenhouse gas emissions, while also reducing the state's vulnerability to price increases and supply disruptions, are phenomenal.

In 2007, Governor Schwarzenegger signed Executive Order S-01-07, which established the Low Carbon Fuel Standard (LCFS) for surface transportation fuels sold in California. The Air Resources Board adopted the standard, which requires fuel suppliers and distributors to ensure that, on average, the mix of fuel they sell into the California market meets a declining standard for GHG emissions, with the ultimate target of 10 percent reduction in carbon intensity of their fuel mix by the year 2020. According to a 2007 study:

<sup>9</sup> This figure increases by approximately five pounds to a total of 24 pounds of CO<sub>2</sub> per gallon, when the emissions released during drilling, refining and distributing the gasoline are accounted for. The higher figure represents the full fuel cycle impact of the gasoline's use (also known as the 'well-to-wheel' impact).

<sup>10</sup> Throughout 2011, crude oil prices were up 25 percent from a year prior, averaging over \$100 a barrel. The U.S. Energy Efficiency Administration's website noted: “Energy price forecasts are uncertain.”



Tesla Car, an all-electric vehicle

*We find it possible to either manufacture a significant amount of low-carbon fuel within California or to import it from outside the state. Many of the low carbon fuels expected to be commercially available in large quantities within the 2020 time horizon are biofuels... (p. 9). In addition to these reductions in carbon intensity in the light duty fleet, vehicles that use diesel fuel today (heavy duty on-road vehicles and a wide variety of off-road applications like forklifts and construction equipment) might use low-carbon fuels. Three strategies seem feasible, low-GHG diesel fuels, natural gas, and electrification.<sup>11</sup>*

Other fuel sources which could contribute to the LCFS and reduce the use of some gasoline and diesel fuel include natural gas, liquefied petroleum gas (LPG), electricity, and hydrogen.

## Strategy Three: Smarter Travel—Reducing Vehicle Miles Traveled

Land use influences people’s travel behavior because the location of housing, jobs, stores, services, and civic, educational and recreational facilities, all affect the frequency and distance of people’s trips. The City of Fremont has local authority over the land use patterns of the community. As described earlier in this chapter, the policy emphasis on locating the city’s highest-intensity employment and residential development near transit centers, such as BART, is intended to play a key role in reducing vehicle miles traveled. However, it is important to note that, while optimal land use patterns make possible travel choices which reduce greenhouse gas emissions, it is ultimately the accumulation of individual behaviors—the choices people make about how they move around—that will largely determine the level of emission reductions that occur.

<sup>11</sup> Farrell, Alexander E., (UC Berkeley) and Sperling, Daniel, (UC Davis) Project Directors. “A Low-Carbon Fuel Standard for California: Part 1: Technical Analysis, August 1, 2007”, p. 12.

The potential impact of behavior change should not be discounted or underestimated. Working Group III of the Intergovernmental Panel on Climate Change (IPCC) made the following findings about the role of behavior on mitigating climate change impacts in all sectors in the short- to- medium term (defined by the Panel as extending to 2030):

*Changes in lifestyle and behaviour patterns can contribute to climate change mitigation across all sectors. Management practices can also have a positive role.*

- *Lifestyle changes can reduce GHG emissions. Changes in lifestyles and consumption patterns that emphasize resource conservation can contribute to developing a low-carbon economy that is both equitable and sustainable.*
- *Education and training programmes can help overcome barriers to the market acceptance of energy efficiency, particularly in combination with other measures.*
- *Changes in occupant behaviour, cultural patterns and consumer choice and use of technologies can result in considerable reduction in CO<sub>2</sub> emissions related to energy use in buildings.*
- *Transport Demand Management, which includes urban planning (that can reduce the demand for travel) and provision of information and educational techniques (that can reduce car usage and lead to an efficient driving style) can support GHG mitigation.*
- *In industry, management tools that include staff training, reward systems, regular feedback, and documentation of existing practices can help overcome industrial barriers, reduce energy use, and GHG emissions.<sup>12</sup>*

The vital link between land use and transportation was the foundational concept underlying Senate Bill (SB) 375, adopted by the California legislature in 2008. For the nine-county San Francisco region, the bill requires the Metropolitan Transportation Commission (MTC), the regional transportation planning agency, and the Association of Bay Area Governments (ABAG), the regional planning agency, to adopt a *Sustainable Communities Strategy* (SCS) which integrates MTC’s *Regional Transportation Plan* (RTP) with ABAG’s *Regional Housing Needs Allocation* process. The SCS must attempt to identify areas within the region which

<sup>12</sup> IPCC, 2007: Summary for Policymakers. In: *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, p. 12. B. Metz., O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds.), Cambridge University Press, Cambridge, United Kingdom and New York NY, USA.

would ultimately provide sufficient housing for all of the region's population. The SCS must also attempt to coordinate the resulting land-use pattern with the transportation network, in order to achieve a 15% per capita reduction in greenhouse gas emissions from light-duty vehicles (automobiles and light trucks).<sup>13</sup>

In addition to this target, MTC and ABAG have adopted other performance targets for the SCS/RTP. Of these, the following have the potential to reduce greenhouse gas emissions as well:

- Increasing the average daily time walking or biking per person for transportation by 60% (for an average of 15 minutes per person per day)
- Decreasing average per-trip travel time by 10% for non-auto modes of travel
- Decreasing automobile vehicle miles traveled per capita by 10%
- Maintaining the transportation system in a state of good repair by:
  - Increasing local road pavement condition index to 75 or better<sup>14</sup>
  - Decreasing distressed lane-miles of state highways to less than 10% of total lane miles
  - Reducing average transit asset age to 50% of useful life<sup>15</sup>

The primary goal of the SCS is to promote development density near transit and within urban centers. While the SCS is intended to support consensus on a preferred growth pattern for the region, SB 375 explicitly provides that local governments are not required to update their general plans in accordance with the SCS. Therefore, the SCS does not carry the same authority as the Regional Housing Needs Allocation process. The

process of developing the SCS/RTP was underway during the preparation of this Climate Action Plan. Adoption of the SCS/RTP is anticipated to occur in 2013.

The Sustainable Communities Strategy, Regional Transportation Plan, and Regional Housing Needs Allocation processes primarily address future development. However, since Fremont is largely developed, it is necessary to consider the current population's transportation-related behaviors. Data from the 2000 census (the most recent available at the time of the preparation of the Climate Action Plan) showed that an overwhelming majority of Fremont residents—over 77 percent—travel to work by driving alone. About 12 percent of the city's residents carpool and five percent take public transportation. Less than three percent of Fremont residents work at home and less than two percent walk or bicycle to work. This commute-related data highlights the tremendous challenges facing the community if it is to achieve measurable reductions in travel behaviors that produce greenhouse gas emissions. For non-commute vehicle trips, replacing these trips with different means of transportation would be ideal; however, other strategies, such as changes in driving habits (combining several errands into one trip and eliminating rapid acceleration and braking) can also help reduce both vehicle miles traveled and greenhouse gas emissions.

*Transportation pricing* is another policy approach aimed, in part, at reducing vehicle miles traveled.

Transportation pricing refers to programs that seek to offset the hidden costs and impacts of driving, which include **environmental costs** (such as air pollution and increased greenhouse gas emissions) and **societal costs** (such as traffic congestion and longer travel times, resulting in higher fuel and vehicle maintenance costs; health impacts from dirtier air; increased wear and tear on the roadways, resulting in higher maintenance costs; and increased accident rates). Transportation pricing programs are designed to incorporate the *full* cost of driving (beyond those paid directly by the consumer, such as vehicle purchase, maintenance, insurance, fuel costs, tolls) into an individual's decision to drive. Transportation pricing policies can be used to shift the mitigation costs of these impacts to single-occupancy drivers; they can also provide incentives and/or rewards to those who use public transportation, non-motorized forms of travel, or collective travel as carpooling and vanpooling.

<sup>13</sup> Technically, SB 375 calls for a reduction in emissions from passenger vehicles beyond the reductions expected from improvements in vehicle efficiency and the use of low-carbon fuels described earlier in this chapter.

<sup>14</sup> MTC and local jurisdictions use a Pavement Condition Index (PCI) score that rates segments of paved roadways on a scale from 0 to 100. MTC established a 75-point score as a target for roadway quality in its long-range Transportation 2035 Plan adopted in 2009. This score describes pavements in good condition requiring mostly preventive maintenance. In 2009, Fremont's roads were rated at 66, a 'fair' rating indicating the likely need for rehabilitation and preventive maintenance to prevent further degradation.

<sup>15</sup> This is a performance measure used in the RTP to assess the state of good repair of the region's transit capital assets. A brand new asset such as a new bus has an asset age of 0%; whereas a 30-year-old bus with an expected useful life of 40 years has an asset age of 75%. The regional target is to reduce the average age to 50% of the useful life, which essentially means that asset replacement is occurring on a regular, sustainable basis.



Toll crossing, San Francisco–Oakland Bay Bridge

Examples of transportation pricing include parking fees, pay-as-you-drive motor vehicle insurance, conversion of the motor fuel excise tax to a comprehensive energy user fee indexed to average vehicle efficiency, and congestion pricing, such as the toll pricing system on the Oakland–San Francisco Bay Bridge.<sup>16</sup> Many transportation pricing strategies are outside of the City’s authority, although Fremont could choose to take an advocacy position on strategies proposed by other agencies. The Climate Action Plan includes several actions which take an incentive-based approach to redistributing Fremont’s highly-skewed commute pattern away from solo drivers towards increased use of transit, carpooling, bicycling and walking. The Plan also seeks to expand the use of workplace policies that encourage and reward these behaviors while also increasing flexibility about when and where employees work.

## Strategy Four: Optimize the System

The fourth strategy supporting the reduction of greenhouse gas emissions from the transportation sector concerns the transportation system itself. Since a vehicle sitting in traffic consumes more energy and emits more greenhouse gas emissions relative to the overall distance traveled, reducing delays and maintaining optimal traffic flow can help reduce emissions. The City of Fremont builds, operates and maintains the public street system; therefore, the City can positively influence system optimization through proper pavement

<sup>16</sup> In 2010, tolls on the bridge for light-duty vehicles were changed to \$6 during weekday peak commute hours (but only \$2.50 for carpools with three or more passengers during weekday peak commute hours) dropping to \$4 during off-peak hours on weekdays and \$5 on Saturday and Sunday.

maintenance to support smooth driving and reduced rolling resistance, and traffic signal coordination<sup>17</sup>, which helps to reduce congestion and non-productive vehicle idling at red lights. Caltrans is responsible for the highways within Fremont and uses strategies such as ramp metering and real-time traveler information to help cars move smoothly onto and along a highway.

However, Fremont’s roads are not used exclusively by drivers. Bicyclists, pedestrians, and transit vehicles all use Fremont’s transportation system, including sidewalks and trails. The City’s challenge, then, is to balance the requirements for optimal traffic flow with the need to provide a safe and efficient system for bicyclists, pedestrians and transit vehicles so that people will increasingly chose these ways for getting to where they need to go, instead of driving alone (or driving at all).

Fremont identifies priorities for projects which expand and improve the City’s pedestrian and bicycle systems, provide user amenities, and remove barriers for pedestrians and bicyclists through two separate but interrelated documents: the Pedestrian Master Plan (adopted by the City Council on December 4, 2007, and scheduled to be updated in 2012-13) and the Bicycle Master Plan (adopted by the City Council on January 12, 2012). Funding for specific projects is allocated through the City’s biennial Capital Improvement Program Plan. Physical improvements are supplemented by educational programs aimed at increased walking and bicycling. The Climate Action Plan supports the ongoing use of these master plans for guiding Fremont’s investments in bicycle and pedestrian improvements and for advancing the Climate Action Plan’s primary goal of achieving greenhouse gas emission reductions community-wide.

The increased availability and desired use of alternative fuel vehicles has created a new challenge to system optimization: the development of charging infrastructure to help make these vehicles a viable option for residents, businesses, and public agencies. The lack of charging infrastructure, which is both a local and regional issue, would be a constraint on wide-spread public acceptance and purchase of these vehicles. To address this issue as it pertains to electric vehicles, in February, 2011, the BAAQMD showed its commitment

<sup>17</sup> Fremont utilizes traffic signal coordination on major arterials on weekdays during the morning peak, noon peak, and evening peak hours, to maintain optimal traffic flow and reduce congestion.



Photo by Wilson F. via ChargePoint Network

Electric vehicle charging stations

## Actions for Reducing Greenhouse Gas Emissions

The Climate Action Plan seeks to achieve the goal of reducing greenhouse gas emission from the transportation sector by facilitating transit-oriented development, conducting outreach and educational efforts to promote behavior change, and creating the conditions that support people’s ability to make choices which support this goal. Meeting the City’s ambitious greenhouse gas reduction goals in the transportation sector will rely heavily on State and regional initiatives, as previously discussed. However, individuals can make choices and change behaviors in ways that will also make a positive impact. Specific ideas for actions which individuals, businesses and organizations can take to help reduce greenhouse gas emissions from transportation can be found in the section titled “What You Can Do!”

Staff will collaborate with stakeholders when undertaking work on actions in this chapter, especially for those actions which may result in new local regulations.

For more information about the proposed actions to reduce greenhouse gas emissions from the combustion of fossil fuels in City of Fremont operations, as well as a description of current City programs that achieve emission reductions in this area, see Chapter Six, “Municipal Services and Operations.”

to a “robust charging infrastructure” by awarding \$3.9 million to four companies to coordinate and deploy electric vehicle charging equipment throughout the Bay Area. The funding will be used for chargers in private residences and for public use at key transportation corridor sites throughout the region.

As the City of Fremont continues to increase the number and type of alternative fuel vehicles in its fleet, it will also continue to provide the required fueling infrastructure for those vehicles at various City-owned sites. For example, compressed natural gas fueling is available at the Development Services Center (DSC), and electric vehicle charging stations will be installed at two locations (the DSC and City Hall) to charge electric vehicles purchased in part through grant funding awarded by the Metropolitan Transportation Commission to the multi-agency *Local Government Electric Vehicle Fleet National Demonstration Project*.

# Emission Reduction Actions and Implementation Timeline

*GOAL: Reduce greenhouse gas emissions by facilitating transit-oriented development, conducting outreach and educational efforts to promote behavior change, and creating the conditions that support people's ability to make choices which support this goal.*

## Short-Term Actions: 1-3 Years from Plan Adoption

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### Advocate

- L-A1 Apply transit-oriented development principles at the Fremont, Irvington, and Warm Springs/South Fremont BART Stations, the Centerville train station, and the City Center, and consider other opportunities, particularly the Fremont Boulevard corridor.
- L-A2 Continue implementation of the City's Pedestrian Master Plan to improve pedestrian infrastructure (such as sidewalks and conveniently located crosswalks) for walking throughout the community, in order to support increased pedestrian trips.
- L-A3 Continue implementation of the City's Bicycle Master Plan to improve bicycle infrastructure, in order to support increased bicycle trips.
- L-A4 Encourage the reduction of single-occupancy vehicle use by establishing a commuter shuttle service program, to connect local business districts to Amtrak, Bus Rapid Transit, and BART stations.

### Collaborate/Participate

- L-C1 Cooperate with regional agencies seeking to develop a network of fuel stations for vehicles using electricity, biofuels, and other non-fossil fuel energy sources, using the publication *Ready, Set, Charge, California! A Guide to EV Ready Communities* as a primary resource.
- L-C2 Collaborate with other agencies and the State of California to disseminate information about the "Just Check It" program, which addresses the importance and benefits of proper tire inflation.

### Promote/Encourage

- L-P1 In newly constructed and remodeled non-residential buildings, encourage the provision of amenities, such as showering and changing facilities, to enable walking and bicycle use by employees.

### Regulate

- L-R1 Require employers to provide preferential parking for carpools.
- L-R2 Require Transportation Demand Management strategies be implemented when developments outside transit-oriented development areas request increased development capacity (e.g. increases in floor area ratios).
- L-R3 Require new sidewalk construction to meet the five-foot width minimum requirement, to enhance usability by pedestrians and those using mobility devices.
- L-R4 Require applicants for private schools to submit plans for managing vehicular movement and parking which serves the school, and include, as a condition of approval, measures to address vehicle idling.
- L-R5 Prohibit redesignation and rezoning of land for lower intensity land uses in transit-oriented development areas, areas within walking distance of basic services, and other areas served by transit systems.

- L-R6 Consider requirements to provide pre-wiring for electric vehicle charging in new home construction as part of a Green Building program.
- L-R7 Require new developments, particularly those within transit-oriented areas and along transit corridors, to provide pedestrian, bicycle and transit amenities as a condition of approval.

## **Medium-Term Actions: 3-5 Years from Plan Adoption**

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### **Collaborate/Participate**

- L-C3 Collaborate with regional transportation agencies and the Chamber of Commerce to provide information about, and access to, incentives and services to increase the use of alternatives to single-occupant auto commuting, for employers of all sizes throughout the community. Examples include the Commuter Check and Bicycle Commuter Check Programs.
- L-C4 Partner with regional transportation agencies to encourage and facilitate the development of car-sharing, carpooling and other services that reduce the need to own a personal motor vehicle.

### **Promote/Encourage**

- L-P2 Encourage employers to provide transit subsidies, bicycle facilities, alternative work schedules, flextime, telecommuting and work-at-home programs, and other measures to reduce peak hour travel demand.

### **Regulate**

- L-R8 Adopt regulations restricting locations of drive-through businesses to reduce the impacts of vehicle idling on adjacent uses, such as housing, schools, and health care facilities.

## **Long-Term Actions: 5-10 Years from Plan Adoption**

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### **Collaborate/Participate**

- L-C5 Partner with both public and private educational and childcare institutions to address vehicle idling at drop-off/pick-up locations serving the institutions.
- L-C6 Partner with BART, Washington Hospital, Kaiser Permanente and other large institutions to address vehicle idling at their facilities, through a public education campaign, signage, and enforcement program.



**Table 2-2: Greenhouse Gas Reductions, Relative Cost Range, and Community Co-Benefits—Land Use and Mobility**

<i>Opportunity Area</i>		<i>Actions</i>	<i>GHG Reductions in 2020 (MTCO<sub>2e</sub>)</i>	<i>Community Co-benefits</i>	<i>Relative Cost to City</i>	<i>Relative Private Cost</i>
<b>Chapter Two: Land Use and Mobility</b>						
<b>Transit-Oriented Development</b>	L-A1	Apply transit-oriented development principles at the Fremont, Irvington, and Warm Springs BART Stations, the Centerville train station, and the City Center, and consider other opportunities, particularly the Fremont Boulevard corridor.	Quantified in State Reduction: SB 375— <i>Sustainable Communities and Climate Protection Act*</i>	<ul style="list-style-type: none"> <li>- Promotes smart growth</li> <li>- Strengthens local economy</li> <li>- Improves air quality</li> <li>- Improves public health</li> <li>- Improves neighbourhood experience</li> </ul>	Medium	NA
	L-R5	Prohibit redesignation and rezoning of land for lower intensity land uses in transit-oriented development areas, areas within walking distance of basic services, and other areas served by transit systems.			Medium	NA
<b>Pedestrian Improvements</b>	L-A2	Continue implementation of the City’s Pedestrian Master Plan to improve pedestrian infrastructure (such as sidewalks and conveniently located crosswalks) for walking throughout the community, in order to support increased pedestrian trips.	Quantified in State Reduction: SB 375— <i>Sustainable Communities and Climate Protection Act*</i>	<ul style="list-style-type: none"> <li>- Promotes smart growth</li> <li>- Improves air quality</li> <li>- Improves public health</li> <li>- Improves neighbourhood experience</li> </ul>	High	NA
	L-R3	Require new sidewalk construction to meet the five-foot width minimum requirement, to enhance usability by pedestrians and those using mobility devices.			Medium	NA
	L-R7	Require new developments, particularly those within transit-oriented areas and along transit corridors, to provide pedestrian, bicycle and transit amenities as a condition of approval.			Low	High
<b>Bicycle Improvements</b>	L-A3	Continue implementation of the City’s Bicycle Master Plan to improve bicycle infrastructure, in order to support increased bicycle trips.	Quantified in State Reduction: SB 375— <i>Sustainable Communities and Climate Protection Act*</i>	<ul style="list-style-type: none"> <li>- Promotes smart growth</li> <li>- Improves air quality</li> <li>- Improves public health</li> <li>- Improves neighbourhood experience</li> </ul>	High	NA
	L-P1	In newly constructed and remodeled non-residential buildings, encourage the provision of amenities, such as showering and changing facilities, to enable walking and bicycle use by employees.			Medium	High
	L-R7	Require new developments, particularly those within transit-oriented areas and along transit corridors, to provide pedestrian, bicycle and transit amenities as a condition of approval.			Low	High

*Relative Cost to City Range: Very Low: < \$10,000 ; Low: \$10,000 - \$20,000 ; Medium: \$20,001 - \$100,000 ; High: > \$100,000*

*Relative Private Cost Range: Very Low: < \$100 ; Low: \$100 - \$200 ; Medium: \$201 - \$1,000 ; High: > \$1,000*

\* See page 1-9.

**Table 2-2: Greenhouse Gas Reductions, Relative Cost Range, and Community Co-Benefits—Land Use and Mobility**

<i>Opportunity Area</i>		<i>Actions</i>	<i>GHG Reductions in 2020 (MTCO<sub>2</sub>e)</i>	<i>Community Co-Benefits</i>	<i>Relative Cost to City</i>	<i>Relative Private Cost</i>
<b>Chapter Two: Land Use and Mobility</b>						
<b>Transportation Demand Management</b>	L-A4	Encourage the reduction of single-occupancy vehicle use by establishing a commuter shuttle service program, to connect local business districts to Amtrak, Bus Rapid Transit, and BART stations.	Quantified in State Reduction: SB 375— <i>Sustainable Communities and Climate Protection Act*</i>	<ul style="list-style-type: none"> <li>- Improves air quality</li> <li>- Improves public health</li> </ul>	Medium	High
	L-R1	Require employers to provide preferential parking for carpools.			Medium	High
	L-R2	Require Transportation Demand Management strategies be implemented when developments outside transit-oriented development areas request increased development capacity (e.g. increases in floor area ratios).			Medium	High
	L-C3	Collaborate with regional transportation agencies and the Chamber of Commerce to provide information about, and access to, incentives and services to increase the use of alternatives to single-occupant auto commuting, for employers of all sizes throughout the community. Examples include the Commuter Check and Bicycle Commuter Check Programs.			Medium	Varies
	L-C4	Partner with regional transportation agencies to encourage and facilitate the development of car-sharing, carpooling and other services that reduce the need to own a personal motor vehicle.			Medium	Varies
	L-P2	Encourage employers to provide transit subsidies, bicycle facilities, alternative work schedules, flextime, telecommuting and work-at-home programs, and other measures to reduce peak hour travel demand.			Medium	High
<b>Alternative Fuel Infrastructure</b>	L-C1	Cooperate with regional agencies seeking to develop a network of fuel stations for vehicles using electricity, biofuels, and other non-fossil fuel energy sources, using the publication “ <i>Ready, Set, Charge, California! A Guide to EV Ready Communities</i> ” as a primary resource.	Quantified in State Reduction: SB 375— <i>Sustainable Communities and Climate Protection Act*</i>	<ul style="list-style-type: none"> <li>- Improves air quality</li> <li>- Improves public health</li> </ul>	Cost Neutral	NA
	L-R6	Consider requirements to provide pre-wiring for electric vehicle charging in new home construction as part of a Green Building program.			Low	High

\* See page 1-9.

**Table 2-2: Greenhouse Gas Reductions, Relative Cost Range, and Community Co-Benefits—Land Use and Mobility**

<i>Opportunity Area</i>		<i>Actions</i>	<i>GHG Reductions in 2020 (MTCO<sub>2</sub>e)</i>	<i>Community Co-Benefits</i>	<i>Relative Cost to City</i>	<i>Relative Private Cost</i>
<b>Chapter Two: Land Use and Mobility</b>						
<b>Vehicle Efficiency</b>	L-C2	Collaborate with other agencies and the State of California to disseminate information about the “Just Check It” program, which addresses the importance and benefits of proper tire inflation.	Quantified in State Reduction: SB 375— <i>Sustainable Communities and Climate Protection Act*</i>	- Improves air quality - Improves public health	Medium	NA
<b>Vehicle Idling</b>	L-R4	Require applicants for private schools to submit plans for managing vehicular movement and parking which serves the school, and include, as a condition of approval, measures to address vehicle idling.	Not Quantified	- Reduces fuel costs - Improves air quality - Improves public health	Medium	High
	L-R8	Adopt regulations restricting locations of drive-through businesses to reduce the impacts of vehicle idling on adjacent uses, such as housing, schools, and health care facilities.			Medium	NA
	L-C5	Partner with both public and private educational and childcare institutions to address vehicle idling at drop-off/ pick-up locations serving the institutions.			Low	High
	L-C6	Partner with BART, Washington Hospital, Kaiser Permanente and other large institutions to address vehicle idling at their facilities, through a public education campaign, signage, and enforcement program.			Medium	High

\* See page 1-9.



