CLIMATE ACTION PLAN

CITY OF LARKSPUR

JUNE 2010

CITY OF LARKSPUR

RESOLUTION NO. 26/10

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF LARKSPUR APPROVING A CLIMATE ACTION PLAN AND A GREENHOUSE GAS EMISSION REDUCTION TARGET

WHEREAS, on November 7, 2007, the City of Larkspur adopted Resolution No. 44/07 resolving to participate in the Cities for Climate Protection Campaign and, as a participant, pledges to take a leadership role in promoting public awareness about the causes and impacts of climate change;

WHEREAS, on November 7, 2007, the City of Larkspur agreed to undertake the Cities for Climate Protection Campaign's five milestones to reduce both greenhouse gas and air pollution emissions throughout the community, and specifically:

- Conduct a greenhouse gas emissions inventory and forecast to determine the source and quantity of greenhouse gas emissions in the jurisdiction;
- Establish a greenhouse gas emissions reduction target;
- Develop an action plan with both existing and future actions which when implemented will meet the local greenhouse gas reduction target;
- Implement the action plan; and
- Monitor and report progress; and

WHEREAS, on June 3, 2009, the City of Larkspur approved Larkspur's 2005 Greenhouse Gas Emissions Inventory and directed staff to complete a Climate Action Plan to reduce government and community GHG emissions over the next ten years; and

WHEREAS, the City of Larkspur collaborated with the Marin Climate and Energy Partnership (MCEP) and the MCEP Sustainability Coordinator to prepare a Draft Climate Action Plan; and

WHEREAS, the City of Larkspur's internal Green Committee reviewed and advised on the Draft Climate Action Plan; and

WHEREAS, on May 25 and June 22, 2010, the Larkspur Planning Commission held public hearings on the Draft Climate Action Plan and voted to recommend approval of the Draft Climate Action Plan and a greenhouse gas emissions reduction target of 15% below 2005 levels by 2020; and

WHEREAS, on July 21, 2010, the City Council held a duly noticed public hearing on the draft Climate Action Plan and the proposed greenhouse gas emissions target.

****

NOW THEREFORE, BE IT RESOLVED, that the City Council of the City of Larkspur approves:

1. The Climate Action Plan, dated Draft June 2010, and
2. A Greenhouse Gas Emissions Target of 15% below 2005 levels by 2020.

IT IS HEREBY CERTIFIED that the City Council of the City of Larkspur duly introduced and adopted the foregoing resolution at a regular meeting held on the 21st day of July, 2010 by the following vote:

AYES:	COUNCILMEMBER: Chu, Hartzell, Hillmer, Lundstrom, Rifkind
NOES:	COUNCILMEMBER: None
ABSTENTIONS:	COUNCILMEMBER: None
ABSENT:	COUNCILMEMBER: None

Joan L. Lundstrom
MAYOR

ATTEST:
Cynthia Hirsman
CITY CLERK

CREDITS AND ACKNOWLEDGEMENTS

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Daniel Hillmer, Councilmember
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1. INTRODUCTION

1.1 Purpose of the Climate Action Plan

The City of Larkspur understands that climate change has the potential to significantly affect Larkspur's residents and businesses, as well as other communities around the world. The City also recognizes that local governments play a strong role in reducing greenhouse gas emissions and mitigating the potential impacts of climate change.

The purpose of this Climate Action Plan is to compile existing and potential strategies (i.e., actions, projects, and programs) that the City's government operations and the community can take to address climate change. It provides a brief background on what climate change is and its potential impacts, but focuses on the efforts Larkspur can take to reduce its greenhouse gas emissions and mitigate, to the extent feasible at the local level, the potential impacts of climate change.

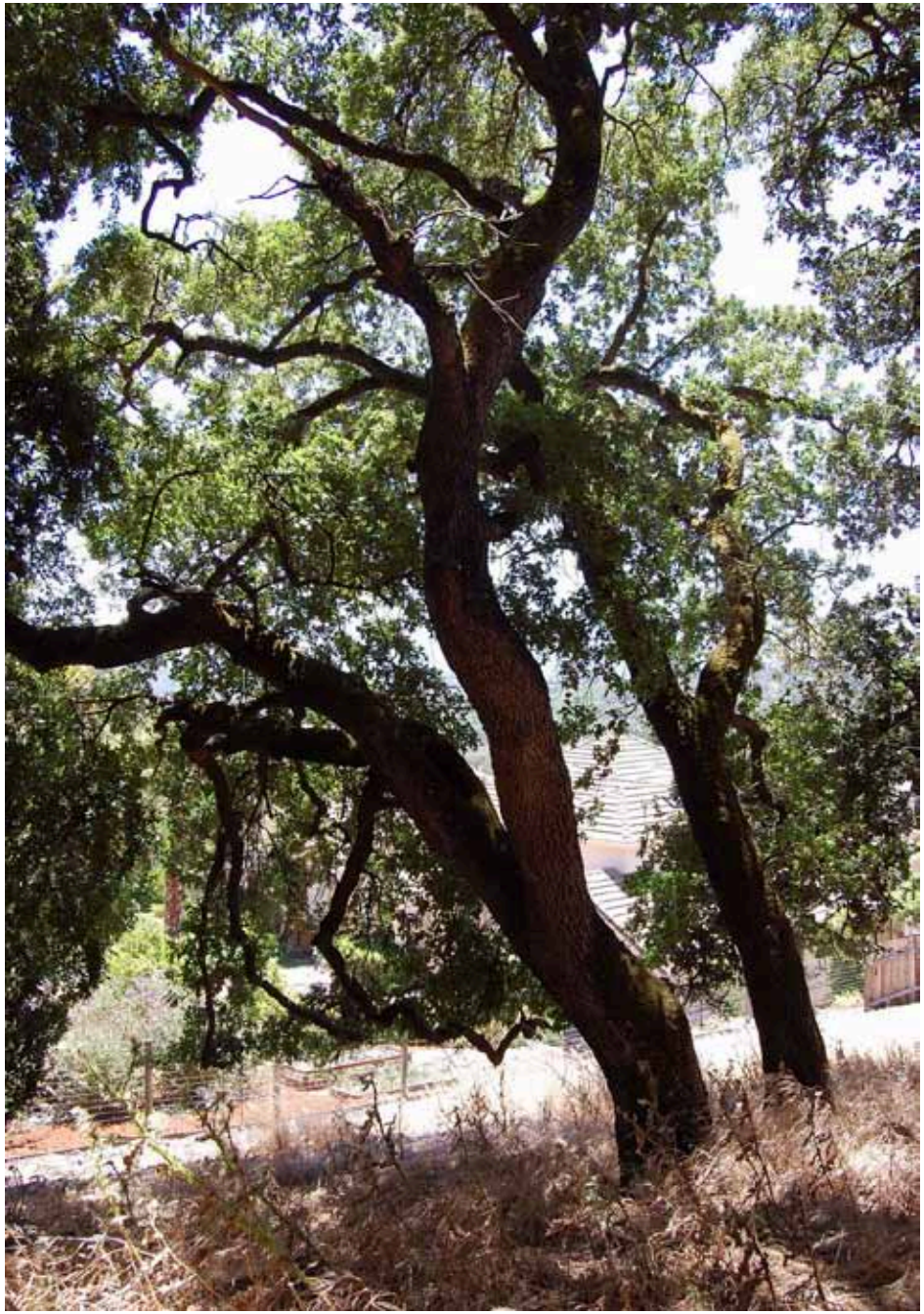
Through actions outlined in this Plan, such as increasing energy efficiency of buildings, encouraging less dependence on the automobile, and using clean, renewable energy sources, the community can experience lower energy bills, improved air quality, reduced emissions, and an enhanced quality of life. The City's preparation of a 2005 Greenhouse Gas Emissions Inventory and this Climate Action Plan is the beginning of an ongoing planning process that includes assessing, planning, mitigating and adapting to climate change.