# Chapter Three: Energy

## Maximizing Energy Efficiency and Reducing Energy Use



### Key Learning Points

- Saving energy is easier than making more of it. *Reduce* the need for energy, then *produce* what you need.
- Efficiency—squeezing more work out of less energy—is the foundation of any effort to reduce reliance on fossil fuels.
- Energy *efficiency* is an energy *resource*.

### How does energy consumption translate into greenhouse gas emissions?

**Generating 1 kWh of electricity = approximately one-half (0.5) pound CO<sub>2</sub>e**

**Burning 1 therm of natural gas = approximately 12 pounds CO<sub>2</sub>e**

*You can use this information, along with your PG&E bill, to calculate your household's or business's monthly greenhouse gas emissions from using electricity and natural gas.*

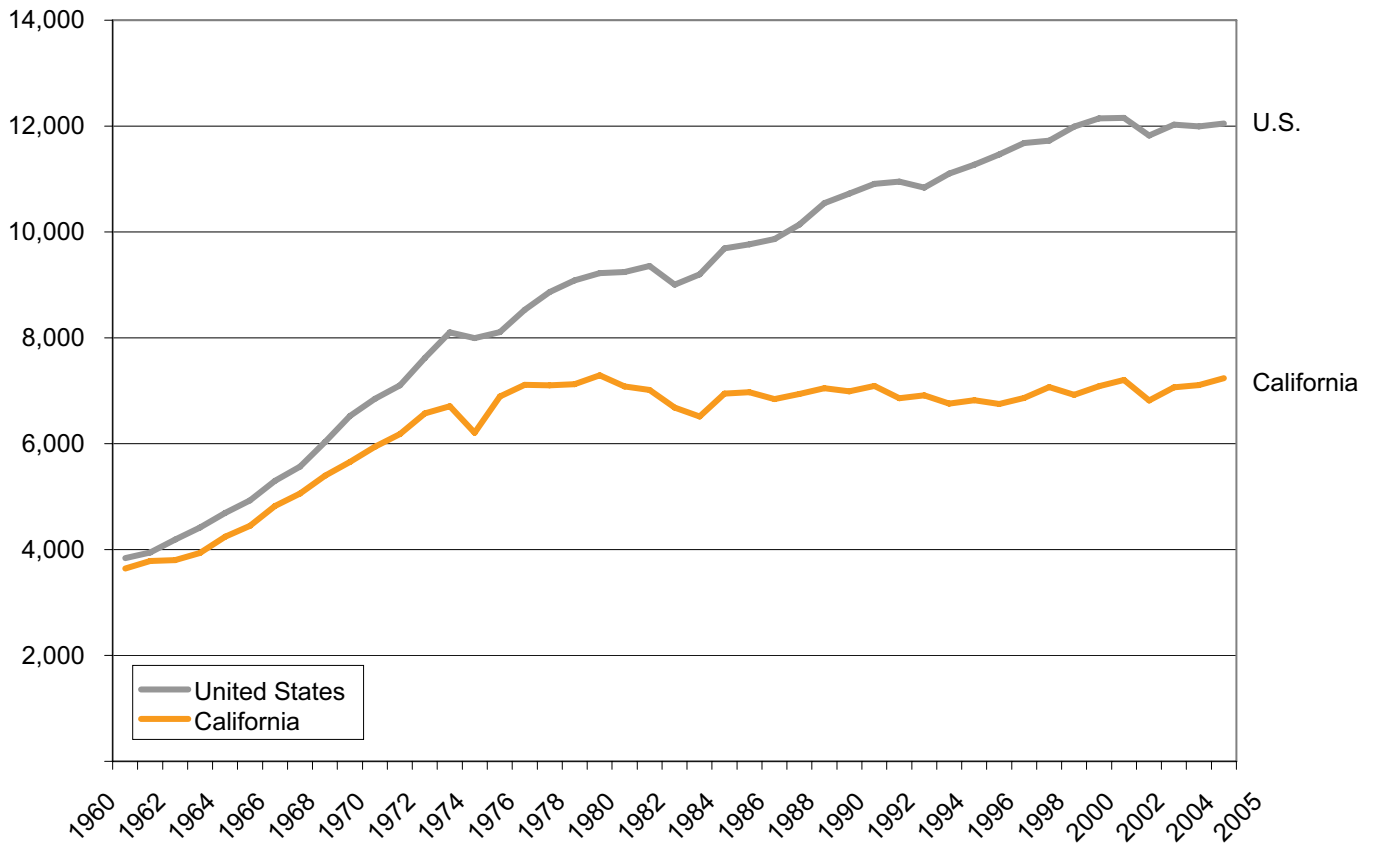
### Introduction

For decades, the State of California has been a leader in energy efficiency policies, programs, legislation and technological innovations. The impact and benefits of California's leadership in energy efficiency, which has focused on the 'three-legged stool' of *utility-scale energy efficiency programs, building standards, and appliance standards*, are noted by the State Office of the Attorney General:

*California is an excellent illustration of the environmental and economic gains from strong efficiency measures. As a result of California's policies, over the last 35 years, while the rest of the country increased its per capita electricity use by 50%, California's per capita use has remained virtually flat, while the state's economy has grown by 80%. These efficiency standards have saved California more than \$56 billion in electricity and natural gas costs since 1978, equivalent to more than \$1,000 per household and increased Gross State Product by 3%, or \$31 billion. Moreover, the state has avoided the construction of 24 additional power plants.<sup>1</sup>*

<sup>1</sup> State Office of the Attorney General, <http://ag.ca.gov/globalwarming/economics.php>

**Figure 3-1: Per Capita Electricity Sales, California vs. U.S.**



Source: California Energy Commission, 2008 Energy Action Plan Update, p. 6.



In spite of these laudable achievements, overall electricity use is expected to rise between one and two percent annually as California continues to experience rapid population growth. Therefore, California must intensify its

efforts to achieve AB 32’s goals of reductions in greenhouse gas emissions by ‘bending the curve’ of electricity use, as shown in Figure 3-1, downward. Energy efficiency is the most powerful strategy for reducing greenhouse gas emissions from the production, transmission and combustion of both electricity and natural gas. Natural gas is used to produce electricity, and as a direct energy source for the residential, commercial and industrial sectors.

## Meeting California’s Electricity Needs: The State’s Loading Order

California’s priority-ranked policy of programs and new facilities to meet California’s power needs is called the *loading order*. Developed in 2003, the loading order policy is meant to ensure that adequate, reliable, and reasonably-priced electrical power and natural gas supplies are provided throughout the state through cost-effective and environmentally-sound policies, strategies, and actions.

The loading order, which could be called a program of *Reduce, then Produce*, sets California’s priorities as follows:

**Priority #1:** Increasing **energy efficiency** and **conservation** in order to reduce electricity use.

**Priority #2:** Using **demand response** strategies to reduce peak period demand for energy.

**Priority #3:** Using **renewable** and **distributed generation resources** first, and then **clean fossil-fueled generation** next, to meet power generation needs.

In addition to achieving reductions in greenhouse gas emissions, the loading order's approach of *reduce, then produce* will also improve energy reliability, reduce air pollution, and contribute to energy price stability. Fremont's Climate Action Plan emphasizes energy conservation and energy efficiency strategies, while also supporting renewable energy sources and distributed energy systems. The City will continue to build on past successes in achieving greenhouse gas emission reductions in its own operations through strategies such as energy-efficient lighting retrofits and use of energy-efficient heating, venting and air conditioning (HVAC) systems, while exploring new opportunities in areas such as distributed, renewable energy systems. Pursuing these opportunities will help develop organizational capacity in building, operating and maintaining these systems, while demonstrating leadership and commitment to the community at large.

The philosophy underlying the State's loading order is reflected in the Climate Action Plan's actions for reducing greenhouse gas emissions in the building energy sector, and is discussed in further detail in this chapter.

## What is the difference between energy conservation and energy efficiency? How do they relate to one another?

**Energy conservation** refers to actions that reduce or eliminate unnecessary energy use. **Energy efficiency** can be defined as methods, tools and technologies that use less energy to provide the same level of energy service. In other words, energy efficiency addresses how *effectively* energy is being used for a given purpose. Increased efficiency achieves decreased production demand. Researchers coined the term "nega-watt" to emphasize that a kilowatt-hour saved through efficiency was a kilowatt-hour that would not have to be produced and delivered by an existing or new power plant.

By reducing overall energy demand, the system becomes more stable and reliable and less vulnerable to supply shortages, especially at times of peak demand. Strategies for energy efficiency include utility-scale energy efficiency programs and stringent performance standards for appliances and in building codes.

Energy conservation behavior and energy efficiency are synergistically linked. For example, replacing incandescent light bulbs with more efficient bulbs, such as compact fluorescents (which use approximately 66% less energy for the same lighting level), is an energy conservation *action* which utilizes an energy efficient *technology* to provide the desired lighting. Another example is insulating a home so that it requires less energy for heating and cooling (an energy conservation action), and then replacing the home's old furnace with a modern heating system (an energy efficiency technology which uses energy more efficiently than the furnace). This is an example of *reduce, then produce*. Both strategies reduce greenhouse gas emissions. Energy conservation and energy efficiency strategies provide financial benefits through lower energy bills.

In addition, utility companies, water agencies, and government agencies sometimes offer rebates and incentives for building retrofits and energy efficient appliances, resulting in additional money savings and greenhouse gas emission reductions.

## Pacific Gas and Electric Company, Fremont's Power Provider

Pacific Gas and Electric Company (PG&E) is an investor-owned utility (IOU) providing electricity and natural gas to northern and central California, including the City of Fremont. Serving over 15 million customers, PG&E derives its electric power from both non-renewable (nuclear, natural gas, coal, fossil fuels) and renewable (geothermal, wind, solar, hydroelectric, and biomass/biofuel) sources. The utility also purchases electricity from independent producers and out of state suppliers; natural gas is purchased from a variety of sources across the country.

The sources of power that make up PG&E's electricity mix at any given time will have a significant impact on Fremont's greenhouse gas emissions. This is due to the fact that the use of carbon-rich fossil fuels creates greenhouse gas emissions, while renewable energy



## 2005 Baseline Inventory of Greenhouse Gas Emissions: Stationary Energy Sources

Fremont's 2005 baseline inventory found that approximately 37% of total greenhouse gas emissions in Fremont resulted from energy consumption by stationary (non-mobile) sources in the residential sector (15% of total) and commercial and industrial sectors (22% of total).

Fremont's total stationary energy consumption in 2005 was about 1.3 billion kWh of electricity and 58.7 million therms of natural gas. This energy consumption accounted for approximately 600,000 metric tons of CO<sub>2</sub>e (MTCO<sub>2</sub>e). Of the 600,000 MTCO<sub>2</sub>e emitted due to stationary energy use, 40% (240,000 metric tons) was from residential buildings and 60% (360,000 metric tons) was from commercial and industrial buildings.

The methodology for preparing Fremont's emission inventory quantifies the emissions resulting from the production, transmission and consumption of electricity and natural gas. This methodological approach reflects the general philosophy that a community should take responsibility for the impacts associated with its energy consumption, regardless of whether the energy generation occurs within the geographical limits of the city (as is the case for those jurisdictions with their own municipal power supply). Of these three stages—production, transmission, and consumption—Fremont's residents and businesses have the most direct control over consumption, with the potential to influence production and transmission by moving from utility-supplied energy to distributed energy sources. This highlights the importance of state-level actions, such as the Renewables Portfolio Standard (discussed later in this chapter), in helping the city make progress towards its reduction goal for greenhouse gas emissions.

sources are emission-neutral. For example, in 2005 every kilowatt-hour (kWh) of energy provided by PG&E generated about 0.49 pounds of CO<sub>2</sub>, while in 2009, each kilowatt-hour generated about 0.57 pounds.<sup>2</sup> This means that a kWh used in 2009 generated about 16% more greenhouse gas emissions than for a kWh used in 2005. Since Fremont cannot influence PG&E's decisions about the utility's power mix, the community's efforts to reduce greenhouse gas emissions related to building energy usage will need to focus on energy conservation and energy efficiency.

California's policy of decoupling utility sales and revenues has played a key role in making it the nation's most energy efficient state. Initiated in 1978 for natural gas and 1982 for electricity, this policy removed utility disincentives for energy efficiency and energy conservation. Stated another way, with decoupling, utilities became indifferent to, rather than financially harmed by, efficiency improvements.

This long-standing regulatory framework was expanded by the California Public Utilities Commission's adoption, on September 20, 2007, of a system known as *decoupling plus*. This system uses incentives, penalties and rewards to drive IOUs to help customers become more energy efficient, and to generate shareholder earnings when the utilities invest in energy efficiency strategies.

<sup>2</sup> These figures are called the "emissions factors" for the energy produced by PG&E at different times.



## Regulatory and Policy Context

Both the federal and state governments, as well as regional agencies, are involved in regulatory and policy-making activities concerning greenhouse gas emissions in the building energy sector. This section provides a brief discussion of some relevant initiatives addressing energy and greenhouse gas emissions.

**Federal government:** The federal government promotes and advances energy efficiency through a variety of mechanisms: providing funding for research, development, and program implementation; establishing energy efficiency standards for buildings, equipment, and appliances; providing loans, tax credits and incentives; and removing market barriers through rule-making, programs and policies. Within the U.S. Department of Energy (DOE), a Cabinet-level department formed in 1977 in response to the oil crisis, the Office of Energy Efficiency and Renewable Energy (EERE) leads the federal government's work in these areas, which is often conducted in partnership with the private sector, state and local government, DOE national laboratories (such as Lawrence Berkeley National Laboratory), and universities.

Some examples of federal initiatives include:

### Energy Star



Launched in 1992 by the U.S. Environmental Protection Agency (EPA), this program advances energy efficiency in the residential, commercial and industrial sectors by providing information on products, services and practices that reduce

greenhouse gas emissions through efficient use of energy. Consumer products which meet the energy efficiency requirements in the Energy Star specifications earn the right to display the Energy Star logo on the product.

### Energy Policy Act of 2005

Passed by Congress and signed into law by President George W. Bush, the Act addresses a wide range of energy-related issues, including appliance standards, energy use in federal buildings and fleets, and the provision of tax incentives and loan guarantees for various types of energy production.



### Energy Independence and Security Act of 2007

This bill, along with Executive Order 13423, updated many of the energy management requirements in the Energy Policy Act of 2005, in some cases setting more challenging goals. Among the provisions in the bill are revised standards for appliances such as dishwashers and freezers, new initiatives for promoting energy conservation in buildings and industry, and a program to be phased in between 2012 and 2014 which requires approximately 25 percent greater efficiency from light bulbs.

In another demonstration of its national leadership in energy efficiency and reducing greenhouse gas emissions, California requested and received permission from Congress to become the first state in the nation to begin implementation of the light bulb requirements ahead of the federal mandate. As a result, beginning on January 1, 2011, bulbs previously designed as 100-watt light bulbs will have to use 72 watts or less. By 2013, similar standards for traditional incandescent 75-watt, 60-watt and 40-watt bulbs are scheduled to go into effect. The new bulbs will use less energy to deliver the same lighting level as the older design, and will not create heat as a wasted byproduct.

## **Energy Efficiency and Conservation Block Grant (EECBG) Program**

Funded by the 2009 American Recovery and Reinvestment Act (ARRA) and authorized by the Energy Independence and Security Act of 2007, the EECBG Program provided funding to state and local governments for developing, promoting, implementing, and managing energy efficiency and conservation projects and programs designed to reduce greenhouse gas emissions and improve energy efficiency. The City of Fremont received a \$1,891,200 grant from the program and strategically deployed the funds into a number of projects, including retrofits of lighting and HVAC systems in city buildings, community grants for energy efficiency projects implemented by non-profit and other government agencies, and a new ‘cool roof’ at the Fremont Main Library building.

**State of California:** In 1974, the California Energy Commission (CEC) was formed to develop and implement what were, at the time, the nation’s first energy efficiency standards for buildings and appliances. The following summary of key legislation and policy documents pertaining to energy in the building sector reflects, in part, the important role which the CEC has played in the intervening decades. The laws and policies address both the *sources* of power (the power input) and the *consumption* of power (by buildings, equipment, and appliances, and the people who use them).

## **Title 24, Part 6, of the California Code of Regulations**

Enacted in 1978 and alternately referred to as Title 24 or the California Building Standards Code, these regulations govern the design and construction of all types of buildings. Title 24 contains requirements pertaining to mechanical, electrical, structural and plumbing systems, and requires measures for energy conservation, ‘green’ design, construction and maintenance, fire and life safety, and accessibility. Title 24 is enforced by cities and counties, as required by state law. Title 24’s minimum building energy efficiency standards, which apply to all new homes, additions and alterations to existing homes, and to most commercial buildings, are updated periodically as new energy efficiency technologies and methods achieve enhanced energy savings and reduced greenhouse gas emissions.

## **Self-Generation Incentive Program (SGIP)**

Originally conceived as a peak-load reduction program, the SGIP, which began in 2001, provides incentives to support existing, new, and emerging distributed energy systems which are installed on the customer’s side of the utility meter. Currently, wind turbines, fuel cells, and their corresponding energy storage systems qualify for the program; solar installations are not included. PG&E administers this program for its service area, including the City of Fremont.

## **Integrated Energy Policy Report (IEPR)**

The IEPR was first adopted in 2003 by the California Energy Commission. The CEC adopts a new report every two years, and an update every other year. The IEPR is the overall guiding document on California’s energy policy and meets the requirement established in Senate Bill 1389 (Bowen and Sher, Chapter 568, Statutes of 2002) that the Commission “[C]onduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices. The Energy Commission shall use these assessments and forecasts to develop energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the state’s economy, and protect public health and safety.”<sup>3</sup>

## **Senate Bill 1368 (2006)**

This law limits long-term investments in baseload generation by the state’s utilities to power plants that meet the emissions limit of 1,100 pounds of CO<sub>2</sub> per megawatt-hour of electricity delivered. The emissions limit provides an energy efficiency metric for utility-scale energy production, reflecting the policy direction that “We are increasingly moving to an industry in which environmental responsibility will be a condition of delivering energy services to consumers, regardless of regulatory structure.”<sup>4</sup>

## **Renewables Portfolio Standard (2002), Executive Order S-14-08 (2008) and SB 2X (2011)**

California’s Renewables Portfolio Standard was first established in 2002 under Senate Bill 1078, and then

<sup>3</sup> California Public Resources Code § 25301(a).

<sup>4</sup> State of California, *Energy Action Plan 2008 Status Update*, p. 4.

accelerated in 2006 under Senate Bill 107. This program originally required the State's seven investor-owned utilities (including PG&E), electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources by at least 1% of their retail sales annually, until they reached 20% by 2010. However, under Executive Order S-14-08, signed by Governor Schwarzenegger in November 2008, the standard was raised to 33% by 2020. The standard was codified as SB 2X (originally known as SBX 1-2), approved by the Legislature on March 29, 2011 and signed into law on April 12, 2011 by Governor Jerry Brown.

Renewable energy sources eligible under the standard include, among others, solar, geothermal, wind, biomass and small-scale hydroelectric. Currently, approximately one-third of PG&E's total electric portfolio is provided by renewable energy resources, including over 14% from resources eligible under the RPS program (large-scale hydroelectric is a renewable energy source but is not considered eligible under the RPS). PG&E is seeking new contracts that would increase the level of RPS-eligible renewable sources to 20% by 2013.

### **Global Warming Solutions Act of 2006 (AB 32) and Climate Change Scoping Plan (2008)**

The Climate Change Scoping Plan, developed by the California Air Resources Board as directed by AB 32, anticipates that the largest reductions in greenhouse gas emissions across the state will come from major reforms, including those in the energy sector. The Scoping Plan contains measures addressing energy resources, energy generation and energy efficiency. Examples include the Renewables Portfolio Standard, the Million Solar Roofs Program (discussed below), and a menu of energy efficiency strategies targeting the industrial, agricultural, commercial, and residential sectors. The Scoping Plan emphasizes that, if California is to achieve its aggressive goals for reducing greenhouse gas emissions, it will need to pursue new strategies, such as 'zero net energy' buildings (see the discussion below of California's *Long Term Energy Efficiency Strategic Plan*), while strengthening the traditional strategies of utility-level programs and efficiency performance standards for buildings and appliances.

### **Million Solar Roofs Program (SB 1, Murray, Chapter 132, Statutes of 2006)**

The Million Solar Roofs Program is a ratepayer-financed incentive program aimed at transforming the market for rooftop solar systems by driving down costs over time. Million Solar Roofs builds on previous ratepayer-funded programs, providing up to \$3.3 billion in financial incentives that decline over time. The program includes several sub-programs which address incentives for both new and existing residential and non-residential buildings. The Million Solar Roofs program also includes eligibility criteria, conditions for incentives, and rating standards for solar energy system incentive programs. For example, in order to qualify for the program, new construction projects must meet energy efficiency levels that exceed the state's Title 24 Building Energy Efficiency Standards, and existing building owners must conduct an energy audit. These requirements help achieve even greater energy efficiency outcomes and increased reductions in greenhouse gas emissions than would result from use of the renewable solar energy resource alone.

### **Assembly Bill 1103 (2007)**

This law contains two key provisions pertinent to the energy consumed by nonresidential buildings:

- 1) Effective January 1, 2009, the law requires electric and gas utilities to maintain records of the energy consumption data of all nonresidential buildings to which they provide services, in a format compatible for uploading to the EPA's *Energy Star Portfolio Manager* program, for at least the most recent 12 months, and to upload that data (in a manner which preserves confidentiality) to the EPA's program website.
- 2) Effective January 1, 2010, the law requires the owner or operator of a nonresidential building to disclose the *Energy Star Portfolio Manager* benchmarking data and ratings for the most recent 12-month period, to a prospective buyer, lessee or lender.

This law helps address the *split incentive* barrier to achieving energy efficient improvements in existing buildings, where one party pays for the improvements (the building owner or manager) and another party receives the financial benefit from the lower energy costs (the tenant or lessee). Since the energy use data can be useful in the evaluation and comparison of options for the purchase, lease or financing of non-residential buildings, owners will be incentivized to make the improvements in order to maintain competitiveness in the marketplace.

## California Long Term Energy Efficiency Strategic Plan (2008)

The California Public Utilities Commission adopted the state's first *Long Term Energy Efficiency Strategic Plan* in September 2008. The Plan sets forth a statewide roadmap to maximize achievement of cost-effective energy efficiency in California's electricity and natural gas sectors between 2009 and 2020, and beyond. The Strategic Plan aims for a dramatic scaling-up of energy efficiency efforts through the following four "Big Bold Strategies":

- All new residential construction in California will be zero net energy by 2020.
- All new commercial construction in California will be zero net energy by 2030.
- The heating, ventilation, and air conditioning (HVAC) industry will be reshaped to ensure optimal equipment performance.
- All eligible low-income homes will be energy efficient by 2020.

## Comprehensive Energy Efficiency Program for Existing Residential and Nonresidential Buildings (AB 758, 2009)

This law requires the California Energy Commission to develop and implement a comprehensive program to achieve greater energy savings in the state's existing residential and nonresidential building supply. The Commission's work on the program is expected to take several years, beginning in 2011 and scheduled for completion in 2014.

## California Green Building Standards Code (CALGreen Code: Part 11, Title 24)

California's first-in-the-nation CALGreen Code is contained within Title 24, and became effective January 1, 2011. CALGreen requires most new buildings to be more energy efficient through the application of both mandatory requirements and voluntary standards.

The Fremont City Council adopted an ordinance, effective January 1, 2011, which mandates that new residential buildings comply with the Green Building Code and with Tier 1 requirements, or, alternately, achievement of at least fifty points from the GreenPoint Checklist, a tool which assesses the 'green' qualities of a home. Mandatory Tier I compliance includes 15% reduction in overall energy use and 20% reduction in

water consumption beyond the CALGreen baseline; other performance measures, such as diversion of construction waste from landfill, are discussed in the relevant chapters of the Climate Action Plan.

**Regional agencies:** At a September 15, 2010 public hearing, the Board of Directors of the Bay Area Air Quality Management District adopted the final *Bay Area 2010 Clean Air Plan*. This regional plan reflects BAAQMD's first efforts at providing an integrated, multi-pollutant strategy to protect both public health and the climate and to improve air quality. The Clean Air Plan promotes four Energy and Climate Measures—energy efficiency, renewable energy, urban heat island mitigation, and tree planting—and notes that, '... to the extent that these measures are successful in reducing energy use, they will also contribute to reducing emissions of pollutants such as NO<sub>x</sub>, PM, and air toxics.'<sup>5</sup> Each of these four Energy and Climate measures is addressed in Fremont's Climate Action Plan.