Specifically, this Plan does the following:

- Summarizes the various regulations at the federal, state, and regional levels.
- Incorporates the City's 2005 Greenhouse Gas Emission Inventory, which identified sources of greenhouse gas emissions generated by both the community and the City's government operations.
- Estimates how these emissions may change over time and establishes a target to reduce greenhouse gas emissions to 15% below 2005 levels by 2020.
- Provides natural system, energy use, transportation, land use, green purchasing, and waste and water use strategies necessary to minimize Larkspur's impacts on climate change and meet the established greenhouse gas emission's target.

1.2 Relationship to the General Plan

It is intended that the Larkspur General Plan will integrate and reference this Plan, instead of including the Plan in the General Plan itself. Though both the General Plan and the Climate Action Plan are intended as long-range plans, the Climate Action Plan may be updated on a more regular basis to add and amend strategies as new information, policy guidance, and regulations regarding climate change evolve and new technologies to address it are developed.



1.3 Climate Change Background

A balance of naturally occurring gases dispersed in the atmosphere determines the Earth's climate by trapping infrared radiation (heat), a phenomenon known as the greenhouse effect. Significant evidence suggests that human activities are increasing the concentration of these gases (known as "greenhouse gases" or GHG) in the atmosphere, causing a rise in global average surface temperature and consequent global climate change. The greenhouse gases include carbon dioxide, methane, nitrous oxide, halocarbons, ozone, and water vapor. Each one has a different degree of impact on climate change. To facilitate comparison across different emission sources with mixed and varied compositions of several GHG, the term "carbon dioxide equivalent" or CO2e is used. One metric ton of CO2e may consist of any combination of GHG, and has the equivalent Global Warming Potential (GWP) as one metric ton of carbon dioxide (CO2). According to EPA's April 2009, "Inventory of U.S. Greenhouse Gas Emissions," the majority of GHG emissions comes from fossil fuel combustion, which in turn is used for electricity, transportation, industry, and heating, etc.

Collectively, these gases intensify the natural greenhouse effect, causing global average surface temperatures to rise, which affects local and global climate patterns. These changes in climate are forecasted to manifest themselves in a number of ways that might impact Larkspur as well as other changes to local and regional weather patterns and species migration.

According to a 2006 Summary Report from the California Climate Change Center, global warming could significantly impact California water and forest resources. The Center's 2006 Summary Report noted the following findings and potential risks to California[1]:

- Precipitation is the most important hydrologic variable and most difficult to forecast.
- Warming raises the elevation of snow levels with reduced spring snowmelt and more winter runoff.
- Less snowmelt runoff means lower early summer storage at major foothill reservoirs with less hydroelectric power production.
- Higher temperatures and reduced snowmelt compounds the problem of providing suitable cold-water habitat for salmon species.
- Rising sea levels would adversely affect many coastal marshes and wildlife reserves.
- Higher temperatures increase the demand for water by plants.
- Climate change in California will result in a higher frequency of large damaging fires.
- Regional climates that are hotter and drier will result in increased pest and insect epidemics within California's forests.

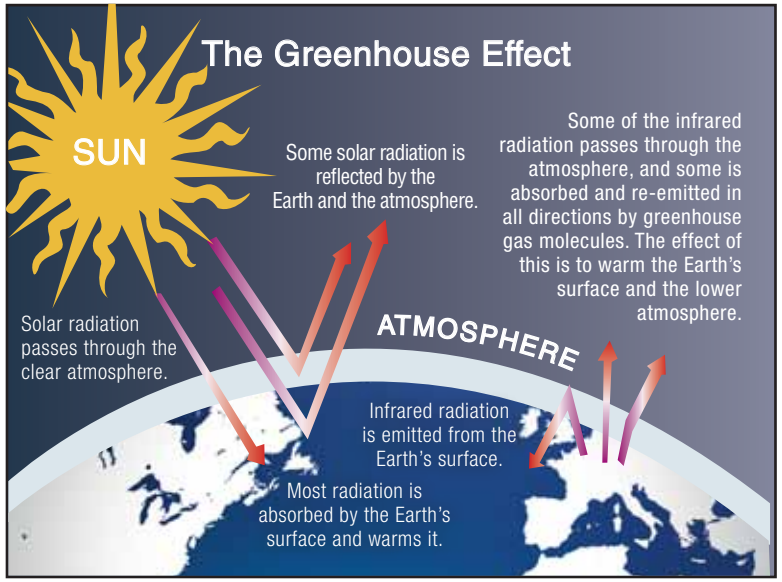


Figure 1: The Greenhouse Effect

1 A Summary Report from: California Climate Change Center. Our Changing Climate: Assessing the Risks to California. Document No. CEC-500-2006-077. July 2006. http://www.energy.ca.gov/2006publications/CEC-500-2006-077/CEC-500-2006-077.PDF, accessed 3/22/10.