## Loading Order Priority #1: Energy Efficiency and Energy Conservation

### Part One— Residential Buildings: Existing Housing

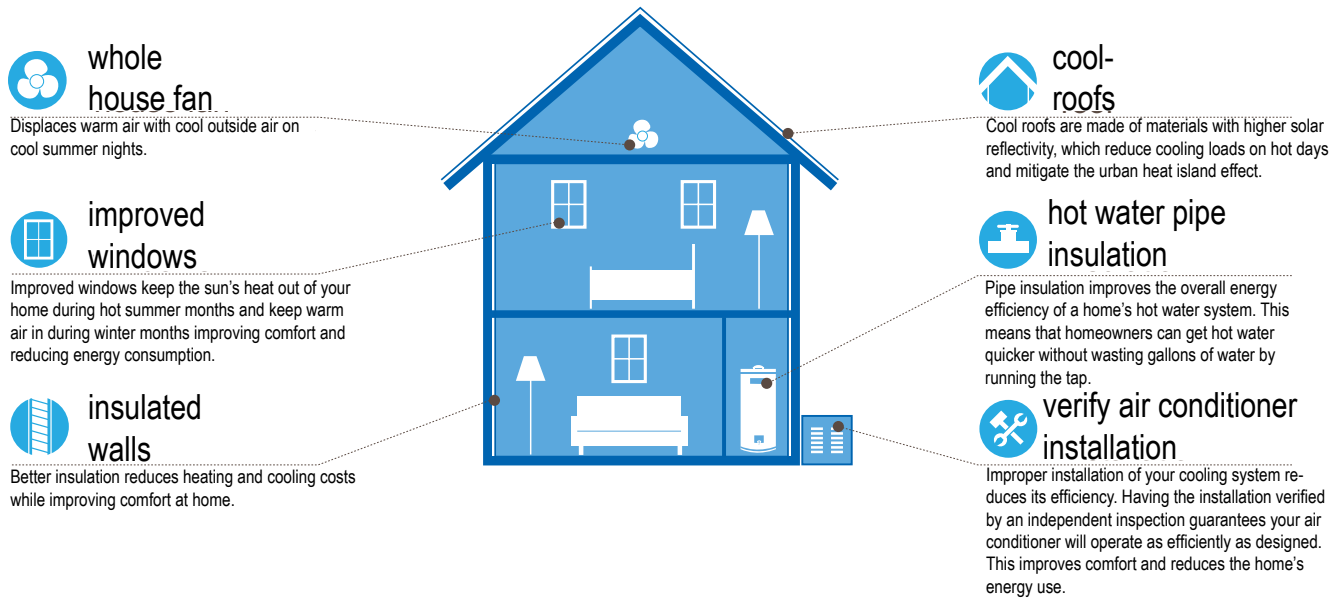
Programs and methods for energy efficient retrofits of existing residential buildings are often targeted to specific types of buildings (such as single-family homes and multi-family buildings). This section provides an overview of the characteristics of Fremont's existing residential building stock, in order to better understand the opportunities and potential barriers to reducing greenhouse gas emissions in the residential sector.

In 2005 (the year of Fremont's baseline emissions inventory), there were approximately 70,000 housing units in the city; by 2010, this number had increased to approximately 71,000 units. Of these, around 70% are single-family units (detached and attached); 4% are buildings with two to four units; 27% are buildings with five or more units; and less than 1% are mobile homes.<sup>6</sup> Approximately two-thirds of Fremont's housing is owner-occupied and one-third is renter-occupied. The large number of renter-occupied housing units suggests that the split-incentive barrier may be significant for Fremont.

<sup>5</sup> Bay Area Air Quality Management District, *Bay Area 2010 Clean Air Plan*, September 15, 2010, pp. 4-11. 'NO<sub>x</sub>' refers to 'nitrogen oxides' and 'PM' refers to 'particulate matter'.

<sup>6</sup> Numbers total more than 100% due to rounding.

**Figure 3-2: Examples of Energy Efficient Building Retrofits**

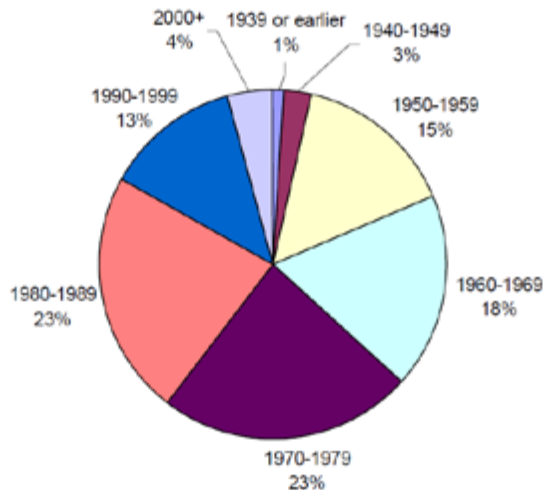


Source: California Energy Commission, California 2012

As shown in Figure 3-3, a substantial portion of Fremont's housing stock was built before the advent of California's energy efficiency codes, beginning in the 1970s.

Over the past three decades, the State of California has pursued energy savings and efficiencies through regular adoption of increasingly stringent building standards. As a result, newer buildings are more energy efficient than older buildings of comparable type and size which have not undergone energy efficiency upgrades. Therefore,

**Figure 3-3: Fremont Housing Stock by Year Built**



Source: California Department of Finance 1990–2007, U.S. Census 2000

retrofitting older buildings with improvements such as insulation, double-paned windows, water-efficient plumbing fixtures, and modern HVAC systems and appliances, presents considerable opportunities for achieving both cost and energy savings and reductions in greenhouse emissions.

Given the distribution, by age, of Fremont's housing stock, **energy-efficient building retrofits**, examples of which are shown in Figure 3-2, will be a key strategy to making meaningful progress towards the City's emission reduction goal.

However, potential barriers to completing energy efficient retrofits can prove difficult, if not insurmountable, to some building owners. Examples of barriers include:

- Lack of awareness about the retrofit benefits and opportunities
- Difficulty securing financing to pay for the improvements
- Lack of incentives for landlords to upgrade a rental unit when the energy savings will go to the tenant (the split incentive)
- Limited availability of licensed, qualified retrofit contractors
- Reluctance to undertake a construction project potentially disruptive to everyday life.

Fortunately, in California, various programs minimize, or remove entirely, the barriers described above. The examples below reflect the range of programs aimed at achieving energy efficiency in the residential building sector, and, wherever possible, removing barriers to successful implementation.

### Energy Upgrade California



*Energy Upgrade California* is a state-wide program intended to help property owners of existing single-family, multi-family and small commercial buildings improve the energy efficiency of their buildings. The program advocates a “whole house” approach, which views the home as a complete system. From the whole house perspective, heating, air conditioning, water, and other systems can work together to make the home more comfortable and more effectively achieve energy efficiencies and cost savings. The program’s website (<http://energyupgradecalifornia.org>) provides information about planning the project, locating qualified licensed contractors to perform the work, and securing rebates and other incentives to help with project costs.

In January 2012 the City, along with the Energy Upgrade California team, hosted a well-attended workshop which provided information and responded to questions from homeowners from Fremont, Newark and Union City interested in participating in the Energy Upgrade California Program.

#### **Home Energy Rating System (HERS)**

The *Home Energy Rating System* is a program from the California Energy Commission which establishes protocols and procedures for conducting a home energy audit. Armed with the audit’s data, which includes an evaluation of the cost-effectiveness of options, a homeowner can better make informed decisions about which energy efficiency strategies to pursue.

#### **Low Income Home Energy Assistance Program**

California’s Department of Health and Human Services administers this program, which assists low income homeowners with home retrofits, such as attic insulation and weather-stripping, as well as payment of energy bills.

#### **Engage 360**

On October 14, 2010, the CPUC introduced *Engage 360*, a brand name and web portal for statewide use to

increase consumer awareness and participation in demand-side management activities and to encourage behavior changes that save energy, reduce greenhouse gas emissions, and support clean energy solutions. This program is an outgrowth of the Marketing, Education and Outreach effort identified in the State’s *Long Term Energy Efficiency Strategic Plan*.

### Part One—Residential Buildings: Future Housing

The General Plan Update Environmental Impact Report indicates that Fremont is expected to add approximately 45,000 people and 17,000 new housing units by the year 2035. These housing units will be required to meet current building codes, and appliances which are either installed by the builder or purchased by the homeowner will reflect energy efficiency standards in place at the time of construction or purchase. While new technologies and highly energy-efficient buildings will improve performance, occupant behavior will continue to play an important role in driving greenhouse gas emission levels to their lowest possible levels.

### Part Two: Commercial and Industrial Buildings

The City’s inventory of commercial and industrial buildings is summarized in Table 3-1.

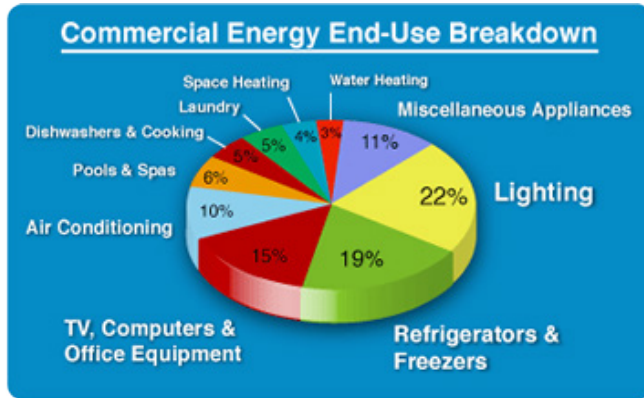
**Table 3-1: City of Fremont Inventory—Commercial and Industrial Buildings**

Research and development	21 million square feet (2008)
Manufacturing	9.0 million square feet (2008)
Warehouse	8.3 million square feet (2008)
Retail	5.9 million square feet (2006)
Office	2.3 million square feet (2008)

Sources: Economic and Planning Systems, Inc. *Industrial Land Use Analysis for the City of Fremont General Plan Update*, April 2008, and Strategic Economics. *Fremont Market Analysis and Retail Strategy*, September 2008.

A detailed analysis of the characteristics of Fremont’s commercial and industrial building stock, such as building type, size, and date of construction, is beyond the scope of the Climate Action Plan. However, the issues pertaining to residential buildings previously described—the relationship of building age and type of construction to energy efficiency strategies, barriers to completing energy efficient retrofits, and the significant opportunities for achieving reductions in greenhouse gas emissions in these buildings—are also relevant to the commercial and industrial sectors.

**Figure 3-4: Commercial Energy End-Use Breakdown (2000)**



Source: Flex Your Power website: <http://www.fypower.org/com>. Image originally from *California Statewide Commercial Sector Energy Efficiency Potential Study*, California Energy Commission, July 9, 2002, Study ID #SW039A, Final Report, Volume 1 of 2.

**Commercial sector:** Figure 3-4 provides a macro-level view of commercial energy use in California. This information illustrates the diversity of energy end uses, which, taken together, can account for as much as 30 percent of a building’s operating cost.

The design, construction, operation and maintenance of commercial buildings, which are usually larger in size and used by more occupants than residential buildings, are factors which affect energy end use.



*Flex Your Power*, California’s statewide energy efficiency marketing and outreach campaign,

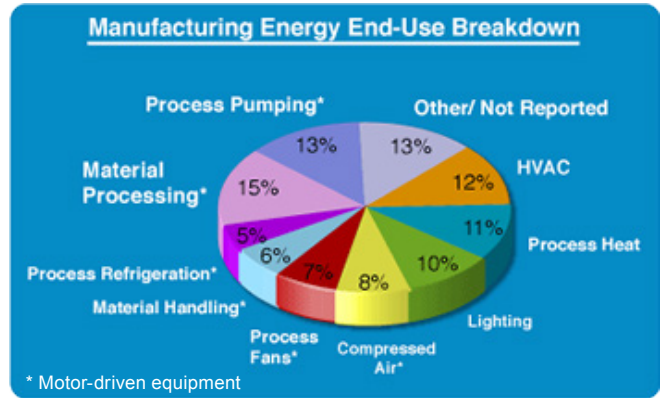
describes the following multi-step process for owners of commercial buildings to follow in order to achieve maximum benefit from building retrofit strategies:

**Step 1: Benchmark the facility:** *Benchmarking* involves collecting data about actual energy use and comparing the data to industry standards, or to the energy use of a specific building over time.

**Step 2: Conduct an energy audit and investigate energy efficiency options.** The audit provides information about energy use by equipment and systems and serves as the foundation for decision-making about which energy efficiency options will deliver the greatest benefits.

**Step 3: Develop an energy management program.** The program is intended to identify the resources needed to ensure successful ongoing management and implementation of the chosen energy efficiency options.

**Figure 3-5: Manufacturing Energy End-Use Breakdown (2000)**



Source: Flex Your Power website: <http://www.fypower.org/ind>. Original figure from: *California Energy Commission, California Energy Demand 2003-2013 Forecast*, February 11, 2003, #100-03-002SD and Xenergy analysis.

**Step 4: Measure results:** Identifying actual energy and cost savings can serve a variety of managerial, operational, and motivational purposes, and can lead to the pursuit of additional energy efficiency measures once initial successes are realized.

Potential benefits from undertaking energy efficiency measures in existing commercial buildings include:

- Reductions in energy consumption and greenhouse gas emissions
- Lower operating costs
- Increased asset value, and
- Positive public perception of the business.

**Industrial sector:** Fremont’s industrial sector includes a range of businesses, such as manufacturing, biotechnology, information technology, warehousing and distribution, and more recently, clean tech<sup>7</sup>. Since technologies and processes differ between industries, as well as between individual facilities in the same sector, the optimal strategies for achieving energy efficiencies for businesses operating within individual buildings will vary. Figure 3-5 is illustrative of energy end-use in manufacturing, and is useful for understanding the areas of opportunity for achieving energy efficiencies in buildings, systems, equipment and operations.

<sup>7</sup> There are many definitions of ‘clean tech’. In Fremont, the clean technology business tax exemption program applies to specific activities, generally including research and development relevant to, and/or manufacture of, solar panels, clean energy vehicles and infrastructure, renewable energy sources, and commercially viable techniques, materials and products that materially improve energy efficiency, water conservation, air quality, or clean chemistry.

***New commercial and industrial development:*** The Land Use Background Report prepared for the updated General Plan inventoried approximately 2 million square feet of vacant commercial land and 25 million square feet of vacant industrial land.<sup>8</sup> Once developed, this land will include buildings, parking, and landscaping. New commercial and industrial projects will be required to meet various energy efficiency standards (including water use requirements), such as Title 24 and the City of Fremont’s Water Efficient Landscape Ordinance. These requirements reflect minimum standards; additional efficiencies, with resulting reductions in greenhouse gas emissions, can be achieved through the use of energy-efficient design and technologies for features such as roofing, windows, lighting and HVAC systems.

As is the case with the residential sector, there are programs in California available to the commercial and industrial sectors to help reduce energy use, achieve greater energy efficiencies, and reduce greenhouse gas emissions. Many of these programs are administered by utilities and are in the form of incentives and rebates. Qualification criteria usually specify minimum energy performance standards to ensure that the utility’s investment yields meaningful results. The examples below illustrate different approaches to achieving energy efficiency in the commercial and industrial building sectors.

- ***Enhanced Automation Initiative:*** This program, funded by California ratepayers under the auspices of the California Public Utility Commission (CPUC) and as part of PG&E’s 2010-2012 energy efficiency program, pays large commercial and institutional customers to improve energy efficiency of existing building automation systems or energy management systems. The program offers free on-site assessment of building controls, cash incentives for reprogramming the controls, and hardware upgrades.
- ***Emerging Renewables Program*** of the California Energy Commission provided rebates to consumers who installed qualifying renewable energy systems on their property. The amount of the rebate was variable, depending on the system size, technology, and installation method.
- ***Savings by Design Program:*** This program is also funded by California taxpayers under the auspices of the

<sup>8</sup> Current land use regulations allow some non-industrial uses, such as high-volume retail, recreation, religious facilities, and medical offices, in industrial areas.

CPUC and administered by PG&E. It offers design assistance, owner and design team incentives, and information, tools and training on energy efficient technologies and strategies for the design and construction of new commercial buildings that aim to exceed California’s Title 24 energy efficiency standards.

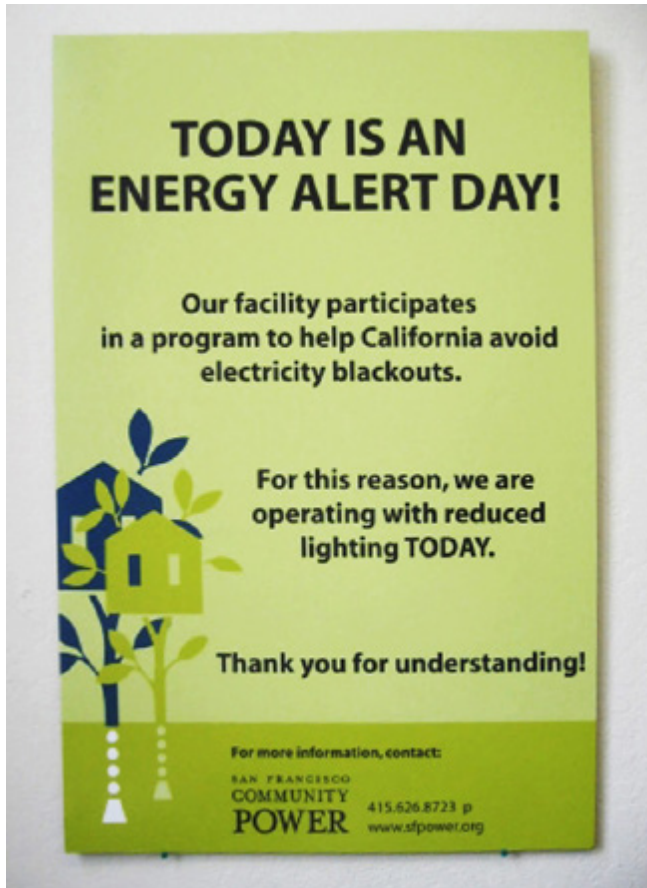
The Climate Action Plan acknowledges the availability and value of these and other energy efficiency programs for the commercial and industrial sectors. Implementation of the Plan will focus on increasing awareness of and participation in these programs as a key strategy for reducing energy use in the building sector. The Climate Action Plan does not include mandatory energy efficiency actions for the commercial and industrial sectors, in order to minimize compliance requirements and to support the City’s economic development goals.

## **Loading Order Priority #2: Demand Response, or, Reducing Peak Period Energy Demand**

California’s loading order identifies demand response as the next preferred strategy for addressing California’s energy needs. Demand response (also called *peak demand management*) allows end-use electric customers to reduce their electricity usage during a given time period (when demand is high), or shift that usage to another time period (when demand is lower). For example, households that use their washing machines and dryers at off-peak hours (usually early and late in the day) can help reduce demand on the system. Supply and demand can be affected by natural factors such as heat waves and storms, and operational factors such as periodic power plant repairs and maintenance. While building sufficient power plants to satisfy every possible supply and demand scenario is one approach to address this fluctuation in supply and demand, the financial cost and environmental impacts would be prohibitive.

Although demand response does not necessarily decrease total energy consumption, it does achieve other beneficial outcomes, such as preventing rolling blackouts by offsetting the need for more electricity generation at peak times, and saving ratepayers money by lowering high-priced peak time energy usage. PG&E is one of three regulated investor-owned utilities in California which administers demand response programs. One example is the *SmartAC™ Program for Businesses and Residential Properties*, a free program for owners and





Community Power's Demand Response Program

renters/lessees of commercial and residential properties. During times of peak use, PG&E activates the program, which automatically adjusts the programmed temperature on participating central air conditioners or heat pumps to reduce the energy use of the equipment.

In addition to reducing energy use and lowering greenhouse gas emissions, demand response programs reinforce **knowledge**, **engagement**, and **action** by empowering residents, organizations and businesses to understand the connection between their energy use behaviors and the creation of greenhouse gas emissions, and that their active participation in managing energy use is vital to the environmental and economic well-being of the community, the region, and the state.

The City of Fremont exhibits leadership in reducing energy use through demand response by participating in San Francisco Community Power's demand response program. During certain hot summer days, the City increases the temperature on thermostats to reduce the energy needed for cooling its buildings.

### Loading Order Priority #3: Renewable Energy and Distributed Energy Generation Resources

The third strategy in California's loading order for meeting the State's energy needs is the use of renewable energy and distributed energy resources. **Renewable energy** is defined by the Energy Efficiency Administration of the Department of Energy as "energy sources that are naturally replenishing but flow limited. They are virtually inexhaustible in duration but limited in the amount of energy that is available per unit of time." The State of California's Renewables Portfolio Standard (RPS) includes the following technologies as eligible renewable energy sources: biomass<sup>9</sup>, conduit hydroelectric, digester gas, geothermal, landfill gas, ocean wave, small hydroelectric, wind, solar thermal electric, photovoltaic, and combustion of municipal solid waste. Energy provided by these technologies can be counted by electric companies towards meeting the mandated increase in procurement of renewable energy resources under the provisions of the RPS program.

**Distributed energy resources** are small-scale power generation technologies located close to where the electricity will be used. Examples of distributed energy resources include solar photovoltaic systems, wind turbines, and small fuel cells. These systems provide an alternative to, or an enhancement of, the large, centralized electric power system.<sup>10</sup> Distributed energy resources that use renewable power sources also provide the benefit of reduced or eliminated greenhouse gas emissions.<sup>11</sup> Other benefits include: reduced amounts of energy lost in transmission from power source to end user (compared to utility-scale power systems); reduced need for more power transmission lines; higher service reliability, and potentially lower power costs for the consumer. Distributed energy systems also contribute to the state's overall energy independence. In 2010, PG&E interconnected over 10,000 customer-owned solar power systems to the electric grid. In total, PG&E has

<sup>9</sup> Biomass includes organic material from plants and animal waste, municipal solid wastes, industrial wastes, and terrestrial and aquatic crops grown solely for energy purposes. One example is ethanol, a liquid transportation fuel commonly made from corn.

<sup>10</sup> In the PG&E service area, a system must be connected to the grid in order to be considered distributed generation. The California Energy Commission has identified the lack of common standards for interconnecting distributed energy resources to the grid as a barrier to wide acceptance and installation of these technologies.

<sup>11</sup> Propane and diesel generators are two examples of non-renewable energy use by a distributed energy resource.

connected over 45,000 of these solar systems to the grid—more than any other utility in the nation.

In Fremont, one example of distributed energy projects by public agencies is Union Sanitary District's (USD) solar power project at the Irvington Pump Station, USD's Irvington Pump Station solar array will cover 2.8 acres at the Pump Station site and produce approximately 875,000 kilowatt-hours per year. The electricity produced by the system is the equivalent of powering approximately 100 homes and should provide all of the energy needed for on-site operations.

Programs at the federal and state levels focusing on renewable and distributed energy seek to increase the use of these technologies by addressing financial and regulatory barriers to their deployment. Two examples of these programs are:

- **Wind Powering America:**

This program is a nationwide initiative of the U.S. DOE's Office of Energy Efficiency and Renewable Energy, intended to increase the use of wind energy across the country. The program addresses both large-scale 'wind farms' and small wind facilities, such as those designed to power a single building.



- **New Solar Homes Partnership (NSHP):** This program from the California Energy Commission is part of the comprehensive statewide solar program, known as the California Solar Initiative. The NSHP focuses on achieving renewable, distributed-energy power sources during the construction of new homes through financial incentives and other support to home builders.

## Actions for Reducing Greenhouse Gas Emissions

The Climate Action Plan's approach to reducing greenhouse gas emission from the building energy sector is based primarily on the twin pillars of sustainable energy policy: *energy efficiency* and *renewable energy*.

Action areas include:

- Implementing regulatory mandates
- Expanding community outreach and education to maximize participation in existing and future programs, and to increase awareness of resources and incentives
- Ensuring regulatory compliance with energy codes and encouraging voluntary achievement of more stringent levels of performance
- Active involvement in collaborative efforts and partnerships.

Since energy use is also directly related to water use, land use and transportation, actions included in those topical chapters of the Climate Action Plan will help Fremont make positive progress towards its emission reduction goal.

Staff will collaborate with stakeholders when undertaking work on actions in this chapter, especially for those actions which may result in new local regulations.

Specific ideas for actions which individuals, businesses and organizations can take to help reduce greenhouse gas emissions from energy use can be found in the section titled "What You Can Do!"

For more information about the proposed actions to reduce greenhouse gas emissions from energy use in City of Fremont facilities and operations, as well as a description of current City programs that achieve emission reductions through energy efficiency and conservation, see Chapter Six, "Municipal Services and Operations."

# Emission Reduction Actions and Implementation Timeline

*GOAL: Reduce greenhouse gas emissions through energy efficiency strategies, community education, and collaboration with PG&E and other energy program providers.*

## Short-Term Actions: 1-3 Years from Plan Adoption

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### Advocate

- E-A1 Work towards utilizing existing programs offered by Pacific Gas and Electric for weatherizing the homes of all qualifying low-income households in Fremont.
- E-A2 Utilize existing funding programs, such as Community Development Block Grant programs, to achieve energy efficiency improvements in existing and new buildings.
- E-A3 Encourage the installation of energy efficiency retrofits by creating a Property Assessed Clean Energy (PACE) program, which allows qualified residential and non-residential property owners to repay the cost of installing energy efficiency retrofits on their property tax bill.

### Collaborate/Participate

- E-C1 Participate in the California Comprehensive Residential Building Retrofit Program, known as “Energy Upgrade California in Alameda County” and funded by the federal America Recovery and Reinvestment Act, to promote residential building retrofits.
- E-C2 Continue the annual collaboration with the California Youth Energy Services (CYES) program to conduct residential energy audits and to distribute compact fluorescent light bulbs and compact fluorescent lamp torchieres as replacements for halogen torchieres in Fremont households.
- E-C3 Continue the annual collaboration with the California Youth Energy Services program to conduct residential energy and water audits and to distribute water-saving shower heads and faucet aerators to Fremont households, to replace less efficient fixtures. (This action is also listed in the “Water” Chapter).
- E-C4 Continue to partner with Pacific Gas and Electric to offer energy efficiency programs for commercial buildings.



### Promote/Encourage

- E-P1 Encourage the replacement of high-pressure sodium and mercury vapor lights used in existing private streets and private parking lots with energy-efficient alternatives, such as light-emitting diodes (LEDs).
- E-P2 Promote tree planting throughout the City, to provide shade on buildings which reduces demand for air conditioning and helps reduce the ‘urban heat island’ effect.
- E-P3 Promote existing solar thermal programs, such as PG&E’s Solar Water Heating Rebate and the California Solar Initiative’s Thermal Program, to encourage the installation of solar hot water systems in existing and new residential and commercial buildings.
- E-P4 Facilitate the adoption of smart grid and other peak load reduction technologies, such as building energy management systems and smart appliances, within new and existing buildings.
- E-P5 Consider requirements to provide pre-wiring for future solar photovoltaics and other renewable on-site power generation systems in new home construction as part of a Green Building program.

## **Regulate**

- E-R1 Eliminate local regulatory barriers to installation of distributed renewable energy systems, such as wind and solar, through revisions to the zoning code and other relevant city policies.

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## **Medium-Term Actions: 3-5 Years from Plan Adoption**

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### **Advocate**

- E-A4 Consider establishing ‘energy budgets’ for newly-constructed and remodeled single family homes over a certain square footage beyond that which is required by State law.

### **Collaborate/Participate**

- E-C5 Work with Pacific Gas and Electric in a public information and education campaign to encourage every household and business to reduce their energy consumption and to utilize more energy efficient lighting and appliances.
- E-C6 Work with Pacific Gas and Electric to increase awareness and use of financial incentives to assist residential and commercial customers to improve energy efficiency.

### **Promote/Encourage**

- E-P6 Encourage business owners to convert or replace their gasoline-powered gardening equipment, such as lawn mowers, leaf blowers, and edge trimmers, with electric equipment.
- E-P7 Provide support and incentives to increase energy efficiencies and partner with others in the private sector, such as real estate and other professionals, to create tools and incentives to achieve this goal.

## **Regulate**

- E-R2 Develop and enforce performance standards for exterior lighting of commercial and industrial buildings and parking lots, which will include minimum and maximum lighting levels while providing a safe environment.

**Table 3-2: Greenhouse Gas Reductions, Relative Cost Range, and Community Co-Benefits—Energy**

<i>Opportunity Area</i>		<i>Actions</i>	<i>GHG Reductions in 2020 (MTCO<sub>2e</sub>)</i>	<i>Community Co-Benefits</i>	<i>Relative Cost to City</i>	<i>Relative Private Cost</i>
<b>Chapter Three: Energy</b>						
<b>Energy Efficiency Improvements</b> - Existing - Residential	E-A1	Work towards utilizing existing programs offered by Pacific Gas and Electric for weatherizing the homes of all qualifying low-income households in Fremont.	1,874	<ul style="list-style-type: none"> <li>- Electricity reduction: 43,188 kWh/year</li> <li>- Natural gas reduction: 30,743 therms/year</li> <li>- Reduces energy bills</li> <li>- Improves air quality</li> <li>- Improves public health</li> </ul>	Low	Low
	E-A2	Utilize existing funding programs, such as Community Development Block Grant programs, to achieve energy efficiency improvements in existing and new buildings.	168		Cost Neutral	High
	E-C1	Participate in the California Comprehensive Residential Building Retrofit Program, known as “Energy Upgrade California in Alameda County” and funded by the federal America Recovery and Reinvestment Act, to promote residential building retrofits.			Medium	Varies
	E-A3	Encourage the installation of energy efficiency retrofits by creating a Property Assessed Clean Energy (PACE) program, which allows qualified residential and non-residential property owners to repay the cost of installing energy efficiency retrofits on their property tax bill.			Medium	Varies
	E-C6	Work with Pacific Gas and Electric to increase awareness and use of financial incentives to assist residential and commercial customers to improve energy efficiency.			Medium	High
	E-P7	Provide support and incentives to increase energy efficiencies and partner with others to create tools and incentives to achieve this goal.			Low	Varies

*Relative Cost to City Range: Very Low: < \$10,000 ; Low: \$10,000 - \$20,000 ; Medium: \$20,001 - \$100,000 ; High: > \$100,000*

*Relative Private Cost Range: Very Low: < \$100 ; Low: \$100 - \$200 ; Medium: \$201 - \$1,000 ; High: > \$1,000*

**Table 3-2: Greenhouse Gas Reductions, Relative Cost Range, and Community Co-Benefits—Energy**

<i>Opportunity Area</i>		<i>Actions</i>	<i>GHG Reductions in 2020 (MTCO<sub>2e</sub>)</i>	<i>Community Co-Benefits</i>	<i>Relative Cost to City</i>	<i>Relative Private Cost</i>
<b>Chapter Three: Energy</b>						
<b>Energy Efficiency Improvements</b> - Existing - Residential	E-C2	Continue the annual collaboration with the California Youth Energy Services (CYES) program to conduct residential energy audits and to distribute compact fluorescent light bulbs and compact fluorescent lamp torchieres as replacements for halogen torchieres in Fremont households.	447	<ul style="list-style-type: none"> <li>- Electricity reduction: 147,157 kWh/year</li> <li>- Natural gas reduction: 2,325 therms/year</li> </ul>	Low	NA
	E-C3	Continue the annual collaboration with the California Youth Energy Services program to conduct residential energy and water audits and to distribute water-saving shower heads and faucet aerators to Fremont households, to replace less efficient fixtures. (This action is also listed in the “Water” Chapter).				
<b>ENERGY STAR Appliances</b>	E-C5	Work with Pacific Gas and Electric in a public information and education campaign to encourage every household and business to reduce their energy consumption and to utilize more energy efficient lighting and appliances.	655	<ul style="list-style-type: none"> <li>- Electricity reduction: 3,397,707 kWh/year</li> <li>- Reduces energy bills</li> </ul>	Medium	Varies
<b>Energy Efficiency Improvements</b> - Existing Buildings - Non-Residential	E-A2	Utilize existing funding programs, such as Community Development Block Grant programs, to achieve energy efficiency improvements in existing and new buildings.	395	<ul style="list-style-type: none"> <li>- Electricity reduction: 563,058 kWh/year</li> <li>- Natural gas reduction: 122,628 therms/year</li> <li>- Reduces energy bills</li> <li>- Improves air quality</li> <li>- Improves public health</li> </ul>	Cost Neutral	Varies
	E-C4	Continue to partner with Pacific Gas and Electric to offer energy efficiency programs for commercial buildings.			Cost Neutral	Low
	E-C6	Work with Pacific Gas and Electric to increase awareness and use of financial incentives to assist residential and commercial customers to improve energy efficiency.			Cost Neutral	Varies
	E-P7	Provide support and incentives to increase energy efficiencies and partner with others, such as real estate and other professionals, to create tools and incentives to achieve this goal.			Low	Very Low

**Table 3-2: Greenhouse Gas Reductions, Relative Cost Range, and Community Co-Benefits—Energy**

<i>Opportunity Area</i>		<i>Actions</i>	<i>GHG Reductions in 2020 (MTCO<sub>2e</sub>)</i>	<i>Community Co-Benefits</i>	<i>Relative Cost to City</i>	<i>Relative Private Cost</i>
<b>Chapter Three: Energy</b>						
<b>Energy Efficiency Improvements</b> - New Buildings - Non-Residential	E-A4	Consider establishing ‘energy budgets’ for newly-constructed and remodeled single family homes over a certain square footage beyond that which is required by State law.	Quantified in State Reduction: Title 24— <i>California Building Energy Code*</i>	- Electricity reduction: 179,583 kWh/year - Natural gas reduction: 333,584 therms/year - Reduces energy bills	Low	Medium-High
<b>Energy Efficiency Improvements</b> - Public Lighting	E-P1	Encourage the replacement of high-pressure sodium and mercury vapor lights used in existing private streets and private parking lots with energy-efficient alternatives, such as light-emitting diodes (LEDs).	1,049	- Electricity reduction: 4,721,693 kWh/year - Reduces energy bills - Improves air quality - Improves public health	Medium	High
	E-R2	Develop and enforce performance standards for exterior lighting of commercial and industrial buildings and parking lots, which will include minimum and maximum lighting levels while providing a safe environment.			Medium	High
<b>Renewable Energy</b> - Existing & New - Residential & Non-Residential	E-P3	Promote existing solar thermal programs, such as PG&E’s Solar Water Heating Rebate and the California Solar Initiative’s Thermal Program, to encourage the installation of solar hot water systems in existing and new residential and commercial buildings.	433	- Electricity reduction: 9,754,285 kWh/year - Natural gas reduction: 81,536 therms/year - Reduces energy bills - Improves air quality - Improves public health - Increases energy independence	Medium	High
	E-P5	Consider requirements to provide pre-wiring for future solar photovoltaics and other renewable on-site power generation systems in new home construction as part of a Green Building program.	5,738		Low	High
	E-R1	Eliminate local regulatory barriers to installation of distributed renewable energy systems, such as wind and solar, through revisions to the zoning code and other relevant city policies.			Low	NA
<b>Energy Efficiency Improvements &amp; Peak Load Reduction</b> - Smart Grid	E-P4	Facilitate the adoption of smart grid and other peak load reduction technologies, such as building energy management systems and smart appliances, within new and existing buildings.	3,785	- Electricity reduction: 17,029,763 kWh/year - Reduces energy bills	Low	High

\* See page 3-6.

**Table 3-2: Greenhouse Gas Reductions, Relative Cost Range, and Community Co-Benefits—Energy**

<i>Opportunity Area</i>		<i>Actions</i>	<i>GHG Reductions in 2020 (MTCO<sub>2e</sub>)</i>	<i>Community Co-Benefits</i>	<i>Relative Cost to City</i>	<i>Relative Private Cost</i>
<b>Chapter Three: Energy</b>						
<b>Building Shade Trees</b>	E-P2	Promote tree planting throughout the City, to provide shade on buildings which reduces demand for air conditioning and helps reduce the ‘urban heat island’ effect.	70	<ul style="list-style-type: none"> <li>- Electricity reduction: 413,041 kWh/year</li> <li>- Natural gas reduction: 4 therms/year</li> <li>- Reduces energy bills</li> <li>- Improves air quality</li> <li>- Improves public health</li> <li>- Improves neighborhood experience</li> <li>- Reduces heat island effect</li> </ul>	Medium	Medium-High
<b>Alternative Fuel -Off-Road Equipment</b>	E-P6	Encourage business owners to convert or replace their gasoline-powered gardening equipment, such as lawn mowers, leaf blowers, and edge trimmers, with electric equipment.	Not Quantified	<ul style="list-style-type: none"> <li>- Reduces fuel costs</li> <li>- Improves air quality</li> <li>- Improves public health</li> </ul>	Medium	High



# Chapter Four: Solid Waste

## How We Manage Our Material Resources



### Key Learning Points

- The less stuff we put in the landfill, the fewer greenhouse gas emissions we'll create!
- Generally, the solid waste hierarchy of *reduce, reuse, recycle*, and *rot/compost* results in the greatest reductions of greenhouse gas emissions.
- Waste reduction (also called waste prevention), including reuse of goods, is one of the easiest and most effective ways to reduce greenhouse gas emissions from garbage.
- Recycling is mainly an energy-saving measure. By recycling, we save energy by not having to drill or mine resources, and also by avoiding the extra transportation of these mined materials.
- Organic material decomposing in a landfill creates methane and carbon dioxide. Methane is a potent greenhouse gas, nearly 21 times more powerful than carbon dioxide at trapping heat in the Earth's atmosphere and accelerating global warming.

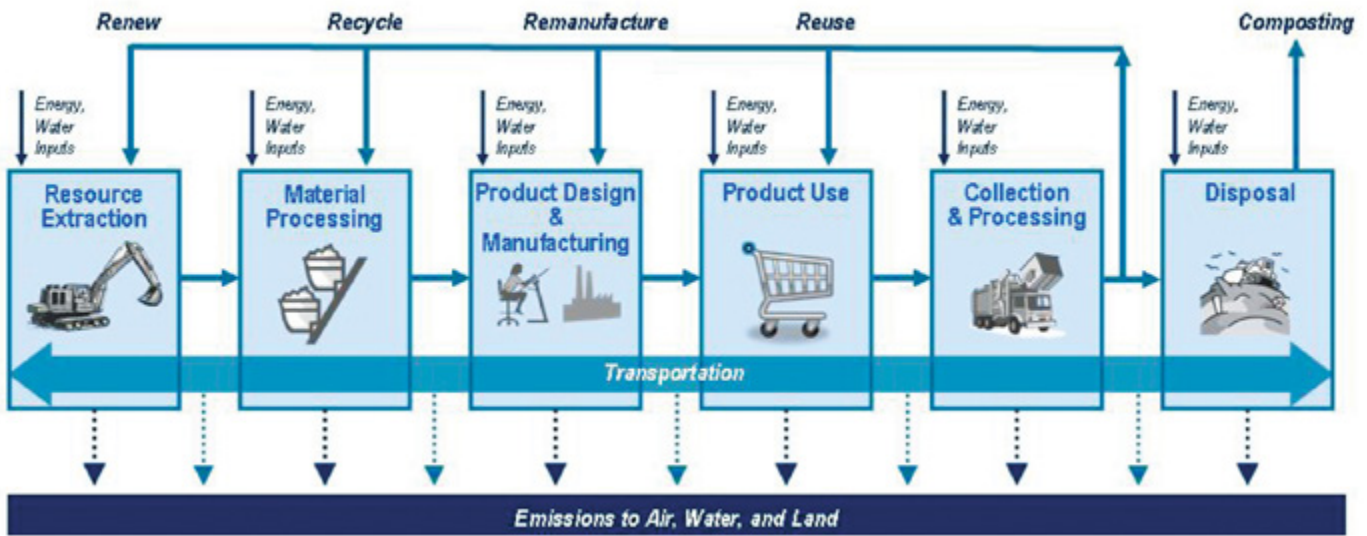
### Introduction

Waste reduction, recycling, and composting are critical strategies to prevent greenhouse gas emissions. The two primary greenhouse gases generated from activities related to solid waste are methane (CH<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>). Methane gas is nearly 21 times more effective than carbon dioxide at trapping heat in the atmosphere, which accelerates global warming. Therefore, it is critical to focus on ways to reduce methane gas emissions as well as carbon dioxide emissions.

In today's consumption-based, disposable-goods society, greenhouse gases are created throughout a product's lifecycle, from mining raw materials through manufacture, transport, and disposal at the end of a product's useful life. This cycle is illustrated in Figure 4-1 which also highlights various practices which can reduce greenhouse gas emissions at different stages.

Reducing waste is one of the easiest strategies for reducing greenhouse gas emissions. In 2005, Fremont residents and businesses sent almost 200,000 tons to the local landfill—nearly one ton (2,000 pounds) for every Fremont resident! By changing behaviors around buying, using, and disposing of the many items which are part of modern life, everyone in Fremont can have a positive impact on climate change.

**Figure 4-1: Flow of Materials through the Production/Consumption Cycle**



Source: U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. *Opportunities to Reduce Greenhouse Gas Emissions through Materials and Land Management Practices*. September 2009, p. 19.

The 2008 Alameda County Waste Characterization study revealed that over 60% of the total amount of materials that ended up in Fremont’s garbage could have been recycled or composted. The percentage of specific types of materials that ended up in Fremont’s garbage is shown in Figure 4-2. Organics, paper, plastic, glass, metals and yard waste present the most significant opportunities for recycling and/or composting. Fremont’s immediate focus is on reducing the amount of organics and paper in the trash.

Waste reduction, reuse, recycling, and composting are key materials management strategies in preserving natural resources, reducing energy use, and preventing greenhouse gas emissions. This chapter discusses these strategies and includes actions for the community to pursue in order to reduce greenhouse gas emissions.

## 2005 Baseline Inventory of Greenhouse Gas Emissions—Solid Waste

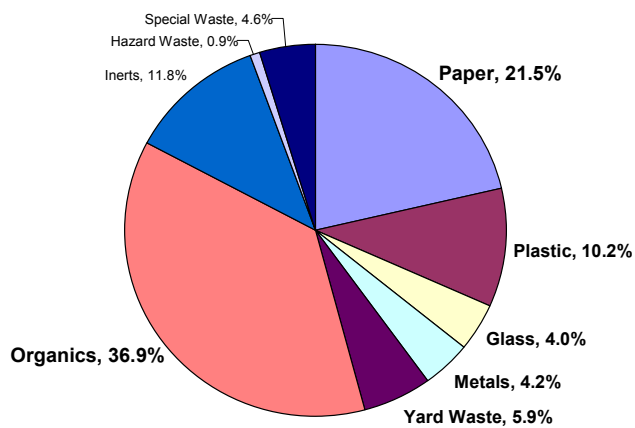
Fremont’s 2005 Baseline Greenhouse Gas Emissions Inventory estimated that the solid waste sector generated around 3% (approximately 58,000 MTCO<sub>2</sub>e), of the community’s total GHG emissions. The solid waste

emissions data is an estimate of methane emissions, based on the percentage of organic material disposed in the Fremont landfill in 2005. However, at this time, there is no national or international standard for inventorying solid waste emissions.

Due to limitations of the methodology used to create Fremont’s sector-based baseline inventory, the benefits of waste reduction and other materials management strategies discussed in this chapter are not readily apparent. For example, since the processing of the community’s recyclables takes place outside the geographic boundary of Fremont<sup>1</sup>, the City’s emissions inventory (which is limited to activities within the geographic boundaries of Fremont) will not reflect the emission reductions resulting from the diversion of these products from the landfill. Nonetheless, Fremont supports materials management strategies that achieve reductions in greenhouse gas emissions, regardless of where those emissions may be accounted for.

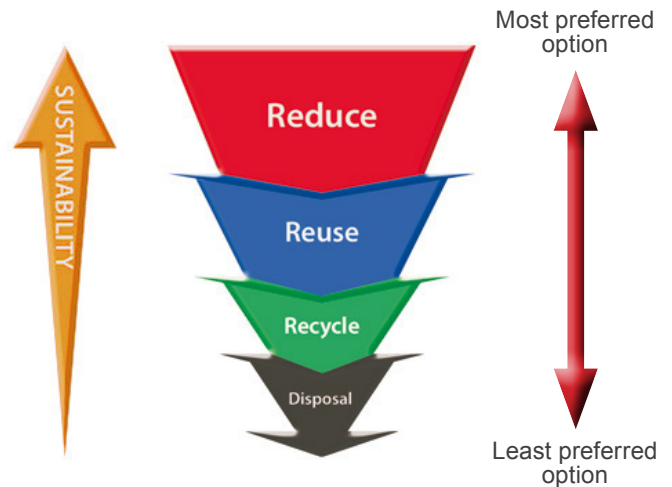
<sup>1</sup> The community’s recyclables are trucked to and sorted at the Fremont Recycling Transfer Station. The actual recycling and remanufacturing into new products occurs both out of state and overseas.

**Figure 4-2: 2008 Waste Characterization Study—Fremont Data**



Source: R.W.Beck. 2008 *Alameda County Waste Characterization Study*. June 2009, Appendix A7, p 2.

**Figure 4-3: The Materials Management Hierarchy**



Source: West Coast Climate and Materials Management Forum

## The Materials Management Hierarchy

The Merriam-Webster dictionary’s definition of garbage as “discarded or useless material” reflects the outdated viewpoint that everything thrown into the garbage can be useless. This definition ignores the fact that many items thrown into the garbage are *resources that can be reused, recycled or composted*. To reinforce the concept of managing materials as *resources*, not *waste*, the Climate Action Plan refers to “materials management” and “resource recovery” strategies rather than “waste management”.

The EPA’s materials management hierarchy states that certain strategies are more environmentally preferable than others. The hierarchy promotes the highest and best use of each material, and specifies the order of preference, with increasing sustainability for each strategy as graphically represented in Figure 4-3. The most preferable materials management strategy is *source reduction* or *waste prevention*, followed by *reuse* of existing items, *recycling*, *rot/compost*, and as the last resort, *disposal*. Each strategy is discussed in greater detail, below.

## Source Reduction/Waste Prevention

*Source reduction* or *waste prevention* describes choices and actions that prevent the creation of waste. Changing the design, manufacture, and/or use of materials and products to reduce what gets thrown away is the most effective approach to reducing greenhouse gas emissions because *emissions which result from all phases of a material’s or product’s lifecycle are avoided*. Other benefits include:

- Conserving natural resources
- Expanding the useful life of existing landfills
- Avoiding the costs of purchasing new products.

Some examples of effective source reduction strategies which can be easily accomplished include:

- Purchasing goods in bulk instead of in individual packages
- Avoiding single-use or disposable products
- Making two-sided copies of documents
- Composting organic materials on site
- Reducing unnecessary packaging from both manufactured and food products.

## Reuse

**Reuse is the act of using a material or object more than once, either for the purpose for which it was originally intended or for another purpose, without making significant alterations to its physical form.**

*Reuse* differs from *recycling* in that reuse does not change the physical form of an object. Reusing an object is more effective at reducing greenhouse gas emissions than recycling, because it uses less energy and fewer resources. Reuse can also be considered a form of waste prevention, since the object is not discarded as it might otherwise have been. Ideally, a product would be designed and manufactured with the express intent to be durable and adaptable enough for reuse.

The expression ‘One person’s trash is another person’s treasure’ may best capture the spirit of the ‘reuse’ approach to materials management. Some examples of reuse practices include:

- Reusing shopping bags and beverage mugs
- Purchasing clothing and other goods secondhand
- Building a construction project with previously-used materials
- Using the California Materials Exchange program to acquire or dispose of materials

There is one notable exception to the maxim that reuse is always preferable to recycling. Because of the significant improvements in the energy efficiency of modern appliances (such as refrigerators, clothes washers and dryers, televisions, and heating and air conditioning systems) it is preferable to replace, rather than repair, older models of these products.

## Recycle

**Recycling is the process of using materials to manufacture a new product, which then has its own distribution and consumption cycle.** By definition, the recycling process involves altering the physical form of the material being recycled. For most materials, recycling represents a significant opportunity to reduce greenhouse emissions, by reducing energy-related greenhouse gas emissions in the manufacturing process and avoiding emissions from other steps in the materials management cycle.



Recycling is essentially an energy-saving measure. Some argue that transportation of recyclable material to the processing facility could negate any greenhouse gas emissions saved by recycling. In fact, recyclable materials would have to travel tens to thousands of miles before reaching the break-even point, where the emissions generated by the transportation outweigh the energy saved from using recycled material to create new products.<sup>2</sup>

Some examples of energy savings resulting from recycling when compared to making new materials are:

- Recycling an aluminum can saves 95% of the energy needed to make a can from raw materials.
- Recycling plastic saves 70% of the energy needed to make new plastic.
- Recycling paper saves 40% of the energy needed to create new paper. Recycling a ton (2,000 pounds) of paper saves 17 trees.
- Recycling a glass bottle saves 30% of the energy needed to make a new bottle from raw materials.

*CalRecycle* (the State authority on recycling, waste reduction, and product reuse, officially known as the Department of Resources Recycling and Recovery), notes that the *full benefits of recycling are only achieved when individuals, businesses and organizations purchase products made from postconsumer waste.*

<sup>2</sup> ICLEI – Local Governments for Sustainability. *ICLEI Resource Guide—Recycling and Solid Waste Management*, March 2008. Appendix I, p. 51.

## Compost

*Composting* mimics the biological decomposition of organic materials such as paper, yard trimmings, wood, food scraps and food-soiled paper into a soil amendment commonly called *compost*. In the anaerobic<sup>3</sup> environment of a landfill, these organic materials produce significant quantities of landfill gas, which consists of about 50% methane and 50% carbon dioxide. Food waste and food soiled paper generate more methane than any other material in the landfill. When composted in an aerobic environment (with oxygen present), such as a backyard compost bin, organic materials do not produce any significant amount of methane. StopWaste.Org notes that composting one ton of food waste reduces greenhouse gas emissions by one ton.