1.4 Sea Level Rise

Because of scientific uncertainties, it is difficult to predict with a high degree of accuracy the sea level rise that will impact Marin County residents. The San Francisco Bay Conservation and Development Commission's (BCDC) most recent assessment assumes a 1.8° to 5.4° F (1° to 3° C) rise in global temperature over the next century and a corresponding sea level rise in San Francisco Bay of 16 inches by mid-century and 55 inches by 2100.[2] Sea level rise of this magnitude would have dramatic impacts on residences, businesses, schools, and public infrastructure located near the shoreline. Inundation maps created by BCDC (see Figure 2) integrate GIS data from the USGS and sea level rise projections to assess the vulnerability of Bay Area communities to different level rise scenarios. A 16-inch rise in sea level would result in the flooding of 180,000 acres of shoreline, which is roughly equivalent to today's 100-year floodplain. A 55-inch rise in sea level would flood over 213,000 acres of shoreline, putting billions of dollars of private and public development at risk. Changes in climate and sea level could cause an increase in storm activity, storm surges, and even greater flooding.

Figure 2: Inundation Effect of 16-Inch Sea Level Rise

SOURCE:
http://www.bcdc.ca.gov/planning/climate_change/maps/16/cbay_north.pdf; Inundation data from Knowles, 2008. Aerial imagery is NAIP 2005 data. Accessed 3/30/10.
DISCLAIMER: Inundation data does not account for existing shoreline protection or wave activity. These maps are for informational purposes only.

2 San Francisco By Conservation and Development Commission Draft Staff Report, "Living with a Rising Bay: Vulnerability and Adaptation in San Francisco By and on its Shoreline," April 7, 2009, http://www.bcdc.ca.gov/proposed_bay_plan/bp_1-08_cc_draft.pdf, accessed 3/30/10.

1.5 Climate Change Mitigation Activities in Larkspur

In November 2007, the City Council adopted Resolution No. 44/07 stating its commitment to participate in the Cities for Climate Protection Campaign (CCP) and, as a participant, pledged to take a leadership role in promoting public awareness about the causes and impacts of climate change. Further, the City also pledged to undertake the program's five milestones to reduce both greenhouse gas and air pollution emissions throughout the community, specifically:

- Conduct a Greenhouse Gas Emissions Inventory and forecast to determine the source and quantity of greenhouse gas emissions in the jurisdiction. In June 2009, the City completed and the City Council adopted Larkspur's 2005 Greenhouse Gas Emissions Inventory. The full report can be found on the City's website.
- Establish a Greenhouse Gas Emissions Reduction Target. In July, 2010, the City Council adopted a GHG emissions reduction target of 15% below 2005 levels by 2020. The year 2005 is used rather than an earlier baseline year due to the more comprehensive and accurate data available for that year.
- Develop a Climate Action Plan with both existing and future actions which when implemented will meet the local greenhouse gas reduction target. In July, 2010, the City Council adopted a Climate Action Plan, dated June 2010.
- Implement the Climate Action Plan. The City will be responsible for implementing the policies, programs and initiatives identified in the Action Plan.
- Monitor and Report Progress. In order for the City to successfully achieve its emissions reduction targets, progress reports will be required to monitor how well the City and the communities are doing in reducing emissions. The Climate Action Plan will be updated and modified, as needed, based on results from the monitoring.

The City's most recent sustainability initiatives are listed below. A more detailed list can be found in the City's 2005 Greenhouse Gas Emissions Inventory.

- Worked with the Marin Energy Management Team (MEMT) to complete preliminary Energy Management Study of Larkspur's public facilities in August of 2005. This led to the implementation of several energy-saving measures:
    - Upgraded City Council Chamber's ceiling with airtight panels to reduce heat loss.
    - Installed new energy efficient lighting in City Hall/Library building and Fire Stations Nos. 15 and 16 (#1 and #2).
    - Replaced tar & gravel roof over Children's Library with new white Duro-Last roofing.
    - Replaced portions of tar & gravel roof over Fire Station No. 16 (#2) with new white Duro-Last ™ roofing.
    - Upgraded HVAC equipment on both City Hall/Library building and Fire Station No. 16 (#2).
    - Replaced all un-insulated ductwork in City Hall/Library building with new insulated ductwork.
    - Installed energy miser on outdoor soda vending machine.
    - Applied for, and were approved for, solar energy grants through the Clean Energy Renewable Bonds (CREBS) program.
- Worked in conjunction with the County of Marin, Caltrans, Sonoma-Marin Area Rail Transit District (SMART), and the Golden Gate Bridge and Highway Transportation District (GGBHTD) on developing the several Highway 101 Corridor projects that will serve to reduce congestion and encourage alternative transportation modes: Highway 101 GAP Closure, Highway 101 Greenbrae / Twin Cities Corridor, Central Marin Ferry Connection, and the Cal-Park Hill / Tunnel Multi-use Pathway.