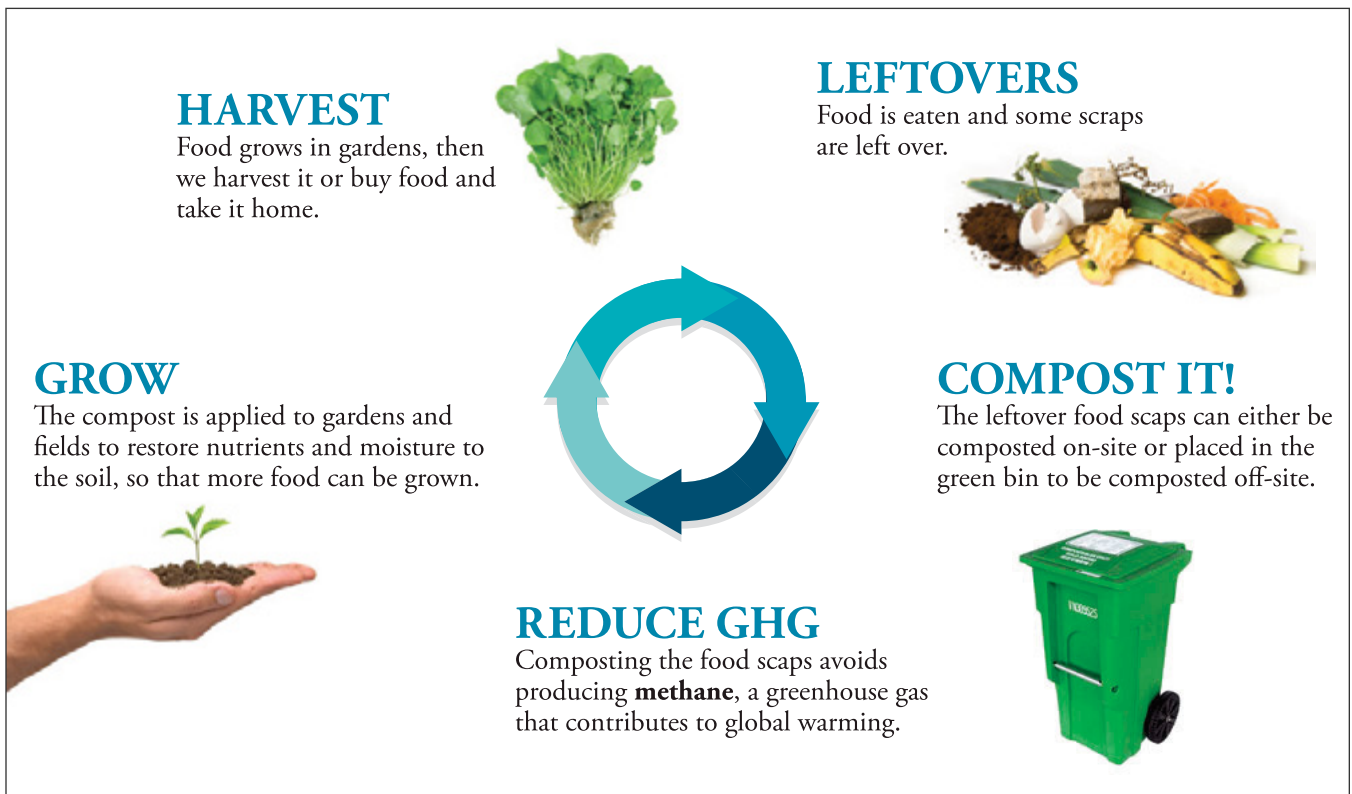
By keeping organic materials out of the landfill and preempting the anaerobic decomposition process which occurs in the landfill, the community can prevent the methane emissions which would otherwise occur.

<sup>3</sup> “Anaerobic” means “without oxygen.”



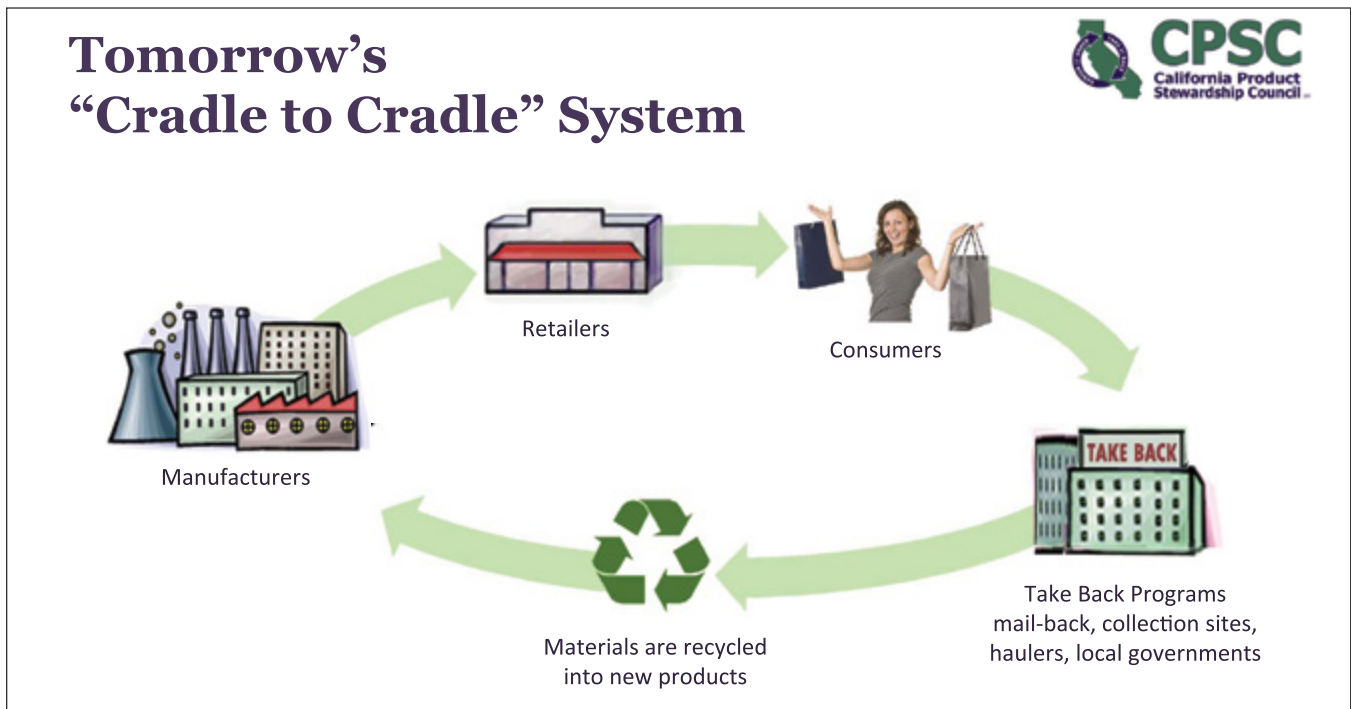
On-site composting (such as backyard composting) achieves the greatest cumulative emission reduction benefits, since no additional energy is used to collect, transport and process the compostable materials. In addition, mixing compost into soil replenishes soil nutrients and reduces the need for irrigation and for chemical fertilizers, pesticides, and additives, which are often petroleum-based. Equally important, adding compost to soil greatly increases the amount of carbon sequestered, as soil holds more carbon than plants. Figure 4-4 illustrates the cycle of composting just described.

**Figure 4-4: The Cycle of Composting**



Source: City of Fremont Environmental Services Division

Figure 4-5: Tomorrow’s “Cradle to Cradle” System



Source: California Product Stewardship Council

Although onsite composting is the optimal approach to handling food scraps and other organic materials, Fremont residents and businesses can place these items in their green organics bin for off-site composting. Currently, approximately 30% of Fremont households and 65 businesses participate in the food scrap composting program. Each additional household and business that places food scraps and food-soiled paper in the green bin will help the community make progress towards achieving its greenhouse gas emission reduction goal.

## Disposal

*Disposal* is the least desirable materials management strategy, and is therefore at the bottom of the solid waste hierarchy. If a product is not reused, recycled or composted at the end of its useful life, it goes to the landfill. Once items thrown in the garbage are on their way to the landfill, there is almost no chance to recover those that could be reused, recycled, or composted. It is a common misconception that recyclable and compostable materials are taken out of garbage bins before they are disposed in the landfill. This does not occur with Fremont’s waste.

## Other Materials Management Strategies: *Upcycling, Designing Out Waste, Extended Producer Responsibility, and Zero Waste*

The introduction of concepts such as *upcycling* and *designing out waste* reflects new ways of thinking about material use and product design, manufacture, and reuse. *Upcycling* is a term used by William McDonough and Michael Braungart in their 2002 book *Cradle to Cradle: Remaking the Way We Make Things*. Upcycling refers to a process that either maintains or improves the quality of materials involved in the upcycling effort. Examples include making purses out of juice packages, new sweaters out of pieces of old, damaged sweaters, and jewelry out of compact discs. Figure 4-5 illustrates the broad concept of a “cradle to cradle” system.

*Designing out waste* seeks to reduce waste by intentionally planning for how a product could be recycled, reused or upcycled at the end of its life **before** the product is made. This approach to consumer goods could create an *endless cycle of resource reuse*, ultimately resulting in zero waste in landfills. As the waste

management industry continues to explore new systems and technologies for keeping waste out of landfills, the private sector continues to explore new ways of thinking about and creating consumer goods.

*Extended producer responsibility* (EPR) is another approach to materials management. EPR places shared responsibility for end-of-life product management on the producers, and all entities involved in the product lifecycle, instead of entirely on the general public. Examples of EPR strategies include buy-back and corporate recycling programs (other than municipal programs) that shift the responsibility for dealing with waste from government to private industry. Successful EPR programs will also result in reductions in product packaging which ultimately means fewer greenhouse gas emissions.

*Zero Waste* is an approach to materials management that seeks to eliminate waste entirely. The Zero Waste International Alliance (zwia.org) states: “Zero Waste is a goal that is ethical, economical, efficient and visionary, to guide people in changing their lifestyles and practices to emulate sustainable natural cycles, where all discarded materials are designed to become resources for others to use. Zero Waste means designing and managing products and processes to systematically avoid and eliminate the volume and toxicity of waste and materials, conserve and recover all resources, and not burn or bury them. Implementing Zero Waste will eliminate all discharges to land, water or air that are a threat to planetary, human, animal or plant health.”

## The Regulatory Context

Regulation of solid waste occurs at the state, county, and local levels. California’s first significant regulation addressing the disposal of solid waste was the *Solid Waste Management and Resource Recovery Act of 1972*. The Act created the Solid Waste Management Board (later renamed the “California Integrated Waste Management Board”) and established the Board’s authority over the handling, disposal and reclamation of solid waste. In the intervening years, both the State and Alameda County have adopted additional solid waste-related legislation. Some examples which address specific products include the following:

- **AB 2020 (1986):** *The Bottle Bill*, which created an incentive for recycling by establishing redemption values for bottles and cans.
- **AB 1305 (1989):** *The Recycled Newsprint Act*, which requires newsprint publishers to use increasing levels of recycled content newsprint.
- **SB 20 (2004):** *The Electronic Waste Recycling Act*, the nation’s first e-waste recycling law.
- **AB 2449 (2006):** Establishes a program allowing consumers to return plastic shopping bags to grocery stores, to encourage the use of reusable bags by consumers and retailers and to reduce the consumption of single-use bags.
- **Alameda County Landfill Ban (2009):** Bans the disposal of plant debris in county landfills by organizations, businesses or individuals who generate significant amounts of plant debris and requires the debris to be separated from all garbage and deposited in the disposal facility’s designated “clean green” area or a designated “organics” cart or collection bin.
- **Alameda County Mandatory Commercial Recycling Ordinance (2012):** This ordinance, effective July 1, 2012, requires businesses, multifamily residences and self-haulers to recycle materials such as cardboard, newspaper, white paper, mixed recyclable paper, recyclable food and beverage glass containers, aluminum and steel food and beverage cans, and HDPE and PET (two common forms of plastic) bottles. The ordinance is intended to divert these materials from disposal in landfills.
- **Alameda County Single Use Bag Ban (2012):** On January 25, 2012, the Alameda County Waste Management Authority adopted the single-use bag ordinance. The ordinance, effective January 1, 2013, bans single-use bags at check out at retailers selling packaged food countywide. Recycled content paper or reusable bags may be provided but only if the retailer charges a minimum price of \$0.10 per bag. The purpose of the ordinance is to reduce the number of bags going to landfill and decrease the problems caused by plastic bags at recycling processing centers and landfills.

In addition to these materials-specific regulations, other regulations addressing solid waste include the following:

### **California Integrated Waste Management Act of 1989 (AB 939 and SB 1322)**

The California Integrated Waste Management Act grew out of concerns about increasing waste streams and decreasing landfill capacity. The Act established quantitative diversion goals of waste from landfills for California's cities and counties of 25 percent by 1995, and 50 percent diversion by 2000. The Act also created the California Integrated Waste Management Board (CIWMB)<sup>4</sup>. A key component of the Act was the establishment of the priority hierarchy for materials management practices consistent with the one described previously in this chapter.

To ensure compliance with State law, a Joint Powers Authority agreement was entered into by Alameda County, two sanitary districts within the county, and all incorporated cities in the county, including the City of Fremont. This agreement created the Alameda County Waste Management Authority (now known as *StopWaste.Org*) and the Alameda County Recycling Board. *StopWaste.Org* is responsible for developing and implementing a Countywide Integrated Waste Management Plan (CoIWMP). This plan includes a Source Reduction and Recycling Element, a Nondisposal Facility Element and a Household Hazardous Waste Element.

At the local level, Fremont adopted AB 939's goals relating to diversion of materials from the landfill through source reduction, reuse, recycling and composting. Upon reaching the 50% diversion goal, in 1999 the City Council increased the goal to diversion of 75% of solid waste generated in Fremont, consistent with the countywide goal established by Alameda County's Measure D<sup>5</sup>. In the intervening years, the City has made continued progress, reaching 74% diversion in 2010, and 73% diversion in 2011.

<sup>4</sup> The CIWMB was dissolved in 2010 and its duties and responsibilities transferred to the *California Department of Resources Recovery and Recycling (CalRecycle)*.

<sup>5</sup> Measure D, "Alameda County Waste Reduction and Recycling Initiative Charter Amendment," was approved by 63% of Alameda County voters in November, 1990. The requirements and prohibitions in the initiative apply to the County of Alameda, as an entity, and to all unincorporated areas within the county.

### **Per Capita Disposal Measurement System, Chapter 343, Statutes of 2008 (SB 1016, Wiggins)**

This legislation changed the measurement system for assessing jurisdictions' performance in keeping waste out of landfills from the 'percentage diverted' system to a 'per capita disposal measurement system'. SB 1016 builds on AB 939 compliance requirements, as opposed to superceding them. The per capita disposal rate indicator uses two factors: a jurisdiction's population (or in some cases employment) and its disposal as reported by disposal facilities. This approach is intended to allow jurisdictions to focus time and resources on successful program implementation by eliminating complex calculations and simplifying goal measurement.

### **The Global Warming Solutions Act of 2006 (AB 32) and the California Climate Change Scoping Plan**

The AB 32 Scoping Plan includes three strategies in the recycling and solid waste sector. Two of the strategies seek to increase the efficiency of landfill methane capture, thereby preventing release of the methane into the atmosphere. The third strategy has the ultimate goal of zero waste delivered to the State's landfills, through methods such as commercial recycling, composting, anaerobic digestion, extended producer responsibility, and environmentally preferable purchasing.

The 2008 Statewide Waste Characterization study revealed that the commercial sector generates around 50% of California's solid waste. In spite of the significant recycling that already occurs, there is considerable opportunity to achieve increased greenhouse gas emission reductions in the commercial sector. Since the commercial sector is not directly subject to the requirements of AB 939, the Scoping Plan identified commercial recycling as a discrete early implementation measure. Adoption of the proposed regulations was scheduled for October 2011. However, with the passage of AB 341 in November 2011, the California Department of Resources Recycling and Recovery incorporated the work already done with the California Air Resources Board for the Mandatory Commercial Recycling Measure into the new Mandatory Commercial Recycling Regulation. California jurisdictions were required to implement the Mandatory Commercial Recycling Regulation effective July 1, 2012.



## StopWaste.Org (Alameda County) Strategic Workplan for 2020 (2010)

The Strategic Workplan provides policy guidance and establishes priorities for staff's work on implementing the CoIWMP. The Workplan seeks to achieve the following goals by the year 2020:

- No more than 10% of the material deposited in landfills is readily recyclable or compostable.
- No more than 10% of the material placed in recycling or composting containers is garbage that is not readily recyclable or compostable.

Effective July 1, 2013, this new type of diversion goal directly measures the results of people's behaviors around throwing things away. The ultimate goal is to change behaviors which result in landfilling materials which don't belong there. As stated earlier in this chapter, Fremont's 2008 Waste Characterization Study revealed that about 60% of materials managed as garbage were actually readily recyclable or compostable. The Strategic Workplan proposes to reduce that percentage to no more than 10% by 2020.

## City of Fremont Materials Management Policies and Regulations

The following materials management policies and regulations support the reduction of greenhouse gas emissions and promote responsible purchasing, use and management of goods.

- **Residential Recycling and Organics Collection:** Residents in single-family homes are required to subscribe to recycling and organics collection service provided by Allied Waste Services, the City's solid waste service provider. Residents in multi-family housing are required to subscribe to recycling collection service. Since 2003, residents in single-family homes have been able to add food scraps and food-soiled paper to their green organics bin.
- **Environmentally Preferable Purchasing Policy (Administrative Regulation 3.10):** This 2006 internal City of Fremont policy promotes purchasing products that are durable, reusable, and long lasting; products that include recycled content, and products that have reduced toxicities.

- **LEED™ Certification for new City of Fremont buildings (Sustainability Policy):** In 2006, the City Council adopted a resolution which requires new City of Fremont buildings over 10,000 square feet in size to obtain Leadership in Energy and Environmental Design (LEED™) certification at the Silver level or higher. The LEED™ rating system includes a rating category which addresses issues such as construction waste management, building and materials reuse, and use of recycled content materials.
- **Bay-Friendly Landscaping Requirements:** In 2009, the City Council adopted a resolution requiring use of Bay-Friendly Landscaping principles, which address design, construction and maintenance for public sector and private sector landscape projects larger than 10,000 square feet. Some of the principles pertaining to materials management include turning plant debris onsite into mulch and/or compost, and using salvaged items and recycled content materials in the landscape design.
- **Construction and Demolition Debris Recycling Ordinance:** Effective in 2009, the Council adopted this ordinance to decrease materials sent to landfills by targeting all demolition projects and larger construction projects (as defined by permit valuation). All asphalt and concrete, and at least 50% of the remaining debris from the project must be recycled.
- **Expanded Polystyrene Disposable Food Service Ware Ordinance:** The City Council adopted this ordinance, effective January 1, 2011, which requires the use of compostable or recyclable food service ware for takeout containers in place of expanded polystyrene foam (or styrofoam™) takeout containers, which are now prohibited.

## Actions for Reducing Greenhouse Gas Emissions

Fremont's solid waste priorities are aligned with those of the Alameda County Waste Management Authority (StopWaste.Org), the State's AB 32 Scoping Plan, and the U.S. Environmental Protection Agency's West Coast Climate and Materials Management Forum. The EPA Forum is a partnership of western cities and states that are developing and sharing ways to integrate lifecycle materials management policies and practices into climate action plans.

Fremont's Climate Action Plan aims to reduce greenhouse gas emissions from the solid waste sector by:

- Expanding outreach and education into the community
- Implementing regulatory mandates to maximize compliance
- Increasing voluntary actions
- Advocating for beneficial legislation
- Maintaining active involvement in collaborative efforts and partnerships.

Staff will collaborate with stakeholders when undertaking work on actions in this chapter, especially for those additions which may result in new local regulations.

Meeting the City's waste reduction and greenhouse gas reduction goals will require additional investment in the materials management infrastructure as well as changes in behavior throughout the community. Specific ideas for actions which individuals, businesses and organizations can take to help reduce greenhouse gas emissions from solid waste can be found in the section titled "What You Can Do!"

# Emission Reduction Actions and Implementation Timeline

*GOAL: Reductions in greenhouse gas emissions achieved by decreasing the amount of solid waste sent to landfills through increased voluntary and mandatory recycling, composting, and other materials management strategies, and from methane gas capture and recovery.*

## Short-Term Actions: 1-3 Years from Plan Adoption

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### Advocate

- SW-A1 Support Extended Producer Responsibility legislation and processes.
- SW-A2 Support legislation that reduces waste and litter from single-use disposable items.
- SW-A3 Increase the number of Certified Green Businesses each year.
- SW-A4 Encourage large waste-generating businesses to get a free waste audit from the City of Fremont.
- SW-A5 Increase the amount of construction and demolition debris recycled from private-sector projects.
- SW-A6 Develop policies and support new technologies to improve waste reduction, recycling and resource recovery programs for materials.
- SW-A7 Institute programs for multi-family units to allow for the collection and composting of food waste and compostable paper where feasible.

### Collaborate/Participate

- SW-C1 Work with Waste Management, Inc. to capture and recover methane gas to use as an energy source at the Tri-Cities Recycling and Disposal Facility and the Altamont Landfill and Resource Recovery Facility.
- SW-C2 Partner with California Youth Energy Services staff to provide information on recycling and composting that can be distributed to residents when CYES performs their energy audits.

### Regulate

- SW-R1 Implement mandatory commercial recycling effective July 1, 2012, as required by the State of California and Alameda County.
- SW-R2 Comply with the California Green Building Code, effective January 1, 2011, which requires all new residential buildings to recycle 65% of the material generated from the project.
- SW-R3 Require recycling as a condition of permit issuance for special events that must secure city-issued permits.

## Medium-Term Actions: 3-5 Years from Plan Adoption

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### Advocate

- SW-A8 Increase recovery of organic materials from the commercial and residential sectors to 75%.
- SW-A9 Increase recovery of recyclable materials from the commercial and residential sectors to 75%.

## Long-Term Actions: 5-10 Years from Plan Adoption

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### **Advocate**

SW-A10 Increase recovery of organic materials from the commercial and residential sectors to 90%.

SW-A11 Increase recovery of recyclable materials from the commercial and residential sectors to 90%.

**Table 4-1: Greenhouse Gas Reductions, Relative Cost Range, and Community Co-Benefits—Solid Waste**

<i>Opportunity Area</i>		<i>Actions</i>	<i>GHG Reductions in 2020 (MTCO<sub>2</sub>e)</i>	<i>Community Co-Benefits</i>	<i>Relative Cost to City</i>	<i>Relative Private Cost</i>
<b>Chapter Four: Solid Waste</b>						
<b>Extended Producer Responsibility</b>	SW-A1	Support Extended Producer Responsibility legislation and processes.	Not Quantified	- Improves air quality - Improves public health	Low	Varies
<b>Waste Diversion</b> - Single-use Disposables	SW-A2	Support legislation that reduces waste and litter from single-use disposable items.	Not Quantified	- Improves air quality - Improves public health	Low	NA
<b>Certified Green Businesses</b>	SW-A3	Increase the number of Certified Green Businesses each year.	Not Quantified	- Improves air quality - Improves public health	Medium	Varies
<b>Methane Capture</b>	SW-C1	Work with Waste Management, Inc. to capture and recover methane gas to use as an energy source at the Tri-Cities Recycling and Disposal Facility and the Altamont Landfill and Resource Recovery Facility.	32,222	- Improves air quality - Improves public health	Low	NA
<b>Waste Diversion</b> - Recycled Paper - Residential & Non-Residential	SW-A4	Encourage large waste-generating businesses to get a free waste audit from the City of Fremont.	4,129	- Improves air quality - Improves public health	Medium	NA
	SW-A6	Develop policies and support new technologies to improve waste reduction, recycling and resource recovery programs for materials.			Medium	NA
	SW-A9	Increase recovery of recyclable materials from the commercial and residential sectors to 75%.			Medium	NA
	SW-A11	Increase recovery of recyclable materials from the commercial and residential sectors to 90%.			Medium	NA
	SW-C2	Partner with California Youth Energy Services staff to provide information on recycling and composting that can be distributed to residents when CYES performs their energy audits.			High	NA
	SW-R1	Implement mandatory commercial recycling by July 1, 2012, as required by the State of California and Alameda County.			Medium	NA
	SW-R3	Require recycling as a condition of permit issuance for special events that must secure city-issued permits.			Medium	Low

*Relative Cost to City Range: Very Low: < \$10,000 ; Low: \$10,000 - \$20,000 ; Medium: \$20,001 - \$100,000 ; High: > \$100,000*

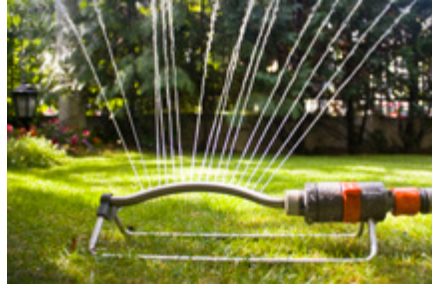
*Relative Private Cost Range: Very Low: < \$100 ; Low: \$100 - \$200 ; Medium: \$201 - \$1,000 ; High: > \$1,000*

**Table 4-1: Greenhouse Gas Reductions, Relative Cost Range, and Community Co-Benefits—Solid Waste**

<i>Opportunity Area</i>		<i>Actions</i>	<i>GHG Reductions in 2020 (MTCO<sub>2</sub>e)</i>	<i>Community Co-Benefits</i>	<i>Relative Cost to City</i>	<i>Relative Private Cost</i>
<b>Chapter Four: Solid Waste</b>						
<b>Waste Diversion</b> - Food & Compostable Paper	SW-A8	Increase recovery of organic materials from the commercial and residential sectors to 75%.	4,650	- Improves air quality - Improves public health	Medium	High
	SW-A10	Increase recovery of organic materials from the commercial and residential sectors to 90%.			Medium	High
<b>Waste Diversion</b> - Food & Compostable Paper - Residential & Non-Residential	SW-A7	Institute programs for multi-family units to allow for the collection and composting of food waste and compostable paper where feasible.	1,185	- Improves air quality - Improves public health	Cost Neutral	High
<b>Waste Diversion</b> - Construction & Demolition	SW-A5	Increase the amount of construction and demolition debris recycled from private-sector projects.	193	- Improves air quality - Improves public health	Medium	High
	SW-R2	Comply with the California Green Building Code, effective January 1, 2011, which requires all new residential buildings to recycle 65% of the material generated from the project.			Medium	Low-Medium

# Chapter Five: Water

## Conservation is the Key



### Key Learning Points

- Conserving water is an effective way to reduce greenhouse gas emissions: *Use less, lose less, and waste less* are the guiding principles of water conservation.
- Water shortages and periods of drought are projected to increase due to climate change.
- If you use water, you use energy.
- If you waste water, you waste energy and money.
- If you save water, you save energy and money.
- For every gallon of water used by the average U.S. family of four, three gallons are used by the power plant supplying the energy for the system which provides the water.
- Fremont's households use about 270 gallons of water per day—over 70% of the water used in the community. Therefore, the greatest opportunities for conservation and efficiency improvements lies in the existing and planned residential development throughout the city, and in behavioral changes by both current and future Fremont residents.