- City staff participated in the Central Marin Transit Study, a multi-jurisdictional effort to develop an incremental program of feasible and fundable improvements to U.S. 101-oriented trunk line bus service and to identify opportunities for transit to serve as effective feeders for both ferry and regional commute bus services. The Central Southern Marin Transit Study offers an important opportunity to develop a comprehensive and implementable plan to improve the effectiveness of regional and local transit service within Southern Marin County's U.S. 101 corridor.
- Working with funding from the Safe Routes to School program, Marin County Congestion Management Authority (now Transportation Authority of Marin), and other outside agencies, the City has implemented and/or planned several sidewalk, bike, and multi-use path projects to improve accessibility, walkability and alternative transportation throughout the City:

    - Doherty Drive Improvements – Bike path / sidewalk widening from Piper Park to Larkspur Plaza Drive (Completed)
    - Bon Air Improvements - Class 2 bike path from Bon Air Bridge to Magnolia Avenue (Completed)
    - East/West Multi-Use Class 1 Pathway – Paved bike and pedestrian pathway between Corte Madera and Larkspur (Completed)
    - Magnolia Avenue Class 1 Bike Extension – Bike and pedestrian improvements at the intersection of Magnolia Avenue and Doherty Drive (Completed)
    - Magnolia Avenue Striping - Class 2 bike path northbound from Dartmouth Drive to Murray Avenue (Planned for 2010)
    - Redwood Highway Improvements – New pedestrian path/sidewalk and class 2 bike lanes from Wornum Drive to Industrial Way (Planned for 2010-2011)
    - Multi-Use Path to Heatherwood Park – Multi-use path from Doherty Drive along east side of Larkspur Creek (Completed)

    - Doherty Drive Class 1 Bike Path - South side from Magnolia Avenue to Redwood High School (Planned for 2010-2011)
    - Elm Avenue Stairs - Neighborhood steps, lane, and pathway improvements (Planned for 2010-2011)
    - Post Street Stairs - Neighborhood steps, lane, and pathway improvements (Planned for 2010)
    - Sir Francis Drake Multi-use path / wooden bridge – New deck and railings (Planned for 2010)
    - ADA Access Pathway to Sandra Marker Trail – 90% funded pathway improvements (Planned for 2010-2011)

- In 2007, the City Adopted the Green Building Ordinance (Ord. 956) which outlined minimum GreenPoint™ building thresholds for new residential structures and additions and a minimum LEED standard for new commercial structures and additions as well as all City-sponsored facilities.

- In 2008, the City adopted a Wood-Burning Ordinance (Ord. 943) to educate the public regarding the negative impacts of burning wood-based fuels, regulate the installation of wood-burning appliances, and prohibit the use of polluting fuel-types.
- In 2008-2009, the City participated in the "Way-to-Go!" program (part of the Non-motorized Transportation Pilot Program involving numerous community partners), to change the travel behavior of local residents by disseminating maps and other information and promote bicycling, walking, transit and carpooling opportunities.
- In 2008, the City formed a staff-level "Green Committee" to regularly review and recommend City operations and policies to encourage energy and resource conservation and identify potential cost savings in promoting green practices.
- In 2010, the City began drafting an update to Ord. 956, Green Building Ordinance, with updated thresholds based on the Draft CALGreen Code and the work of the Building Energy Retrofit and Solar Transformation Committee (BERST), a countywide committee organized by the City of San Rafael to update and unify Green Building standards for the County; this update will be added when approved.
- In 2010, the City was awarded a $63,000 Energy Efficiency and Conservation Block Grant by the California Energy Commission to replace 130 streetlights with more energy-efficient lamps. These streetlights will be retrofitted by 2011.
- In 2010, the City was awarded a $33,523 grant to install three electric vehicle charging stations, with the capacity to charge six cars simultaneously. The stations will be operational by 2011.

1.6 Regulation of Climate Change – Federal, State and Regional Levels

Federal Climate Policy

Currently, there is no federal mandate for greenhouse gas emission reporting or reduction in the United States. Efforts, however, are underway in Congress to develop and enact comprehensive climate and energy legislation. Senator Boxer, Chair of the Environmental and Public Works Committee, has stated that AB 32 goals and strategies may be a viable starting point for federal legislation.

State Climate Policy

California produces roughly 1.4 percent of the world's and 6.2 percent of the total U.S. greenhouse gases (GHG). The State of California has taken the lead in setting specific targets for reducing greenhouse gas emissions from the burning of fossil fuels in both power plants and vehicles through the following legislation:

California Solar Initiative Program, 2006. Comprehensive $2.8 billion program that provides incentives toward residential and commercial solar development over 11 years.

Senate Bill 1078 Sher, 2002. Established a Renewable Portfolio Standard requiring electricity providers to increase purchases of renewable energy resources by 1% per year until they have attained a portfolio of 20% renewable resources.

Executive Order S-21-09. In September 2009, California Governor Arnold Schwarzenegger signed an executive order directing the State's Air Resources Board to adopt regulations increasing California's Renewable Portfolio Standard (RPS) to 33 percent by 2020. The RPS will apply to investor-owned utilities, publicly-owned utilities, direct access providers, and community choice aggregators, including Marin Energy Authority.

Assembly Bill 1493 Pavley, 2002. Requires the California Air Resources Board (CARB) to develop and adopt regulations that achieve the maximum feasible reduction of greenhouse gasses from vehicles primarily used for non-commercial transportation by January 2005. In 2009, CARB adopted final regulations that are expected to reduce GHG emissions from California passenger vehicles by about 22 percent in 2012 and about 30 percent in 2016.

Senate Bill 1771 Sher, 2000. Requires the California Energy Commission (CEC) to prepare an inventory of the State's greenhouse gas emissions, to study data on global climate change, and to provide government agencies and businesses with information on the costs and methods for reducing greenhouse gases. Also establishes the California Climate Action Registry to serve as a certifying agency for companies and local governments to quantify and register their greenhouse gas emissions for possible future trading systems.