### What is the relationship between water use, energy, and greenhouse gas emissions?

Water and energy are intertwined in a symbiotic relationship: most methods of producing energy require water<sup>1</sup>; and producing, distributing, heating and cooling usable water requires energy, as does its treatment once it becomes wastewater. Therefore, if you use water, you use energy. If you waste water, you waste energy, and if you waste energy, you waste water. And, in both cases, you waste money and generate greenhouse gas emissions.

<sup>1</sup> Water use in energy production and distribution is a complex issue; even renewable energy systems, such as large-scale concentrated solar power facilities, rely on significant amounts of water in the production and export of electricity for end users. In addition, these systems use water to clean the parabolic mirrors or Fresnel lenses which are central to the system's design and operation. Even small-scale, on-site photovoltaic systems, such as those found on homes and businesses, require water for the manufacturing of the semiconductor materials in the panels, although no water is needed to convert sunlight to electricity once the panels are in use.

**Figure 5-1: The Water Supply—Use-Disposal Process**



Source: National Resources Defense Council, “Energy Down the Drain: The Hidden Costs of California’s Water Supply”, August 2004, p. 2.

In California, this water-energy symbiotic relationship is dramatic: the State Water Project is the largest single user of energy in California, using about two to three percent of all electricity consumed in California.<sup>2</sup> Fremont’s population directly contributes to this energy consumption, since Alameda County Water District, Fremont’s water provider, relies on the State Water Project for approximately 40% of the water that the District supplies to its customers.

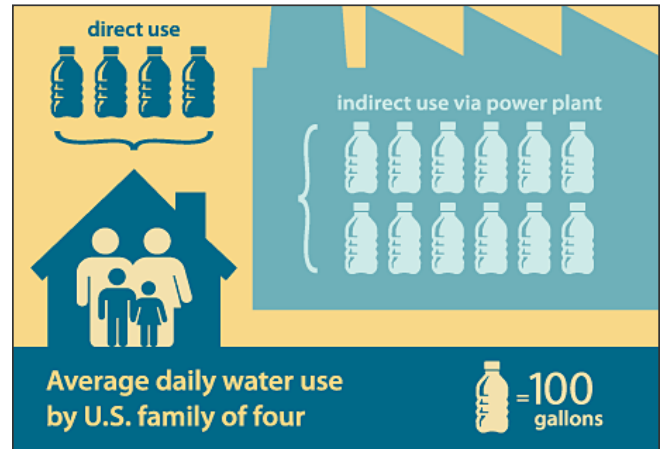
The indirect use of water required for the system of water production and distribution, which is hidden from the end user, is many times greater than the direct use, which is more tangible to the end user. Figure 5-2 illustrates the concept of *direct use* (water consumed in a home or other building for uses such as drinking, bathing, cooking, cleaning, and watering the landscape) and *indirect use*, which refers to the energy consumption associated with the production and distribution system. This figure shows that, for every gallon of water used by the average U.S. family of four, three gallons are used by the power plant supplying the energy for the system which provides and distributes the water.<sup>3</sup>

Reducing the use of water is therefore an important energy efficiency strategy – with the added benefit of saving money for the consumer. Reducing the amount of energy required for the production and distribution of drinkable water, and the treatment of wastewater, reduces the greenhouse gas emissions that result from these processes.

<sup>2</sup> The State Water Project, which provides water to two-thirds of California’s population, is also a power producer, operating four pumping-generating plants and five hydroelectric power plants.

<sup>3</sup> This national average may not accurately reflect the actual ratio of direct to indirect use in California and, locally, in ACWD’s service area, which utilizes electricity generated from relatively water-efficient facilities, such as hydropower. The concept of direct to indirect use, however, is still relevant in ACWD’s service area.

**Figure 5-2: Direct and Indirect Use of Water by American Households**



Source: Union of Concerned Scientists

Another example of the *indirect use* of water is the use of millions of gallons of water in the manufacture of consumer products. Many of the concepts discussed in Chapter Four, about how materials management can reduce greenhouse gas emissions through energy savings, also apply in the water sector. By reducing consumption, and reusing and recycling manufactured products, each of us can help conserve water and energy, and reduce greenhouse gas emissions.

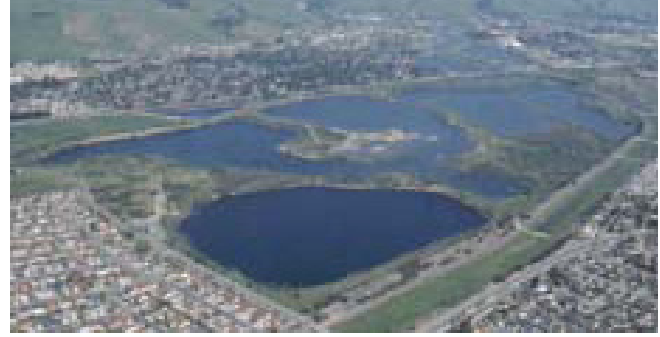
Some specific examples of how much water is used in the manufacture of everyday products include the following:<sup>4</sup>

- Manufacturing the steel for making a car takes about 80,000 gallons of water.
- Producing a gallon of gasoline uses from 1 to 2.5 gallons of water.
- It takes at least twice as much water to produce a plastic water bottle as the amount of water the bottle contains.
- It takes more than 700 gallons of water to make one new cotton shirt.

**While technological improvements in buildings, appliances, vehicles, and manufacturing processes can all help reduce water and energy use, technology alone will not be enough to ensure that Fremont will achieve its goals for reducing greenhouse gas emissions.**

<sup>4</sup> Source: The Hidden Water in Everyday Products, [www.h2oconserve.org](http://www.h2oconserve.org)





Percolation ponds at Quarry Lakes.

*Water conservation*<sup>5</sup> is a highly effective, cost-efficient, and generally easy strategy which individuals of all ages, businesses, organizations, and the community at large can pursue on a daily basis and help the city progress towards its emission reduction goals. ***Use less, lose less, and waste less are the guiding principles of water conservation.***

## Climate Change and Drought Risk in California

Recent state actions have drawn attention to drought risks, including those related to climate change. California's 2010 *Drought Contingency Plan* (DCP), the state's first adopted drought plan, was developed following Governor Schwarzenegger's executive orders and drought proclamations for 2008 and 2009.<sup>6</sup>

The DCP highlights climate change-induced drought risks as follows:

- Warming temperatures due to global climate change, combined with changes in precipitation and runoff patterns, are projected to increase the frequency and intensity of droughts in California. Regions that rely heavily upon surface water (rivers, streams, and lakes) could be particularly affected as runoff becomes more variable, and more demand is placed on groundwater. Climate change and a projected increase in California's population will also affect water demand. Warmer temperatures will likely increase

<sup>5</sup> The Climate Action Plan utilizes the definitional distinction between the terms 'water conservation' and 'water use efficiency' which was made in the February 2010 *20x2020 Water Conservation Plan*, prepared by multiple California state agencies, as follows: "*Water conservation* is defined as a reduction in water loss, waste, or use. The general term water conservation may include *water use efficiency*, in which more water-related tasks are accomplished with the same or lesser amounts of water." (p. 2)

<sup>6</sup> California has experienced many periods of drought, as noted in the 2010 DCP: "Historical multi-year droughts include: 1912-13, 1918-20, 1923-24, 1929-34, 1947-50, 1959-61, 1976-77, 1987-92, and most recently the current drought which began in 2007." (p. 3)

evapotranspiration<sup>7</sup> rates and extend growing seasons, thereby increasing the amount of water that is needed for the irrigation of many crops, urban landscaping and environmental water needs.<sup>8</sup>

- These climate change-related drought risks have led to a growing body of new laws which mandate reductions to water and water-related energy use.

## Fremont's Water Supply and Wastewater Treatment Systems

Alameda County Water District (ACWD) is the public agency providing water service to the City of Fremont, as well as the neighboring cities of Newark and Union City. Union Sanitary District (USD) is an independent special district providing wastewater collection, treatment and disposal to the three cities. The two agencies developed a recycled water master plan in 1993 which served as the basis for ACWD's recommended approach to the use of recycled water (described later in this chapter). The two agencies have periodically updated the master plan, most recently in 2010.

Significant components of the system which captures and manages Fremont's local water supply, all of which originates in the Alameda Creek watershed, are visible to the public. These elements include:

- The watershed itself, an area of over 633 square miles which extends from Mt. Diablo in the north to Mt. Hamilton in the south, and eastward to the Altamont Pass. Approximately seven percent of the watershed is developed for residential, commercial or industrial purposes; the majority is undeveloped, open range land or public lands and parks.

<sup>7</sup> Evapotranspiration refers to the loss of water from the soil through both evaporation and transpiration from the plants growing in the soil.

<sup>8</sup> Natural Resources Agency and California Department of Water Resources. *California Drought Contingency Plan*, November 2010, p. 3.

**Table 5-1: Alameda County Water District Data**

Service Area:	Fremont, Newark, and Union City—104.8 Square Miles
Population:	331,387 (January 2012)
Customers:	81,242 (July 2011)
Sources of Supply:	<ul style="list-style-type: none"> <li>- State Water Project: 40%</li> <li>- San Francisco Public Utilities Commission (Hetch Hetchy): 20%</li> <li>- Alameda Creek Watershed Runoff (recharges the Niles Cone Aquifer): 40%</li> </ul>
Water Use by Category (FY 2008-09):	<ul style="list-style-type: none"> <li>- Residential: 30,846 acre feet (71.7%)</li> <li>- Business: 5,919 acre feet (13.8%)</li> <li>- Industrial: 3,435 acre feet (8.0%)</li> <li>- Miscellaneous: 2,795 acre feet (6.5%)</li> </ul>

Source: Alameda County Water District Fact Sheet

- Alameda Creek and the Alameda Creek Flood Control Channel, containing two large, inflatable rubber dams spanning the channel’s width which capture rainwater runoff, as well as a portion of the water supply from the State Water Project.
- Quarry Lakes, where the water from the flood control channel is diverted for percolation into the underlying groundwater basin.

In addition to these components, sixteen wells are used to extract water from the groundwater basin.

Table 5-1 provides an overview of the District and its customers.

The diversity of ACWD’s water sources provides the agency with flexibility in water resource management, but has the downside of limited District control over the majority (approximately 60%) of the supply. Decisions concerning water allocations from the non-local sources, especially in times of drought and water rationing, can have significant impacts on ACWD’s customers.

The data in Table 5-1 reveals that the majority of water use—about 270 gallons per day per single family household—is by the residential sector. As such, the greatest opportunities for conservation and efficiency improvements lies in the existing and planned residential development throughout the city, and in behavioral changes by both current and future Fremont residents.

## The Regulatory Context Affecting Water Use in Fremont

This section provides an overview of key current and future regulations and policies addressing water use in the City of Fremont. As a local agency, the City of Fremont is directly responsible for implementation and enforcement of some of these policies and regulations, while other agencies, such as Alameda County Water District, are responsible for others.

### **The California Global Warming Solutions Act of 2006 (AB 32) and the California Climate Change Scoping Plan (2008)**

AB 32, the *California Global Warming Solutions Act of 2006*, required the Air Resources Board to prepare a Scoping Plan to achieve greenhouse gas emission reductions in California. The Scoping Plan defines the state’s water sector to include groundwater, surface water, agricultural use, urban use, conveyance, treatment, wastewater, and water recycling. The Scoping Plan includes three measures targeting the reduction of energy requirements associated with providing reliable water supplies, and two measures focused on reducing the amount of non-renewable electricity associated with conveying and treating water. Some of these measures will be implemented locally through SBx7-7.

## **SBx7-7: The Water Conservation Act of 2009**

California Senate Bill 7 (SBx7-7), *The Water Conservation Act of 2009*, was enacted in November, 2009. SBx7-7 requires the state to reduce per capita water consumption by 20% by the year 2020, regardless of the sufficiency of existing water systems. The state would also be required to make incremental progress towards this goal by reducing per capita water use by at least 10% on or before December 31, 2015. SBx7-7 is an example of legislation which implements measures identified in the AB 32 Scoping Plan.

The California Department of Water Resources has developed four methodologies for adoption by water agencies to ensure compliance with SBx7-7 and to support the state's efforts to meet the reduction of per capita water consumption by the two target years. ACWD has elected to use 'Target Method 4', which provides for flexibility in implementation in response to local circumstances.

## **SB 407 (2009): Water-efficient Plumbing Fixture Requirements**

Another State law (see California Civil Code sections 1102.155 and following, and 1101.1 and following) requires certain residential and commercial properties built before 1994 to install water-efficient plumbing fixtures by 2017 and 2019, respectively. The regulations address fixtures such as showers, urinals and toilets. Since the amount of existing residential and commercial buildings in Fremont exceeds the amount what can be built in the future, under the provisions of the City's General Plan and the availability of developable land, there is significant potential to conserve water (and energy), and to reduce greenhouse gas emissions, by replacing older fixtures with more efficient ones.

## **2010 California Green Building Standards Code (CALGreen) and the State Water Efficient Landscape Ordinance (WELO)**

The California Green Building Standards Code does not mandate the use of specific high-efficiency types of water fixtures to achieve water conservation and efficiency. Instead, the Code's water efficiency measures, which became effective in July 2011, are performance-based, requiring a 20 percent reduction in potable (drinkable) indoor water use and, for outdoor water use, the development of a water budget for landscape irrigation



Flannel bush, or Fremontia, (*Fremontodendron* spp.), is a California native plant that needs little water to thrive. The plant was named after Major General John C. Frémont, the City of Fremont's namesake.

according to the State Water Efficient Landscape Ordinance (WELO). The City has been enforcing the requirements of the State ordinance since its adoption on January 1, 2010, through the building permit process.

WELO applies to all residential projects (except single-family homes) with landscape areas larger than 2,500 square feet in size, as well as single-family home projects with landscape areas larger than 5,000 square feet in size.

## **2010 Bay-Friendly Landscape Requirements**

On July 1, 2010, Bay-Friendly Landscape requirements for new and renovated projects went into effect. The City requires private projects to meet at least seven of the nine minimum Bay-Friendly Landscape requirements, many of which include water-saving measures.

## **Potential Use of Recycled Water and Other Non-Potable Water Sources**

Alameda County Water District and Union Sanitary District have evaluated several opportunities for the use of recycled water in ACWD's service area. ACWD does not currently offset potable water demands through the use of recycled water or other non-potable sources. However, ACWD's plans include implementation of alternative water sources in the future for non-potable uses, including industrial uses and landscape irrigation.<sup>9</sup>

<sup>9</sup> Alameda County Water District, *2010-2015 Urban Water Management Plan*, adopted June 9, 2011, p. 6-2.

State law (Government Code section 65601 and following) requires local agencies to adopt ordinances requiring new subdivisions to install separate plumbing systems for delivery of recycled water for non-potable uses, **if** recycled water will be available from the water supplier within ten years. The local agency must adopt the ordinance within 180 days of receiving notification from the water agency of the planned availability of recycled water. The District's *2010-2015 Urban Water Management Plan* states that ACWD's long term water supply strategy includes provisions for a potential future recycled water project, and indicates that the planned implementation of a recycled water project in the ACWD service area is still at least ten years away<sup>10</sup>. Because the planned implementation of a recycled water project in the ACWD service area is at least 10 years away, it does not appear that the City will be required to adopt an ordinance as required by state law during the timeframe of the CAP. However, to date, the City has required the installation of separate distribution systems for recycled, non-potable water (commonly known as 'purple pipe') in selected large development projects as part of the approval process. To support the successful implementation of the use of recycled water in the future, the City will continue its practice of encouraging or requiring the installation of separate distribution systems for non-potable water in development projects.

In addition to encouraging large-scale, area-wide systems, the Climate Action Plan supports small-scale, on-site use of recycled water, known as 'greywater systems' or 'laundry to landscape systems', as a way to maximize water use efficiency. In a residential context, "greywater" refers to the leftover water from bathtubs, showers, hand basins and washing machines. Some definitions of greywater also include water from the kitchen sink. Greywater systems capture this leftover water for uses such as landscape irrigation and, if allowed by State and local regulations, toilet flushing.

## Actions for Reducing Greenhouse Gas Emissions

The Climate Action Plan's approach to reducing greenhouse gas emission from the use and treatment of water throughout the community includes:

- Collaborative efforts with agencies such as ACWD and organizations such as the California Youth Energy Services
- Continuation of existing regulatory programs

Staff will collaborate with stakeholders when undertaking work on actions in this chapter, especially for those actions which may result in new local regulations.

Specific ideas for actions which individuals, businesses and organizations can take to help reduce greenhouse gas emissions from their use of water can be found in the section titled "What You Can Do!"

For more information about the proposed actions to reduce water use in City of Fremont operations, as well as a description of current City practices that achieve reductions in water use, see Chapter Six, "Municipal Services and Operations."

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<sup>10</sup> Ibid., p. 6-4.

## Emission Reduction Actions and Implementation Timeline

*GOAL: Reduce greenhouse gas emissions through water conservation and efficient use of water resources, collaborative efforts with other public agencies, outreach and educational efforts to promote behavior change, and creating the conditions that support people's ability to make choices which support this goal.*

### Short-Term Actions: 1-3 Years from Plan Adoption

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#### Advocate

W-A1 Continue the annual collaboration with the California Youth Energy Services program to conduct residential energy and water audits and to distribute water-saving shower heads and faucet aerators to Fremont households, as replacements for less efficient fixtures. (This action is also listed in the "Energy" Chapter).

#### Collaborate/Participate

W-C1 Continue to implement the Water Efficient Landscape Ordinance for private development.

W-C2 Collaborate with Alameda County Water District to implement voluntary water conservation and reclamation programs.

#### Promote/Encourage

W-P1 Encourage use of on-site recycled water systems, (also known as 'greywater systems' or "laundry to landscape") consistent with all environmental and health and safety regulations and Alameda County Water District policies and requirements.

### Long-Term Actions: 5-10 Years from Plan Adoption

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#### Collaborate/Participate

W-C3 Collaborate with Alameda County Water District to adopt a retrofit program to encourage installation of water conservation measures in existing businesses and residences.

W-C4 Collaborate with Alameda County Water District and Union Sanitary District to support the use of recycled water.

W-C5 Support development of a process for permitting, registration, and inspection of greywater systems by the City.

W-C6 Consult with ACWD in developing policies and regulations supporting the use of water conserving strategies, including greywater systems.

**Table 5-2: Greenhouse Gas Reductions, Relative Cost Range, and Community Co-Benefits—Water**

<i>Opportunity Area</i>		<i>Actions</i>	<i>GHG Reductions in 2020 (MTCO<sub>2</sub>e)</i>	<i>Community Co-Benefits</i>	<i>Relative Cost to City</i>	<i>Relative Private Cost</i>
<b>Chapter Five: Water</b>						
<b>Water Efficiency Improvements</b> - Indoor - Existing Buildings - Residential & Non-Residential	W-A1	Continue the annual collaboration with the California Youth Energy Services program to conduct residential energy and water audits and to distribute water saving shower heads and faucet aerators to Fremont households, as replacements for less efficient fixtures. (This action is also listed in the “Energy” Chapter).	Quantified in State Reduction: SBx7-7— <i>Urban Water Demand Reduction Requirement*</i>	- Improves water quality - Extends water supply	Low	NA
<b>Water Efficiency Improvements</b> - Outdoor - New Buildings - Residential & Non-Residential	W-C1	Continue to implement the Water Efficient Landscape Ordinance for private development.	Quantified in State Reduction: SBx7-7— <i>Urban Water Demand Reduction Requirement*</i>	- Improves water quality - Extends water supply - Increases natural habitat	Cost Neutral	High
<b>Water Efficiency Improvements</b> - Indoor & Outdoor - New & Existing - Residential & Non-Residential	W-C2	Collaborate with Alameda County Water District to implement voluntary water conservation and reclamation programs.	Quantified in State Reduction: SBx7-7— <i>Urban Water Demand Reduction Requirement*</i>	- Improves water quality - Extends water supply	Low	High
	W-C3	Collaborate with Alameda County Water District to adopt a retrofit program to encourage installation of water conservation measures in existing businesses and residences.			Low	High
<b>Water Efficiency Improvements</b> - Recycled Water	W-C4	Collaborate with Alameda County Water District and Union Sanitary District to support the use of recycled water.	Quantified in State Reduction: SBx7-7— <i>Urban Water Demand Reduction Requirement*</i>	- Improves water quality - Extends water supply	Low	High
<b>Greywater Systems</b>	W-P1	Encourage use of on-site recycled water systems, (also known as ‘greywater systems’ or ‘laundry to landscape’) consistent with all environmental and health and safety regulations and Alameda County Water District policies and requirements.	Quantified in State Reduction: SBx7-7— <i>Urban Water Demand Reduction Requirement*</i>	- Improves water quality - Extends water supply	Medium	High
	W-C5	Support development of a process for permitting, registration, and inspection of greywater systems by the City.			Medium	High
	W-C6	Consult with ACWD in developing policies and regulations supporting the use of water conserving strategies, including greywater systems.			Low	High

*Relative Cost to City Range: Very Low: < \$10,000 ; Low: \$10,000 - \$20,000 ; Medium: \$20,001 - \$100,000 ; High: > \$100,000*

*Relative Private Cost Range: Very Low: < \$100 ; Low: \$100 - \$200 ; Medium: \$201 - \$1,000 ; High: > \$1,000*

\* See page 5-5.

# Chapter Six: Municipal Services and Operations



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*While the primary purpose of the Climate Action Plan vis-à-vis government operations is to identify actions for reducing greenhouse gas emissions in those operations, it also provides an opportunity for the City to save money. In addition, as the organization implements the Plan and in some cases becomes an ‘early adopter’ of new technologies, policies, and behaviors, employees will gain practical experience with various approaches to reducing emissions.*

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## Introduction

The Climate Action Plan encompasses the entire Fremont community as well as the municipal operations of the City of Fremont. Other chapters of the CAP address community-wide actions. This chapter includes actions for reducing greenhouse gas emissions resulting from energy and fuel use for the City’s operations, including buildings, the vehicle fleet, and public infrastructure such as streetlights and traffic signals.

The CAP also identifies ways the City can support choices and behaviors by its employees that will help achieve emissions reductions.

The City of Fremont provides a wide range of services to the public which require energy and create greenhouse gas emissions: police and fire services, building inspection, development and maintenance of public infrastructure (such as roads, parks, public buildings, and street lighting), and environmental and recreation services. In Fremont, water, wastewater, trash collection and recycling, and provision of electricity and gas for buildings, street lighting, and other end uses, are the responsibility of other service providers. In addition, unlike some other cities, Fremont does not operate specialized facilities such as an airport or shipping port. This is an important distinction when comparing greenhouse gas emission inventories between jurisdictions, since each jurisdiction is unique in its operational impacts.

Greenhouse gas emissions from city government operations account for less than one percent of Fremont’s total emissions. While municipal operations represent a proportionally modest opportunity for emissions reductions overall, the essential obligation for the City of Fremont to lead by example remains undiminished. Since the City has a higher degree of control and influence over the municipal activities and facilities that create greenhouse gas emissions than it does over those within the community at large, it can show leadership and commitment while monitoring and reporting progress as emission reduction initiatives are implemented.

While the primary purpose of the Climate Action Plan vis-à-vis government operations is to identify actions for reducing greenhouse gas emissions in those operations, it also provides an opportunity for the City to save money. In addition, as the organization implements the Plan and in some cases becomes an ‘early adopter’ of new technologies, policies, and behaviors, employees will gain practical experience with various approaches to reducing emissions. This organizational capacity-building will help the City be a more effective leader and community partner.