Assembly Bill 32 Nuñez & Pavley, 2006. Also known as The Global Warming Solutions Act of 2006, institutes a mandatory limit on greenhouse gas pollution and requires a reduction in emissions in California to 1990 levels by the year 2020. The bill also directs the California Air Resources Board (CARB) to establish a mandatory reporting system to track and monitor emission levels and requires CARB to develop various compliance options and enforcement mechanisms.

Senate Bill 375 Steinberg, 2008. Will assign a greenhouse gas reduction target for car and light truck emission for each region in the State represented by a metropolitan planning organization (MPO) that is to be addressed with a Sustainable Communities Strategy (SCS). Also touches on planning for transportation, housing and the environment and requires Alternative Planning Strategy documents where a SCS will not achieve the GHG reduction targets.

The most significant of these initiatives are AB 32 and SB 375; the first requires California to reduce its GHG to 1990 levels by 2020, and the second begins to tie GHG reductions to land use. In 2007, the California Air Resources Board (CARB) conducted an emissions inventory for the state to identify emissions levels in 1990 that figure 427 million metric tons of carbon dioxide equivalent. The inventory revealed that transportation was the largest single sector (35% of the state's total 1990 emissions), followed by industrial emissions (24%), imported electricity (14%), in-state electricity generation (11%), residential use (7%), agriculture (5%), and commercial use (3%). (ref: http://www.arb.ca.gov/newsrel/nr120607.htm. 1/1/10)

Preliminary estimates indicate that California's 2020 emission projections could be 600 million tons of CO2e if no actions are taken to reduce GHG. This means that California must prevent 173 million tons of CO2e from being emitted by 2020 in order to meet the 1990 levels as required by AB 32.

CARB is responsible for monitoring and reducing GHG emissions set forth in AB 32, and is, therefore, coordinating statewide efforts. In December 2008, CARB adopted a Scoping Plan that outlines the actions required for California to reach its 2020 emission target. The actions include a broad set of clean energy, clean transportation, and efficiency standards.

In 2009, CARB identified and implemented nine discrete early action measures including regulations affecting landfills, motor vehicle fuels, refrigerants in cars, tire pressure, port operations and consumer products. Additional reduction measures to meet the 2020 target will be adopted by early 2011.

3 California Air Resource Board, "Climate Change Scoping Plan," December 2008, p. 27, http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf, accessed 3/31/10.

Key strategies identified in the Scoping Plan that are best developed and supported by local governments in achieving the climate protection and emission reduction goals include:

- Transportation and community design
- Local and regional emission targets
- Recycling and waste reduction
- Clean energy
- Green buildings
- Water

The CARB Climate Change Scoping Plan "encourages local governments to adopt a reduction goal for municipal operations emissions and move toward establishing similar goals for community emissions that parallel the State commitment to reduce greenhouse gas emissions by approximately 15 percent from current levels by 2020.[3]" It should be noted that CARB does not yet require local governments to develop climate action plans as part of the AB 32 process; however, SB 375, enacted in 2008, does require climate to be included in the General Plans of local jurisdictions.

Marin County Climate Policy

The ecological footprint measures the use of natural resources against the planet's actual biocapacity and its ability to supply these resources. It can be calculated for individuals, regions, countries, or the entire earth and is expressed as the number of global acres (acres with world average biological productivity) that it takes to support one person. As Figure 3 shows, the average American uses 24 global acres per capita, while the average Marin resident requires 27 global acres. Other western democracies, such as France, Germany, and Italy, have footprints of 13, 12, and 9.5 global acres per person, respectively.

In 2006, Marin County developed a strategic plan to reduce annual GHG emissions to 15% below 1990 levels by 2020. In 1990, Marin County GHG emissions were calculated at about 2.6 million tons, and in 2000 at about 3.1 million tons – a 15% increase. Between 2000 and 2005 emissions trends began moving down, so the net increase in emissions between 1990 and 2005 is estimated at 6%. There has not been a complete analysis of the causes of the emissions reduction in the 2000 – 2005 period. However, a reduction in vehicle miles traveled following the dotcom downturn is one likely component of the change.

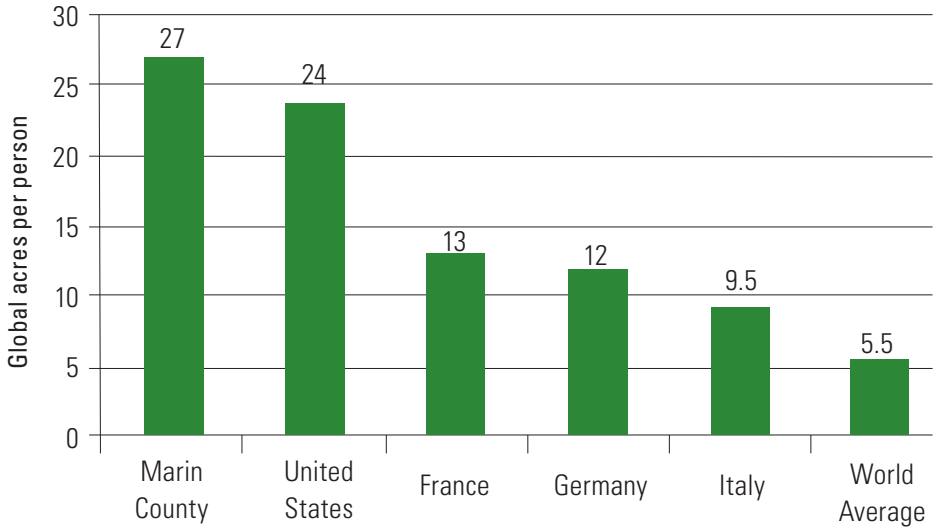


Figure 3: Ecological Footprint Comparison

Source: Redefining Progress, Sustainable Sonoma County, Worldwide Fund for Nature, as quoted in the Marin Countywide Plan, adopted November 6, 2007.

Figures 4 and 5 show the distribution of County-wide GHG emissions by sector in 2005 and emission trends between 1990 and 2005. Since a large portion of the County is operated and governed by the eleven local jurisdictions and numerous special districts, it is important that the municipalities, such as Larkspur, participate in developing emission reduction measures and/or policies.

Coordinated Multi-Jurisdictional Approach: Marin Climate and Energy Partnership

Recognizing the need for a partnership structure that would foster collaboration on the complex GHG reduction challenge, Joint Venture Marin (a partnership of Marin leaders from government, business, and the community) initiated planning for the Marin Climate and Energy Partnership (MCEP) in March of 2007. In November of 2007, MCEP partnered with ICLEI (an international nonprofit organization that sponsors the Mayor's Campaign for Climate Protection) to bring together representatives of all 11 Marin jurisdictions, the County, MMWD, and Transportation Authority of Marin, to develop the MCEP structure and goals, and to develop the necessary resources to plan and implement coordinated GHG Reduction strategies among all local governments in Marin County, along with the transportation and water agencies.

One mission of the Marin Climate & Energy Partnership (MCEP) is to reduce greenhouse gas (GHG) emission levels to the targets of Marin County and local municipalities, while also meeting the criteria air pollutant reduction goals of the Bay Area Air Quality Management District in compliance with the standards set by AB 32. MCEP is directed by a Steering Committee consisting of one representative from each partner jurisdiction and agency, working in collaboration with relevant staff liaisons from member entities. Since its inception, the Marin Community Foundation, the Bay Area Air Quality Management District, and the partner members have provided funding for MCEP. The City has worked closely with the Marin Climate and Energy Partnership to complete this climate action plan, and to implement a coordinated approach to local and regional emissions reduction targets and climate action planning goals.

Figure 4: Marin County Emissions by Sector (2005)

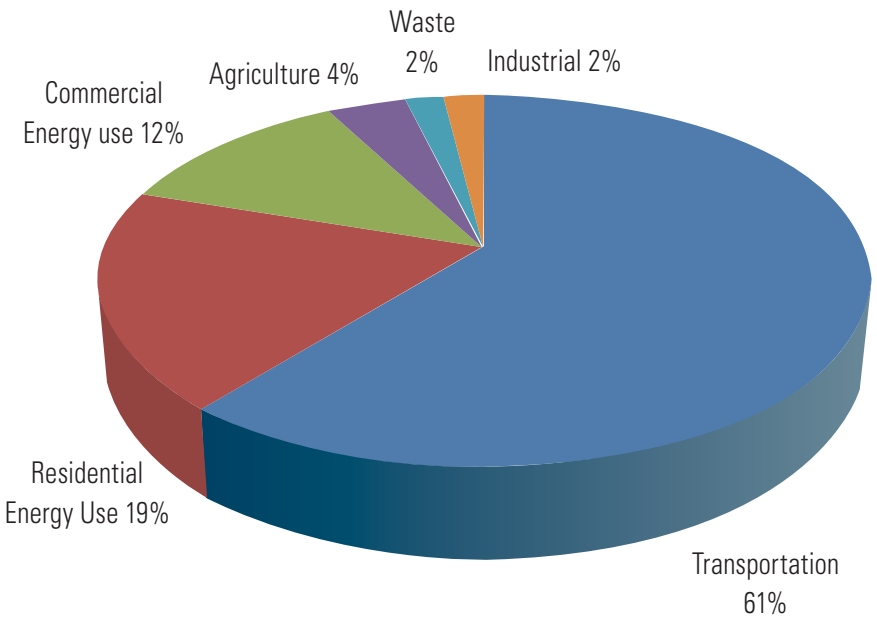
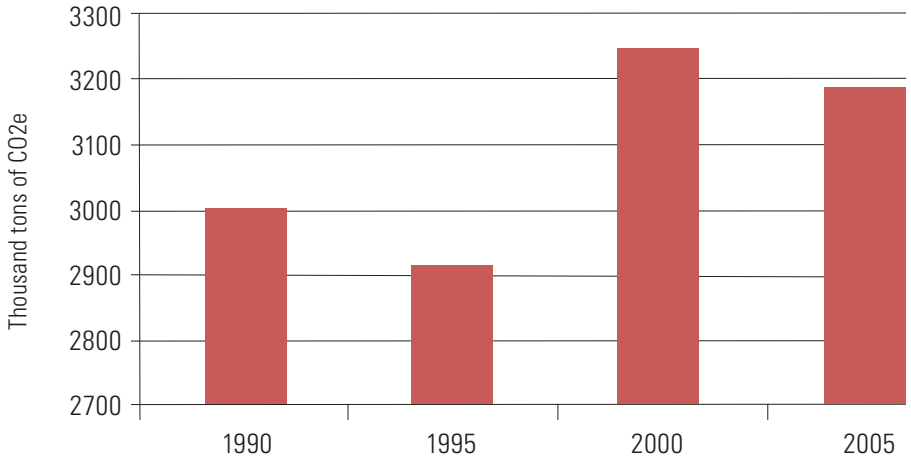


Figure 5: Marin County Emissions 1990-2005



2. LARKSPUR'S GREENHOUSE GAS EMISSIONS

2.1 Larkspur's Profile

Larkspur is a city of 4.5 square miles, located in Marin County in the San Francisco Bay Area. In 2005, according to the Association of Bay Area Governments (ABAG) Projections 2009, Larkspur's population was 12,000, and there were approximately 6,160 households. Included as an indicator of commercial activity, the number of jobs within Larkspur in 2005 was 7,410. Larkspur experienced an estimated 3,649 Heating Degree Days and 292 Cooling Degree Days in 2005. [4]

Table 1: Larkspur's 2005 Profile Chart

Size	Population	Annual Budget	Employees	Climate Zone	Heating Degree Days	Cooling Degree Days
4.5 sq. miles	12,000	$11,442,784	55	3	3,649	292

In 2005, Larkspur provided the core services shown in Table 2, which have been identified as having an impact on greenhouse gas emissions levels. The facilities and equipment that are instrumental in the delivery of these services are the focus of the emissions reduction strategies for government operations in this Climate Action Plan. There are a number of opportunities for reducing emissions from government operations, many of which have added benefits of reducing government operating costs and improving workplace efficiency.