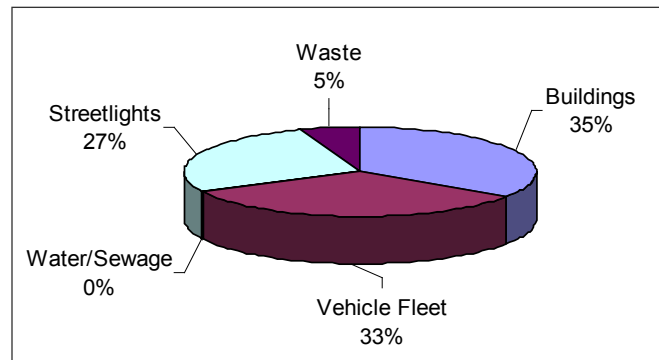
As described in Chapter One, the City has achieved reductions in greenhouse gas emissions through a variety of projects, policies and partnerships. Fremont will continue to build on these achievements, and will actively seek opportunities for funding, collaborative initiatives, and other ways to support staff’s efforts to successfully implement the Plan’s actions. City staff will also work to track and report on energy and financial savings resulting from energy efficiency strategies deployed in buildings, lighting systems, and other City-owned and operated resources.

### 2005 Baseline Inventory of Greenhouse Gas Emissions from Municipal Operations and Facilities

The 2005 baseline inventory showed that the City of Fremont organization created approximately 7,400 MTCO<sub>2</sub>e of greenhouse gas emissions. Figure 6-1 shows the percentages of emissions from the five source categories reported in the baseline inventory.

Each of these emissions source categories is discussed below. In addition, this chapter addresses other topics, such as reducing employee commute vehicle miles, which are opportunity areas for achieving reductions in greenhouse gas emissions by City staff.

**Figure 6-1: 2005 Greenhouse Gas Emissions from City Operations and Facilities**



LEED™ Silver-certified Fire Station #2—Niles Boulevard

### Building Energy Use

Fremont’s accomplishments in energy efficiency and energy conservation in City buildings are described in detail in Chapter One. They include energy efficiency retrofits, such as lighting retrofits; installation of cool roofs; window film to reduce solar heat gain, and reduced number of computer servers for the organization. Other examples include the ice storage system that cools the Police Building and uses energy at lower-cost off-peak hours, and the 2006 policy that requires new City buildings greater than 10,000 square feet in size to attain Leadership in Energy and Environmental Design (LEED™) Silver Certification.

While energy conservation and energy efficiency are the most cost effective approaches to reducing emissions, the use of distributed, renewable energy for City facilities is another important strategy that the City is just





Wally Pond Irvington Community Center

beginning to pursue. The Climate Action Plan calls for the City to explore opportunities for renewable energy systems, whose environmental gains could be augmented by the financial benefits provided for under the *Local Government Renewable Energy Self Generation Program* created by AB 2466 and modified by AB 512 in 2011. As codified in Section 2830 of the Public Utilities Code, local governments can install renewable generation of up to 5 megawatts (MW) at one location within its geographic boundary and generate credits that can be used to offset charges at one or more other locations within the same geographic boundary.

In December 2010, the City Council approved the issuance of debt financing for several projects, including the following energy efficiency projects:

- **Wally Pond Irvington Community Center:** This project includes the installation of a cool roof, replacement of the HVAC system with new, energy-efficient equipment, and provisions for a future solar system.
- **Fremont Main Library:** This project includes the replacement of the HVAC system with new, energy-efficient equipment.

These projects will result in reductions in greenhouse gas emissions and help the City make progress towards its emission reduction goals. They will also reduce maintenance and energy costs and help to protect the community's investment in these well-used public buildings.

## Vehicle Fleet Fuel Consumption

As of early 2012, the City's fleet included 514 vehicles; of these, 52 were alternative fuel vehicles. Fleet vehicles are used for many City services, including police, fire, park and street maintenance, building inspection, and general government operations. Table 6-1 describes the 52 alternative fuel vehicles currently included in the fleet.

**Table 6-1: Alternative Fuel Vehicles in the City of Fremont Fleet**

29 hybrid vehicles
10 compressed natural gas vehicles
5 off-road electric carts (for use in the city's parks)
5 compressed natural gas street sweepers
1 compressed natural gas bus
1 off-road propane forklift
1 off-road hybrid man-lift

The City is committed to the ongoing replacement of fossil-fuel powered vehicles which have reached the end of their useful life with alternative fuel vehicles, wherever feasible. In addition to fleet vehicles, City staff use fossil fuel-powered equipment, such as mowers, edgers, and trimmers, to maintain parks, median strip landscaping, and other public lands. It is expected that new equipment powered by alternative fuel sources that can be used for large-scale maintenance operations will be developed and made available over the coming years. As this occurs, staff will aim to replace existing fossil-fuel powered equipment with new, cleaner equipment.

In 2010, Fremont became a partner agency to the *Local Government Electric Vehicle (EV) Fleet Project*, a multi-agency initiative to purchase electric vehicles for government fleets through \$2.8 million in grant funding from the Metropolitan Transportation Commission. The City will use the local fund allocation to purchase two all-electric vehicles. As part of the project, charging stations at two City buildings will be installed to provide power for the vehicles, as well as other electric vehicles that may be added to the fleet over time. The Local Government EV Fleet Project is an excellent example of the City successfully leveraging partnerships with other agencies and acting as an early adopter of a new technology. The Climate Action Plan supports the creation of a citywide system of fueling stations for the City's fleet of alternative fuel vehicles, to ensure there are no barriers to their use throughout the organization.

## Streetlights and Traffic Signals



Fremont has over 15,500 high pressure sodium (HPS) streetlights. Currently, the annual electricity cost for streetlights is around \$1 million dollars, representing about half of the City's annual utility bills. Light-emitting diode (LED) street lights provide a number of benefits compared to HPS lights, including lower energy consumption and lower greenhouse gas emissions, improved night visibility, and significantly longer lifespan and reduced maintenance costs (since they need to be replaced less frequently).

Fremont's 204 traffic signals (161 owned, operated and maintained by the City and 43 owned, operated and maintained by Caltrans) all have LED bulbs, which have resulted in both energy and maintenance savings. Replacing HPS streetlights with LEDs will achieve energy and cost savings and reduce greenhouse gas emissions.

However, replacement of the entire streetlight system is a multi-million dollar capital expense which is unlikely to be completed at one time. Fremont is taking an incremental approach to retrofitting the HPS streetlights, beginning with the retrofit of 54 street lights on Osgood Road and 264 street lights on Stevenson Boulevard. Money for these lights came from the federally-funded Energy Efficiency and Conservation Block Grant Program, a one-time funding source. Also, in December 2010, the City Council approved the issuance of debt financing (2010 Variable Rate Demand Certificates of Participation) for a variety of projects including LED streetlights for approximately 5-10% of the system. Fremont will continue to seek funding for replacing the remainder of the HPS streetlights, until the system is fully retrofitted.

## The City's Solid Waste



Wood Mulch Around Base of Tree

Similar to any business or household, the City of Fremont purchases and uses a wide range of products and equipment that will ultimately need to be disposed of.

Fremont's approach to managing these materials is informed by the solid waste hierarchy (described in Chapter Four) of waste prevention/source reduction—reuse—recycling/composting and, lastly, disposal.

In 2006, the City Manager approved Administrative Regulation 3.10, *Purchasing Recycled and Waste-Reducing Products*. This directive addresses policies supporting the purchase of recycled, reusable, and waste-reducing products and services, and for ensuring compliance with both state and federal regulations requiring local agencies to buy recycled products. Administration Regulation 3.10 also describes how the organization can reduce toxics and pollution by, for example, purchasing paper products that are processed without chlorine or chlorine derivatives, and replacing fossil-fuel powered fleet vehicles with less-polluting alternatives.

Plant debris from the maintenance of parks, median landscaping, and trees is another component of Fremont's solid waste. As a result of the City's environmentally sustainable practices, **no plant debris is sent to the landfill**. Larger items such as tree limbs are cut up and used as wood chips in locations such as shrub beds, pathways, and tree wells, in order to suppress weed growth and retain moisture in the soil. This practice helps to minimize the need for watering and the use of pesticides. Smaller plant cuttings are loaded into a dumpster and hauled by Allied Waste to their Milpitas facility, where it is turned into compost.

The Environmental Services Division plays an important role in educating employees about waste prevention, recycling, composting and the most environmentally

Flickr photo courtesy of OSU Master Gardener.

appropriate ways to dispose of whatever materials cannot be managed otherwise. The City will continue to build on its effective practices by pursuing new strategies for waste reduction and sustainable materials management.

## Water

The 2005 baseline greenhouse gas inventory of water-related emissions from City operations was limited to the electricity used for water pumps and irrigation. Fremont will achieve additional emission reductions in this area through the expansion of the Calsense water management irrigation system beyond its current use in larger parks to include smaller parks. This system uses water efficiently and prevents overwatering by self-adjusting the daily watering schedule based on evapotranspiration gauge readings, ensuring plant materials are only watered when necessary.

Reducing water use in public buildings will reduce greenhouse gas emissions. As described in Chapter Five, *when you save water, you save energy, and when you save energy, you reduce greenhouse gas emissions*. The Climate Action Plan directs the completion of an assessment of water use in City-owned and operated buildings and facilities, to provide the information necessary for developing and implementing a water conservation and reduction program.

## Reducing Employee Vehicle Miles Traveled

Fremont can seek to reduce its workforce's commute-related vehicle miles traveled, in order to achieve emission reductions. The Climate Action Plan includes several actions to reduce barriers and incentivize options other than single-occupant vehicle use for employee commuting.

## The Benefits of the City's Trees and Open Space System

The movement of carbon from one source to another plays an important role in regulating Earth's climate. The full carbon cycle – basically, the exchange of carbon, at various rates, among terrestrial (land), atmospheric, and aquatic systems – determines whether a landscape is a *carbon source* or a *carbon sink*. Carbon sources are net emitters of carbon into the atmosphere, while carbon sinks are net capturers of carbon (they remove carbon from the atmosphere). *Carbon sequestration* and *carbon storage* are other common phrases which refer to the removal of carbon from the atmosphere.





Terrestrial systems that store carbon include animals, soils, rocks, fossil fuels, and plants<sup>1</sup>. As such, Fremont’s undeveloped, natural open spaces and trees—both publicly and privately owned—influence Fremont’s net inventory of greenhouse gas emissions in a positive way. Currently, there are over 45,000 trees in public rights-of-way, 12,000 to 15,000 trees in medians and parks, and many thousands of trees on private property. In addition, thousands of acres of undeveloped open space and parkland are located within Fremont. Although an estimate of the quantitative benefit of these terrestrial systems in sequestering carbon is beyond the scope of the Climate Action Plan, the brief discussion that follows is meant to highlight the benefits that they provide.

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<sup>1</sup> All types of vegetation – trees, shrubs, flowers, grasses, groundcovers – store carbon in their above-ground tissue and below-ground roots, as well as in the soil which surrounds them. Sequestration rates vary by tree species, soil type, regional climate, topography and management practices. The brief discussion in this Plan focuses on trees, since they are (in most cases) the largest of the plant species and, generally, the longest-lived.

The California Climate Change Scoping Plan identifies urban forestry as an opportunity area for greenhouse gas emission reductions. The Scoping Plan notes that, in addition to carbon sequestration through the process of photosynthesis, trees can provide shading, thereby reducing building energy usage, and can also provide biomass for fossil fuel alternatives from urban green waste.

Neither trees nor soils have unlimited capacity for carbon sequestration, since their carbon level will eventually reach a saturation point beyond which additional storage is no longer possible. This usually happens when trees reach maturity. After reaching the point of carbon saturation, the trees should be maintained in order to prevent losses of carbon back to the atmosphere which would result if and when the tree is cut down or lost to disease or other causes.

Any investment made in increasing and maintaining trees, and preserving undeveloped open space land, will return multiple environmental benefits, as described above.

# Emission Reduction Actions and Implementation Timeline

## Short-Term Actions: 1-3 Years from Plan Adoption

**GOAL: Reduced energy use and greenhouse gas emissions from City operations.**

### Vehicle Fleet

- M1 Continue replacing gasoline- and diesel-powered fleet vehicles with alternative fuel vehicles, such as hybrids, compressed natural gas, and electric vehicles.
- M2 Install charging and refueling stations at appropriate sites throughout the city to service the fleet's alternative fuel vehicles.
- M3 Educate and encourage City staff to limit idling when using fleet vehicles.

### Street and Parking Lot Lighting

- M4 Replace high-pressure sodium and mercury vapor lights used on streets and public parking lots with energy-efficient alternatives, such as light-emitting diodes (LEDs).

### Planning and Budgeting Processes

- M5 For the biannual Capital Improvement Program Plan, add a new criterion to the "Capital Improvement Project Prioritization Process" addressing the potential for projects (including the purchase of equipment such as vehicles for the City's fleet) to reduce greenhouse gas emissions.
- M6 For the annual Operating Budget, add a new criterion, to be used in the evaluation and prioritization of equipment purchasing that addresses the potential for projects to reduce greenhouse gas emissions.



**GOAL: Programs and policies to reduce vehicle miles traveled by employees.**

- M7 During employee recruitment, advertise the City's incentives and subsidies for choosing alternatives to single-occupant auto commuting.
- M8 Provide preferential parking and/or other benefits for carpool and alternative fuel vehicles at City facilities, to encourage and reward carpooling and ownership of alternative fuel vehicles.
- M9 Provide secure bicycle parking, showers, lockers and other amenities at City facilities to promote bicycle use by both employees and visitors.

**GOAL: Increased diversion of solid waste from landfills and increased use of recycled-content products.**

- M10 Increase the amount of recycling and composting at City facilities.
- M11 Increase construction and demolition debris recycled from public-sector projects.
- M12 Enhance and expand waste reduction policies and programs for City facilities, such as the environmentally preferable purchasing policy and incorporate new policies in response to innovations in materials and technologies.
- M13 Support the source-reduction policy (AR 3.10) by discouraging the purchase of water in single-use, disposable containers by all City departments and agencies. Encourage reductions in the purchase of other beverages sold in single-use, disposable containers.
- M14 Increase the use of recycled-content products at City facilities.

***GOAL: Maximum water conservation and efficient use of water in City operations.***

- M15 Enhance and expand the computer-controlled irrigation system throughout the City's park system to reduce water use by tying watering cycles to soil moisture.
- M16 Conduct a water audit of all City-owned and operated buildings and facilities and implement measures to reduce water use. Encourage meeting the LEED™ Standards Rating Systems for Existing Buildings or Commercial Interiors or other comparable sets of standards.
- M17 At the end of the units' useful life, replace least efficient water and wastewater motors and pumps in locations such as City parks with more energy-efficient units.
- M18 Continue implementing the Bay-Friendly Landscape requirements for civic improvement projects which include landscaped areas larger than 10,000 square feet.

***GOAL: Increased use of renewable, distributed energy for City facilities.***

- M19 Evaluate the potential for providing solar, wind, and other renewable energy systems at City facilities.

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### **Medium-Term Actions: 3-5 Years from Plan Adoption**

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***GOAL: Reductions in employee commuting in single-occupant vehicles.***

- M20 Expand and improve existing incentives for City employees to choose alternatives to single-occupant auto commuting, such as flexible work schedules, telecommuting, transit incentives and subsidies, and ridesharing services and subsidies.

***GOAL: Service contracts which advance the City's goal of achieving reductions in greenhouse gas emissions.***

- M21 Evaluate the potential for setting greenhouse gas emission reduction targets and strategies for services contracted by the City, such as solid waste collection.
- M22 Include a provision in the next contract with the City's solid waste collector that the provider use alternative fuel vehicles for the fleet which services Fremont.

***GOAL: Public infrastructure which helps to achieve greenhouse gas emission reductions.***

- M23 Evaluate and, where appropriate, pursue the use of new greenhouse gas-reducing paving technologies for street and parking lot pavement projects. Examples include warm mix asphalt and paving with higher albedos (reflectivity) and improved rolling resistance.

**Table 6-2: Greenhouse Gas Reductions, Relative Cost Range, and Community Co-Benefits—Municipal Services and Operations**

<i>Opportunity Area</i>		<i>Actions</i>	<i>GHG Reductions in 2020 (MTCO<sub>2e</sub>)</i>	<i>Community Co-Benefits</i>	<i>Relative Cost to City</i>	<i>Relative Private Cost</i>
<b>Chapter Six: Municipal Services and Operations</b>						
<b>Municipal Transportation</b> - Fleet Fuel Conversion	M1	Continue replacing gasoline- and diesel-powered fleet vehicles with alternative fuel vehicles, such as hybrids, compressed natural gas, and electric vehicles.	324	<ul style="list-style-type: none"> <li>- Reduces energy bills</li> <li>- Improves air quality</li> <li>- Improves public health</li> </ul>	High	NA
	M2	Install charging and refueling stations at appropriate sites throughout the city to service the fleet's alternative fuel vehicles.			Low	NA
<b>Vehicle Idling</b>	M3	Educate and encourage City staff to limit idling when using fleet vehicles.	Not Quantified	<ul style="list-style-type: none"> <li>- Improves air quality</li> <li>- Improves public health</li> </ul>	Low	NA
<b>Energy Efficiency Improvements</b> - Public Lighting	M4	Replace high-pressure sodium and mercury vapor lights used on public streets and public parking lots with energy-efficient alternatives, such as light-emitting diodes (LEDs).	1,088	<ul style="list-style-type: none"> <li>- Reduces energy bills</li> </ul>	High	NA
<b>Procurement</b>	M5	For the biannual Capital Improvement Program Plan, add a new criterion to the "Capital Improvement Project Prioritization Process" addressing the potential for projects (including the purchase of equipment such as vehicles for the City's fleet) to reduce greenhouse gas emissions.	Not Quantified	<ul style="list-style-type: none"> <li>- Improves air quality</li> <li>- Improves public health</li> </ul>	Very Low	NA
	M6	For the annual Operating Budget, add a new criterion, to be used in the evaluation and prioritization of equipment purchasing that addresses the potential for projects to reduce greenhouse gas emissions.			Very Low	NA

*Relative Cost to City Range: Very Low: < \$10,000 ; Low: \$10,000 - \$20,000 ; Medium: \$20,001 - \$100,000 ; High: > \$100,000*

*Relative Private Cost Range: Very Low: < \$100 ; Low: \$100 - \$200 ; Medium: \$201 - \$1,000 ; High: > \$1,000*

**Table 6-2: Greenhouse Gas Reductions, Relative Cost Range, and Community Co-Benefits—Municipal Services and Operations**

<i>Opportunity Area</i>		<i>Actions</i>	<i>GHG Reductions in 2020 (MTCO<sub>2</sub>e)</i>	<i>Community Co-Benefits</i>	<i>Relative Cost to City</i>	<i>Relative Private Cost</i>
<b>Chapter Six: Municipal Services and Operations</b>						
<b>Transportation Demand Management</b> - City Employees	M7	During employee recruitment, advertise the City’s incentives and subsidies for choosing alternatives to single-occupant auto commuting.	29	<ul style="list-style-type: none"> <li>- Improves air quality</li> <li>- Improves public health</li> </ul>	Cost Neutral	NA
	M8	Provide preferential parking and/or other benefits for carpool and alternative fuel vehicles at City facilities, to encourage and reward carpooling and ownership of alternative fuel vehicles.			Cost Neutral	NA
	M9	Provide secure bicycle parking, showers, lockers and other amenities at City facilities to promote bicycle use by both employees and visitors.			High	NA
	M20	Expand and improve existing incentives for City employees to choose alternatives to single-occupant auto commuting, such as flexible work schedules, telecommuting, transit incentives and subsidies, and ridesharing services and subsidies.			Medium	NA
<b>Waste Diversion</b> - Recycling & Organics	M10	Increase the amount of recycling and composting at City facilities.	Not Quantified	<ul style="list-style-type: none"> <li>- Improves air quality</li> <li>- Improves public health</li> </ul>	Low	NA
<b>Waste Diversion</b> - Construction & Demolition	M11	Increase construction and demolition debris recycled from public-sector projects.	Not Quantified	<ul style="list-style-type: none"> <li>- Improves air quality</li> <li>- Improves public health</li> </ul>	Low	NA
<b>Waste Reduction</b> - Environmentally Preferable Purchasing - Municipal	M12	Enhance and expand waste reduction policies and programs for City facilities, such as the environmentally preferable purchasing policy and incorporate new policies in response to innovations in materials and technologies.	Not Quantified	<ul style="list-style-type: none"> <li>- Improves air quality</li> <li>- Improves public health</li> </ul>	Medium	NA
	M13	Support the source-reduction policy (AR 3.10) by discouraging the purchase of water in single-use, disposable containers by all City departments and agencies. Encourage reductions in the purchase of other beverages sold in single-use, disposable containers.			Medium	NA
	M14	Increase the use of recycled-content products at City facilities.			Varies	NA



**Table 6-2: Greenhouse Gas Reductions, Relative Cost Range, and Community Co-Benefits—Municipal Services and Operations**

<i>Opportunity Area</i>		<i>Actions</i>	<i>GHG Reductions in 2020 (MTCO<sub>2e</sub>)</i>	<i>Community Co-Benefits</i>	<i>Relative Cost to City</i>	<i>Relative Private Cost</i>
<b>Chapter Six: Municipal Services and Operations</b>						
<b>Water Efficiency Improvements</b> - Outdoor - Municipal	M15	Enhance and expand the computer-controlled irrigation system throughout the City's park system to reduce water use by tying watering cycles to soil moisture.	Quantified in State Reduction: SBx7-7— <i>Urban Water Demand Reduction Requirement*</i>	- Improves water quality - Extends water supply	Low	NA
	M18	Continue implementing the Bay-Friendly Landscape requirements for civic improvement projects which include landscaped areas larger than 10,000 square feet.			Cost Neutral	NA
<b>Water Efficiency Improvements</b> - Indoor - Municipal	M16	Conduct a water audit of all City-owned and operated buildings and facilities and implement measures to reduce water use. Encourage meeting the LEED Standards Rating Systems for Existing Buildings or Commercial Interiors or other comparable sets of standards.	Quantified in State Reduction: SBx7-7— <i>Urban Water Demand Reduction Requirement*</i>	- Improves water quality - Extends water supply	Medium	NA
<b>Energy Efficiency Improvements</b> - Water & Wastewater Pumps	M17	At the end of the units' useful life, replace least efficient water and wastewater motors and pumps in locations such as City parks with more energy-efficient units.	2	- Improves water quality - Extends water supply	Medium	NA
<b>Renewable Energy</b> - Municipal	M19	Evaluate the potential for providing solar, wind, and other renewable energy systems at City facilities.	534	- Improves air quality - Increases energy independence	Medium	NA
<b>Service Contracts</b>	M21	Evaluate the potential for setting greenhouse gas emission reduction targets and strategies for services contracted by the City, such as solid waste collection.	Not Quantified	- Reduces energy bills - Improves air quality - Improves public health	Medium	NA
	M22	Include a provision in the next contract with the City's solid waste collector that the provider use alternative fuel vehicles for the fleet which services Fremont.			Very Low	NA
<b>Paving Materials</b>	M23	Evaluate and, where appropriate, pursue the use of new greenhouse gas-reducing paving technologies for street and parking lot pavement projects. Examples include warm mix asphalt and paving with higher albedos (reflectivity) and improved rolling resistance.	Not Quantified	- Improves air quality - Improves public health	Low	NA

\* See page 5-5.



# Chapter Seven: Adapting to Climate Change



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*“It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is the most adaptable to change.” —Charles Darwin*

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When used in the context of climate change, *mitigation* refers to actions that reduce the extent of climate change, and *adaptation* refers to actions that reduce the vulnerability of the built environment to the effects of climate change. Even if humankind was somehow able to immediately stop the production of new greenhouse gases, the high concentration of carbon dioxide and other gases contributing to the greenhouse effect which are already in the atmosphere (from emissions from the burning of fossil fuels for energy beginning in the 19<sup>th</sup> century) would continue to change the climate.

Ideally, a local, regional, state or national climate strategy would address both mitigation and adaptation in an integrated manner. To date, much of California’s climate policy (as described throughout this Plan) has focused on mitigating the impacts of climate change through actions to reduce greenhouse gas emissions. The primary State effort addressing adaptation has been to provide information about the climate-related risks facing California and their potential consequences and impacts.