Table 2: City of Larkspur Services

Services / Facility		Services / Facility	
Community Parks & Facilities	X	Solid Waste Collection	
Electric Utility		Solid Waste Disposal (landfill)	
Fire Protection	X	Street Lighting and Traffic Signals	X
Library and City Offices	X	Stormwater Management	X
Mass Transit		Seaport / Marina	
Natural Gas Utility		Water Treatment	
Police		Water Distribution	
Roadway and Sidewalk Maintenance	X	Wastewater Collection	
Schools		Wastewater Treatment	

4 Climate Zone information is supplied by the U.S. Department of Energy, http://resourcecenter.pnl.gov/cocoon/morf/ResourceCenter/dbimages/full/973.jpg, accessed 3/31/10. Heating and Cooling Degree Days data for the North Coast Drainage Division is supplied by NOAA Satellite and Information Service, National Climatic Data Center, U.S. Department of Commerce, http://www7.ncdc.noaa.gov/CDO/CDODivisionalSelect.jsp, and accessed 3/31/10.

2.2 2005 Greenhouse Gas Emissions Inventory

Government Operations Inventory Results

In 2005, Larkspur operations emitted approximately 540 metric tons (tons) of CO2e.[5] As visible in Table 3, the Employee Commute Sector was the largest emitter (39.7 percent) in 2005. Emissions from the Vehicle Fleet Sector produced the second highest quantity of emissions, resulting in 22.2 percent of total CO2e; and the Lighting Sector produced 18.3 percent of total emissions. The remainder of emissions came from the Buildings Sector (14.5 percent), the Waste Sector (4.6 percent), and the Water Sector (0.8 percent). Emissions from government operations produced approximately 0.5 percent of total community emissions.

Table 3: 2005 Government Operations Emissions by Sector

Sector	Greenhouse Gas Emissions (metric tons CO2e)	Greenhouse Gas Emissions (% CO2e)	Energy Equivalent (million Btu)	Cost* ($)	% of Total Cost
Buildings	78	14.5%	1,241	$40,133	33.0%
Vehicle Fleet	120	22.2%	1,523	$31,120	25.6%
Lighting	99	18.3%	1,441	$47,247	38.8%
Water	4	0.8%	65	$3,202	2.6%
Waste	25	4.6%	0	n/a	0.0%
Employee Commute	214	39.7%	2,754	n/a	0.0%
TOTAL	540	100.0%	7,023	$121,701	100.0%

* Energy cost for electricity, natural gas, gasoline and diesel in 2005.

Community Inventory Results

In 2005, the Larkspur community emitted approximately 106,222 metric tons of CO2e. As shown in Figure 6, the Transportation Sector was by far the largest source of emissions, generating approximately 63,055 metric tons of CO2e, or 59.4 percent of total 2005 emissions. Transportation sector emissions are the result of diesel and gasoline combustion in vehicles traveling on both local roads, including regional route Sir Francis Drake Boulevard, and State Highway 101 as it passes through the jurisdictional boundaries of Larkspur. Electricity and natural gas consumption within the Residential Sector, the second greatest source of 2005 emissions, generated 23,746 metric tons CO2e, or 22.4 percent of the total. Similarly, electricity and natural gas use in Larkspur's Commercial/Industrial Sector produced 17,463 metric tons CO2e, or 16.4 percent of total community emissions. The remaining 1.8 percent (1,958 metric tons) are the estimated future methane emissions that will result from the decomposition of waste that was generated by the Larkspur community during 2005.

5 This number includes all Scope 1 emissions from the on-site combustion of fuels in facilities and vehicles, Scope 2 emissions from the purchase of electricity, and Scope 3 emissions from waste generated by local government operations and emissions associated with employee commute patterns.

The first step toward reducing greenhouse gas emissions is to identify sources of emissions and establish baseline levels. This information can later inform the selection of a reduction target and possible reduction measures to be included in the climate action plan.

Key Findings

Government Operations

- Larkspur's government operations produced approximately 540 metric tons of CO2e in 2005, 0.5 percent of total community emissions.
- The Employee Commute Sector was the greatest source of government operations greenhouse gas emissions in 2005 – producing 214 metric tons of CO2e, or 39.7 percent of total government operations emissions.
- The Vehicle Fleet Sector was the second greatest source of government operations emissions, producing 120 metric tons of CO2e, or 22.2 percent of total government operations emissions.

Community-wide

- Larkspur's community produced approximately 106,222 metric tons of CO2e in 2005.
- The Transportation Sector was the greatest source of community greenhouse gas emissions in 2005 – producing 63,055 metric tons of CO2e, or 59.4 % of total community emissions.
- Within the Transportation Sector, 58.2 percent of emissions are produced from travel on State Highway 101 as it passes through Larkspur's jurisdictional boundaries. The remaining 41.8 percent, or 26,347 metric tons of CO2e, are produced during travel on local roads including regional route Sir Francis Drake Boulevard.
- The Residential Sector produced 23,746 of greenhouse gas emissions in 2005, or 22.4 percent of total community emissions.