Photo credits (from right to left):

1. Courtesy of Troy Boswell, Los Angeles Animal Services.
2. Courtesy of Val Blakely.

One key example of the state's efforts is the 2009 *California Climate Adaptation Strategy*, prepared by the California Natural Resources Agency in response to Governor Schwarzenegger's 2008 Executive Order S-13-08. The Executive Summary opens with the following:

*Climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The state has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and both snowmelt and rainwater running off sooner in the year.*

*These climate driven changes affect resources critical to the health and prosperity of California. For example, forest wildland fires are becoming more frequent and intense due to dry seasons that start earlier and end later. The state's water supply, already stressed under current demands and expected population growth, will shrink under even the most conservative climate change scenario. Almost half a million Californians, many without the means to adjust to expected impacts, will be at risk from sea level rise along bay and coastal areas. California's infrastructure is already stressed and will face additional burdens from climate risks. And as the Central Valley becomes more urbanized, more people will be at risk from intense heat waves.*

*If the state were to take no action to reduce or minimize expected impacts from future climate change, the costs could be severe. A 2008 report by the University of California, Berkeley and the non-profit organization Next 10 estimates that if no such action is taken in California, damages across sectors would result in "tens of billions of dollars per year in direct costs" and "expose trillions of dollars of assets to collateral risk." More specifically, the report suggests that of the state's \$4 trillion in real estate assets "\$2.5 trillion is at risk from extreme weather events, sea level rise, and wildfires" with a projected annual price tag of up to \$3.9 billion over this century depending on climate scenarios. (p. 3)*

Clearly, the stakes are high, and the obstacles and level of uncertainty are considerable. Effective policy-making will need to reflect flexibility and commitment in spite of these obstacles. The Public Policy Institute of California (PPIC) found that "When asked to consider some possible effects of global warming in the state,

Californians are more likely to be very concerned about more severe wildfires (56%), more severe droughts (48%), and increased air pollution (45%) than about increased flooding (28%)."<sup>1</sup>

In another publication, PPIC notes that government agencies, along with public and private utilities, play a critical role in climate adaptation "...because they are responsible for providing services, making infrastructure investments, setting the regulatory contexts, and shaping the incentive structures in which individuals and business will make their own adaptation decisions."<sup>2</sup> The report also describes six particularly vulnerable areas of concern—water resources, electricity, coastal resources, air quality, public health, and ecosystem resources – to which could be added other areas such as cultural and historical resources, transportation systems, and the local economy.

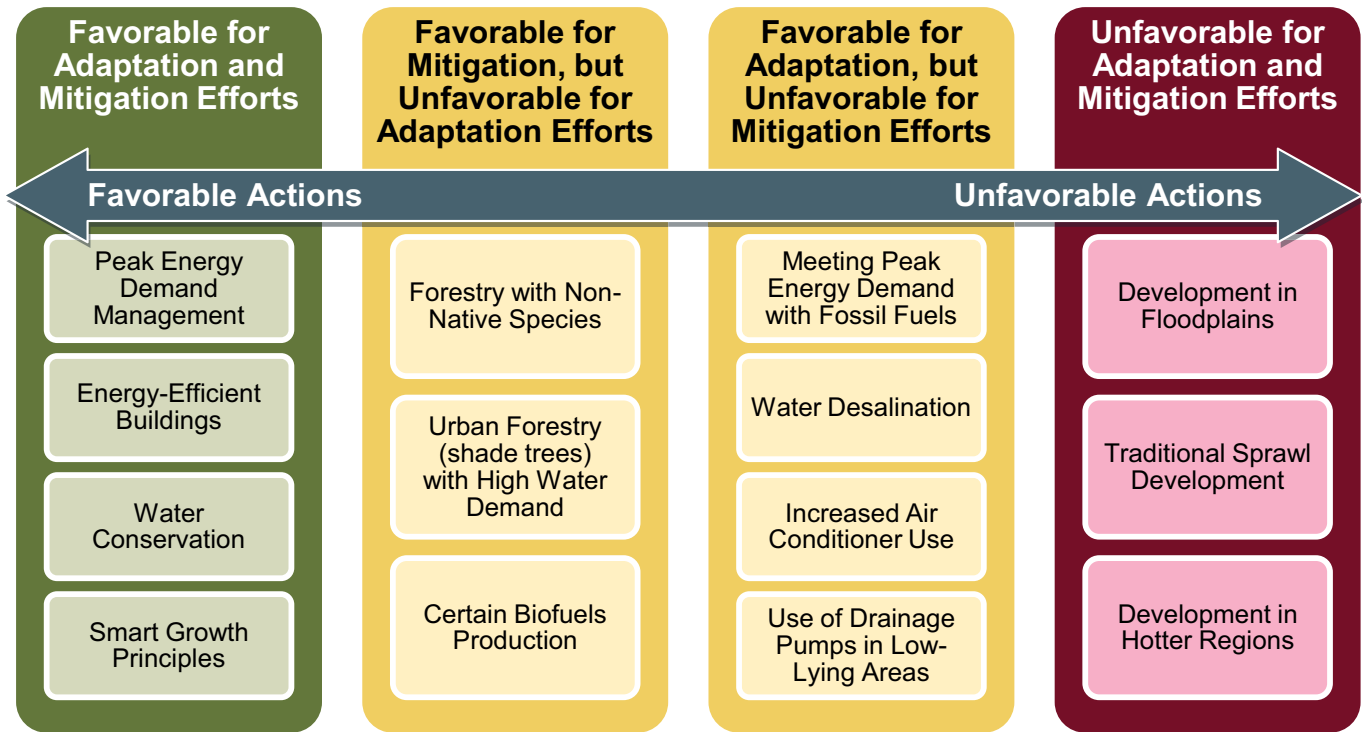
The challenge of pursuing an integrated climate strategy is complicated by the fact that, while some mitigation and adaptation strategies are synergistic, others are at cross purposes. In those cases, tradeoffs will need to be considered. The different time horizons of the two strategies—the longer-term perspective of mitigation versus the shorter-term needs of adaptation—is one factor which may reinforce conflicts. Examples of synergistic actions in this Plan include those which work to reduce greenhouse gas emissions by curbing energy use through improved energy efficiency in buildings. This mitigation strategy also supports the adaptation goal of creating less demand on the electric grid during extreme events such as heat waves, thereby decreasing the likelihood of power blackouts or brownouts. Another example is the mitigation strategy of increasing carbon sequestration by expanding tree planting across the city, which also supports the adaptation goal of counteracting the urban heat island effect through shade and increased natural cooling for buildings.

Figure 7-1 provides additional examples of mitigation and adaptation actions which are complementary or conflicting, and underscores the complexities facing communities, public agencies, the private sector, and individuals seeking to successfully address climate challenges and reduce and manage risk.

<sup>1</sup> Baldassare, M., Bonner, D., Petek, S., and Shrestha, J. *Californians and the Environment*, p. 15. Copyright 2011. Public Policy Institute of California. All rights reserved. San Francisco, CA.

<sup>2</sup> Louise Bedsworth and Ellen Hanak. *Preparing California for a Changing Climate*, p. 1. Copyright 2008, Public Policy Institute of California. All rights reserved. San Francisco, CA.

**Figure 7-1: Complementary and Conflicting Adaptation and Mitigation Actions**



Source: Bedsworth and Hanak, 2008.

The San Francisco Planning and Urban Research Association (SPUR) notes “Climate change adaptation will need to be dealt with at all levels of government. Yet it is at the local and regional levels where vulnerability can best be understood and addressed.”<sup>3</sup> The report describes the vulnerability assessment—defined as “an evaluation of a system’s risk compared to its adaptive capacity, or ability to cope with climate change” (p. 5)—as the main tool of adaptation planning. By way of example, a vulnerability assessment addressing sea level rise in Fremont—which is highlighted in the SPUR report as the Bay Area’s “most difficult climate adaptation challenge”—would map anticipated water levels to identify areas, facilities and populations at potential risk. This information would inform the discussions and decision-making about how to most effectively respond to the risks.

<sup>3</sup> San Francisco Planning and Urban Research Association, *Climate change hits home: Adaptation strategies for the San Francisco Bay Area*, May 2011, p. 29.

The development of adaptation plans by public agencies, including local governments, is in a nascent state. However, a cross-sector, regional approach to adaptation planning which integrates local assessments of vulnerabilities, will likely prove the most efficient way to utilize limited resources to provide the greatest benefit. As SPUR states:

*It is no surprise that no local governments in the Bay Area have adopted a comprehensive approach or plan to handle projected sea level increases on either the Bay or the Pacific Ocean. Local government planning efforts are generally underfunded, meanwhile sea level rise is perceived as a new threat that will not cause significant harm or require emergency response for years, if not decades. There is no public consensus around how to plan for sea level rise, or the most appropriate risk, financial and land-use management strategies for local governments to adopt. There is also a hope that federal, state or even regional organizations will step up with resources and planning tools that local governments will need to negotiate the problem—and also work to phase out programs and policies that can increase future risk to sea level rise, particularly in existing flood-prone areas. (ibid., p. 25)*

As discussed in Chapter One of this Climate Action Plan, Fremont will monitor the adaptation planning efforts anticipated by the Bay Area Climate Compact signatory cities of San Francisco, Oakland and San Jose, as well as the *Adapting to Rising Tides* (ART) collaboration, to inform the city's future work on adaptation planning. In early 2011, Alameda County, from Emeryville to Union City, was selected by the two sponsoring agencies—the San Francisco Bay Conservation and Development Commission (BCDC) and the National Oceanic and Atmospheric Administration Coastal Services Center—as the focus of Bay Area planning for sea level rise and other climate change impacts. The ART project is addressing the issues of how sea level rise and other climate change impacts will affect the future of Bay Area communities, ecosystems, infrastructure, and economy, and what strategies should be pursued on the local and regional level to address the impacts and manage the risks.

The California Energy Commission provided funding and oversight to UC Berkeley's Geospatial Innovation Facility to develop the Cal-Adapt web site. The website is intended to provide data and tools to the general public, researchers and decision makers for better understanding the risks posed by climate change. The website, <http://cal-adapt.org> will continue to be expanded as new information is made available.

# Chapter Eight: Implementation



The Climate Action Plan includes an ambitious, three-stage program of actions for reducing greenhouse gas emissions:

- 62 short-term actions (1-3 years from CAP adoption)
- 15 medium-term actions (3-5 years from adoption)
- 8 long-term actions (5-10 years from adoption)

Some of the implementation actions are mandated by other regulatory bodies (e.g. SW-R1, which requires implementation of mandatory commercial recycling) and/or are part of ongoing programs (e.g. W-C1, which is a state requirement for implementation of the City's *Water Efficient Landscape Ordinance*, occurring during the development review process). Other actions are new to the City, and will require staff to develop implementation processes and programs never before undertaken. Table 8-1 is a summary of all actions for reducing greenhouse gas emissions included in the CAP.

It is important to note that staff resources are limited, so it will be critical to pursue opportunities to leverage both outside funding and the efforts of other agencies in order to implement as many actions as possible.

It is also important to note that ongoing administration of the Climate Action Plan program will involve other staff work efforts in addition to the actions listed in the implementation program. For example, the General Plan calls for an update of the Climate Action Plan every five years. Also, periodic updates of the emissions inventory for both the community and municipal operations will be prepared.

As stated in other chapters, staff will collaborate with stakeholders when working on actions, especially those which may result in new local regulations.

**Table 8-1: Implementation Actions for Reducing Greenhouse Gas Emissions**

## Short-Term Actions: 1-3 Years from Plan Adoption

*Note: Abbreviations in the numbering system refer to the following proposed approaches to implementation actions:*

A	Advocate
C	Collaborate/participate
P	Promote/encourage
R	Regulate
M	Municipal (City-initiated policy directive)

### Land Use and Mobility

#### Advocate

- L-A1 Apply transit-oriented development principles at the Fremont, Irvington, and Warm Springs/South Fremont BART Stations, the Centerville train station, and the City Center, and consider other opportunities, particularly the Fremont Boulevard corridor.
- L-A2 Continue implementation of the City’s Pedestrian Master Plan to improve pedestrian infrastructure (such as sidewalks and conveniently located crosswalks) for walking throughout the community, in order to support increased pedestrian trips.
- L-A3 Continue implementation of the City’s Bicycle Master Plan to improve bicycle infrastructure, in order to support increased bicycle trips.
- L-A4 Encourage the reduction of single-occupancy vehicle use by establishing a commuter shuttle service program, to connect local business districts to Amtrak, Bus Rapid Transit, and BART stations.

#### Collaborate/Participate

- L-C1 Cooperate with regional agencies seeking to develop a network of fuel stations for vehicles using electricity, biofuels, and other non-fossil fuel energy sources, using the publication *Ready, Set, Charge, California! A Guide to EV Ready Communities* as a primary resource.
- L-C2 Collaborate with other agencies and the State of California to disseminate information about the “Just Check It” program, which addresses the importance and benefits of proper tire inflation.

#### Promote/Encourage

- L-P1 In newly constructed and remodeled non-residential buildings, encourage the provision of amenities, such as showering and changing facilities, to enable walking and bicycle use by employees.

#### Regulate

- L-R1 Require employers to provide preferential parking for carpools.



- L-R2 Require Transportation Demand Management strategies be implemented when developments outside transit-oriented development areas request increased development capacity (e.g. increases in floor area ratios).
- L-R3 Require new sidewalk construction to meet the five-foot width minimum requirement, to enhance usability by pedestrians and those using mobility devices.
- L-R4 Require applicants for private schools to submit plans for managing vehicular movement and parking which serves the school, and include, as a condition of approval, measures to address vehicle idling.
- L-R5 Prohibit redesignation and rezoning of land for lower intensity land uses in transit-oriented development areas, areas within walking distance of basic services, and other areas served by transit systems.
- L-R6 Consider requirements to provide pre-wiring for electric vehicle charging in new home construction as part of a Green Building program.
- L-R7 Require new developments, particularly those within transit-oriented areas and along transit corridors, to provide pedestrian, bicycle and transit amenities as a condition of approval.

## Energy

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### Advocate

- E-A1 Work towards utilizing existing programs offered by Pacific Gas and Electric for weatherizing the homes of all qualifying low-income households in Fremont.
- E-A2 Utilize existing funding programs, such as Community Development Block Grant programs, to achieve energy efficiency improvements in existing and new buildings.
- E-A3 Encourage the installation of energy efficiency retrofits by creating a Property Assessed Clean Energy (PACE) program, which allows qualified residential and non-residential property owners to repay the cost of installing energy efficiency retrofits on their property tax bill.

### Collaborate/Participate

- E-C1 Participate in the California Comprehensive Residential Building Retrofit Program, known as “Energy Upgrade California in Alameda County” and funded by the federal America Recovery and Reinvestment Act, to promote residential building retrofits.
- E-C2 Continue the annual collaboration with the California Youth Energy Services (CYES) program to conduct residential energy audits and to distribute compact fluorescent light bulbs and compact fluorescent lamp torchieres as replacements for halogen torchieres in Fremont households.
- E-C3 Continue the annual collaboration with the California Youth Energy Services program to conduct residential energy and water audits and to distribute water-saving shower heads and faucet aerators to Fremont households, to replace less efficient fixtures. (This action is also listed in the “Water” Chapter).
- E-C4 Continue to partner with Pacific Gas and Electric to offer energy efficiency programs for commercial buildings.

### Promote/Encourage

- E-P1 Encourage the replacement of high-pressure sodium and mercury vapor lights used in existing private streets and private parking lots with energy-efficient alternatives, such as light-emitting diodes (LEDs).

- E-P2 Promote tree planting throughout the City, to provide shade on buildings which reduces demand for air conditioning and helps reduce the ‘urban heat island’ effect.
- E-P3 Promote existing solar thermal programs, such as PG&E’s Solar Water Heating Rebate and the California Solar Initiative’s Thermal Program, to encourage the installation of solar hot water systems in existing and new residential and commercial buildings.
- E-P4 Facilitate the adoption of smart grid and other peak load reduction technologies, such as building energy management systems and smart appliances, within new and existing buildings.
- E-P5 Consider requirements to provide pre-wiring for future solar photovoltaics and other renewable on-site power generation systems in new home construction as part of a Green Building program.

**Regulate**

- E-R2 Eliminate local regulatory barriers to installation of distributed renewable energy systems, such as wind and solar, through revisions to the zoning code and other relevant city policies.

**Solid Waste**

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**Advocate**

- SW-A1 Support Extended Producer Responsibility legislation and processes.
- SW-A2 Support legislation that reduces waste and litter from single-use disposable items.
- SW-A3 Increase the number of Certified Green Businesses each year.
- SW-A4 Encourage large waste-generating businesses to get a free waste audit from the City of Fremont.
- SW-A5 Increase the amount of construction and demolition debris recycled from private-sector projects.
- SW-A6 Develop policies and support new technologies to improve waste reduction, recycling and resource recovery programs for materials.
- SW-A7 Institute programs for multi-family units to allow for the collection and composting of food waste and compostable paper where feasible.

**Collaborate/Participate**

- SW-C1 Work with Waste Management, Inc. to capture and recover methane gas to use as an energy source at the Tri-Cities Recycling and Disposal Facility and the Altamont Landfill and Resource Recovery Facility.
- SW-C2 Partner with California Youth Energy Services staff to provide information on recycling and composting that can be distributed to residents when CYES performs their energy audits.

**Regulate**

- SW-R1 Implement mandatory commercial recycling effective July 1, 2012, as required by the State of California and Alameda County.
- SW-R2 Comply with the California Green Building Code, effective January 1, 2011, which requires all new residential buildings to recycle 65% of the material generated from the project.
- SW-R3 Require recycling as a condition of permit issuance for special events that must secure city-issued permits.

## Water

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### **Advocate**

- W-A1 Continue the annual collaboration with the California Youth Energy Services program to conduct residential energy and water audits and to distribute water-saving shower heads and faucet aerators to Fremont households, as replacements for less efficient fixtures. (This action is also listed in the “Energy” Chapter).

### **Collaborate/Participate**

- W-C1 Continue to implement the Water Efficient Landscape Ordinance for private development.
- W-C2 Collaborate with Alameda County Water District to implement water conservation and reclamation programs.

### **Promote/Encourage**

- W-P1 Encourage use of on-site recycled water systems, (also known as ‘greywater systems’ or “laundry to landscape”) consistent with all environmental and health and safety regulations and Alameda County Water District policies and requirements.

## Municipal Services and Operations

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*The actions listed below will be initiated by the City of Fremont*

### **Vehicle Fleet**

- M1 Continue replacing gasoline- and diesel-powered fleet vehicles with alternative fuel vehicles, such as hybrids, compressed natural gas, and electric vehicles.
- M2 Install charging and refueling stations at appropriate sites throughout the city to service the fleet’s alternative fuel vehicles.
- M3 Educate and encourage City staff to limit idling when using fleet vehicles.

### **Street and Parking Lot Lighting**

- M4 Replace high-pressure sodium and mercury vapor lights used on public streets and public parking lots with energy-efficient alternatives, such as light-emitting diodes (LEDs.)

### **Planning and Budgeting Processes**

- M5 For the biannual Capital Improvement Program Plan, add a new criterion to the “Capital Improvement Project Prioritization Process” addressing the potential for projects (including the purchase of equipment such as vehicles for the City’s fleet) to reduce greenhouse gas emissions.
- M6 For the annual Operating Budget, add a new criterion, to be used in the evaluation and prioritization of equipment purchasing that addresses the potential for projects to reduce greenhouse gas emissions.
- M7 During employee recruitment, advertise the City’s incentives and subsidies for choosing alternatives to single-occupant auto commuting.

- M8 Provide preferential parking and/or other benefits for carpool and alternative fuel vehicles at City facilities, to encourage and reward carpooling and ownership of alternative fuel vehicles.
- M9 Provide secure bicycle parking, showers, lockers and other amenities at City facilities to promote bicycle use by both employees and visitors.

***GOAL: Increased diversion of solid waste from landfills and increased use of recycled-content products.***

- M10 Increase the amount of recycling and composting at City facilities.
- M11 Increase construction and demolition debris recycled from public-sector projects.
- M12 Enhance and expand waste reduction policies and programs for City facilities, such as the environmentally preferable purchasing policy and incorporate new policies in response to innovations in materials and technologies.
- M13 Support the source-reduction policy (AR 3.10) by discouraging the purchase of water in single-use, disposable containers by all City departments and agencies. Encourage reductions in the purchase of other beverages sold in single-use, disposable containers.
- M14 Increase the use of recycled-content products at City facilities.

***GOAL: Maximum water conservation and efficient use of water in City operations.***

- M15 Enhance and expand the computer-controlled irrigation system throughout the City’s park system to reduce water use by tying watering cycles to soil moisture.
- M16 Conduct a water audit of all City-owned and operated buildings and facilities and implement measures to reduce water use. Encourage meeting the LEED™ Standards Rating Systems for Existing Buildings or Commercial Interiors or other comparable sets of standards.
- M17 At the end of the units’ useful life, replace least efficient water and wastewater motors and pumps in locations such as City parks with more energy-efficient units.
- M18 Continue implementing the Bay-Friendly Landscape requirements for civic improvement projects which include landscaped areas larger than 10,000 square feet.

***GOAL: Increased use of renewable, distributed energy for City facilities.***

- M19 Evaluate the potential for providing solar, wind, and other renewable energy systems at City facilities.

## **Medium-Term Actions: 3-5 Years from Plan Adoption**

### **Land Use and Mobility**

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**Collaborate/Participate**

- L-C3 Collaborate with regional transportation agencies and the Chamber of Commerce to provide information about, and access to, incentives and services to increase the use of alternatives to single-occupant auto commuting, for employers of all sizes throughout the community. Examples include the Commuter Check and Bicycle Commuter Check Programs.
- L-C4 Partner with regional transportation agencies to encourage and facilitate the development of car-sharing, carpooling and other services that reduce the need to own a personal motor vehicle.

### **Promote/Encourage**

- L-P2 Encourage employers to provide transit subsidies, bicycle facilities, alternative work schedules, flextime, telecommuting and work-at-home programs, and other measures to reduce peak hour travel demand.

### **Regulate**

- L-R8 Adopt regulations restricting locations of drive-through businesses to reduce the impacts of vehicle idling on adjacent uses, such as housing, schools, and health care facilities.

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## **Energy**

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### **Advocate**

- E-A4 Consider establishing ‘energy budgets’ for newly-constructed and remodeled single family homes over a certain square footage beyond that which is required by State law.

### **Collaborate/Participate**

- E-C5 Work with Pacific Gas and Electric in a public information and education campaign to encourage every household and business to reduce their energy consumption and to utilize more energy efficient lighting and appliances.
- E-C6 Work with Pacific Gas and Electric to increase awareness and use of financial incentives to assist residential and commercial customers to improve energy efficiency.

### **Promote/Encourage**

- E-P6 Encourage business owners to convert or replace their gasoline-powered gardening equipment, such as lawn mowers, leaf blowers, and edge trimmers, with electric equipment.
- E-P7 Provide support and incentives to increase energy efficiencies and partner with others, such as real estate and other professionals, to create tools and incentives to achieve this goal.

### **Regulate**

- E-R2 Develop and enforce performance standards for exterior lighting of commercial and industrial buildings and parking lots, which will include minimum and maximum lighting levels while providing a safe environment.

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## **Solid Waste**

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### **Advocate**

- SW-A8 Increase recovery of organic materials from the commercial and residential sectors to 75%.
- SW-A9 Increase recovery of recyclable materials from the commercial and residential sectors to 75%.

## Municipal Services and Operations

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### *The actions listed below will be initiated by the City of Fremont*

- M20 Expand and improve existing incentives for City employees to choose alternatives to single-occupant auto commuting, such as flexible work schedules, telecommuting, transit incentives and subsidies, and ridesharing services and subsidies.
- M21 Evaluate the potential for setting greenhouse gas emission reduction targets and strategies for services contracted by the City, such as solid waste collection.
- M22 Include a provision in the next contract with the City's solid waste collector that the provider use alternative fuel vehicles for the fleet which services Fremont.
- M23 Evaluate and, where appropriate, pursue the use of new greenhouse gas-reducing paving technologies for street and parking lot pavement projects. Examples include warm mix asphalt and paving with higher albedos (reflectivity) and improved rolling resistance.

## Long-Term Actions: 5-10 Years from Plan Adoption

### Land Use and Mobility

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#### **Collaborate/Participate**

- L-C5 Partner with both public and private educational and childcare institutions to address vehicle idling at drop-off/pick-up locations serving the institutions.
- L-C6 Partner with BART, Washington Hospital, Kaiser Permanente and other large institutions to address vehicle idling at their facilities, through a public education campaign, signage, and enforcement program.

### Solid Waste

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#### **Advocate**

- SW-A10 Increase recovery of organic materials from the commercial and residential sectors to 90%.
- SW-A11 Increase recovery of recyclable materials from the commercial and residential sectors to 90%.

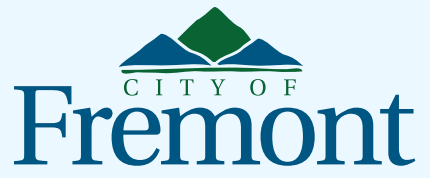
### Water

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#### **Collaborate/Participate**

- W-C3 Collaborate with Alameda County Water District to adopt a retrofit program to encourage installation of water conservation measures in existing businesses and residences.
- W-C4 Collaborate with Alameda County Water District and Union Sanitary District to support the use of recycled water.
- W-C5 Support development of a process for permitting, registration, and inspection of greywater systems by the City.
- W-C6 Consult with ACWD in developing policies and regulations supporting the use of water conserving strategies, including greywater systems.





Cover photo courtesy of Monica Mathiesen.