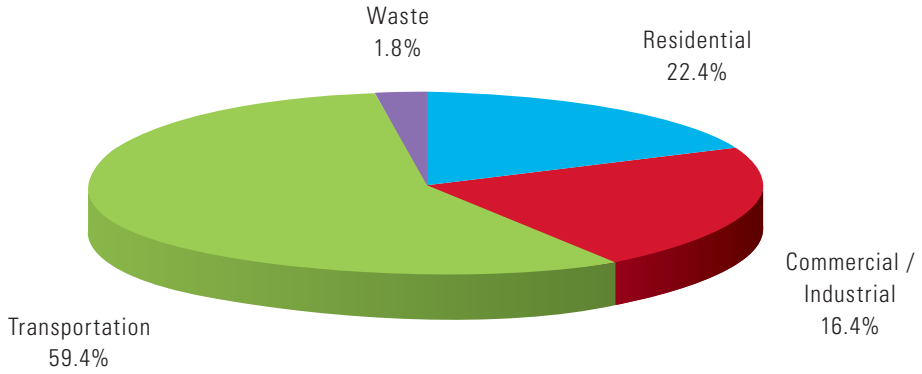


Figure 6: 2005 Community CO2e Emissions

Water Conservation

The Marin Municipal Water District (MMWD) supplies clean drinking water to a 147-square-mile area of south and central Marin. MMWD's water comes from three main sources: local reservoirs, the Russian River in Sonoma County and recycled water. Despite decreased water use per capita since the 1980s, the District would not have enough water in its current water supply sources to meet the needs during a sustained drought like the one in the 1970s. (Source: MMWD, http://www.marinwater.org)

Larkspur falls within MMWD's jurisdiction and all properties in Larkspur are subject to the agency's water conservation regulations. The water conservation requirements, particularly irrigation efficiency, are fairly complex, and the City has relied on MMWD to provide technical review and oversight on water conservation and direction in regard to drought-tolerant landscaping. The City has required compliance with MMWD regulations as a condition of approval for projects subject to the design review and planning permits, as prescribed under LMC Section 18.16.220. The Planning and Building Departments also provide informative handouts on the latest standards for water conservation and drought-resistant landscaping.

For the last several years, the water district's water conservation measures have been outlined under MMWD Ordinance No. 385. This ordinance has required water conserving landscaping review and compliance for all public, industrial, commercial, and multifamily residential projects and only for one- or two- family residential projects involving ½ acre or more of landscaped area. For one- or two- family residential projects involving less than ½ acre of landscaped area, no more than 25% is allowed to be turf and/or pool areas. The ordinance outlined prescriptive irrigation efficiency methods such as automatic irrigation systems, proper soil preparation, and a limited percentage of high-water use plants.

In 2008, Assembly Bill 1881 (AB 1881) was passed directing the Department of Water Resources (DWR) to update the 1992 voluntary model ordinance. The purpose of this directive is to strengthen statewide water conservation efforts in landscaping design by making it mandatory that every local agency (cities, towns, and counties) adopt a water efficient landscape ordinance by January 1, 2010. If a local agency does not adopt such an ordinance by this date, it is obligated to implement and enforce the state-adopted ordinance. DWR published a draft model ordinance in late 2008.

The draft DWR model ordinance establishes mandates that go well beyond the City's ability and staff resources to implement. Like most cities in California, Larkspur does not have staff with the technical skills to review landscape and irrigation plans based on a technical formula for "water allowance" or to monitor water use for landscaping once installed. The City of Larkspur will continue to designate (and defer to) MMWD as the local agency to implement and enforce the mandate that has been set by the State. The City and MMWD have met and there is agreement that MMWD will continue to serve in this capacity. Over the last year, MMWD has consulted with Marin County and local municipalities as to preparation of a draft district ordinance to respond to AB 1881.

On December 16, 2009, the MMWD Board adopted Ordinance No. 414, providing updated water efficient landscaping requirements as well as other water conservation measures. The ordinance was prepared as a collective effort among North Bay water agencies (including MMWD), landscape architects and contractors, irrigation manufacturers, and nurseries, all reaching consensus after several months of discussions and negotiations. The intent of the collective effort was to establish water efficient landscape standards for the region, and an ordinance that can be adopted universally.

To implement and enforce the state mandate, the City will continue to apply the ordinance by reference, deferring to MMWD for technical review and enforcement. The ordinance is, in some terms, stricter than the DWR (state) model. As of January 1, 2010, the ordinance is applicable to all of the following:

- New construction and rehabilitated landscapes for public agency projects, and non-residential private development project with a landscape area equal to or greater than 2,500 square feet requiring a building permit, plan check, or design review.
- New construction and rehabilitated landscapes which are developer-installed in residential projects with a landscape area equal to or greater than 2,500 square feet requiring a building permit, plan check, or design review.
- New construction landscapes that are homeowner-provided and/or homeowner-hired in residential projects with a landscape area equal to or greater than 5,000 square feet requiring a building permit, plan check, or design review.

The ordinance continues to prescribe specific water efficiency measures but principally regulates usage based on a 'maximum applied water allowance' (MAWA). The MAWA is a formula that determines per square foot water demand for landscaping based on evapotranspiration and rainfall averages for the region. Whereas high water use landscaping such as turf requires water at a rate of 1 per square foot, moderate use at 0.6, and low water use at 0.3, the water allowance is based upon maintaining a landscape area demand at a rate of 0.62. The landscape design must then demonstrate an 'estimated total water use' (ETWU) that does not exceed the water allowance.

2.3 Forecast for 2020 Emissions

To illustrate the potential emissions growth based on projected trends in energy use, driving habits, job growth, and population growth from the baseline year going forward, this plan includes an emissions forecast for the year 2020. Under a business-as-usual scenario, Larkspur's emissions will grow by approximately 9.5 percent by the year 2020, from 106,222 to 116,292 metric tons CO2e. Table 4 shows the result of the forecast by sector. A variety of different reports and projections were used to create the emissions forecast, as profiled below.

For the residential and waste sectors, population projections for Larkspur, as released by the Association of Bay Area Governments (ABAG) in 2009, were used to estimate average annual compound growth in energy demand of 0.38 percent. ABAG estimates the Larkspur population was 12,000 in 2005 and will be 12,700 in 2020.

Table 4: Forecast for 2020 Emissions

Sector	2005 (metric tons CO_2e)	2020 (metric tons CO_2e)	Annual Growth Rate	Percent Change from 2005 to 2020
Residential	23,746	25,131	0.38%	5.8%
Commercial/ Industrial	17,463	18,241	0.29%	4.5%
Transportation	63,055	70,847	0.78%	12.4%
Waste	1,958	2,072	0.38%	5.8%
TOTAL	106,222	116,292	—	9.5%

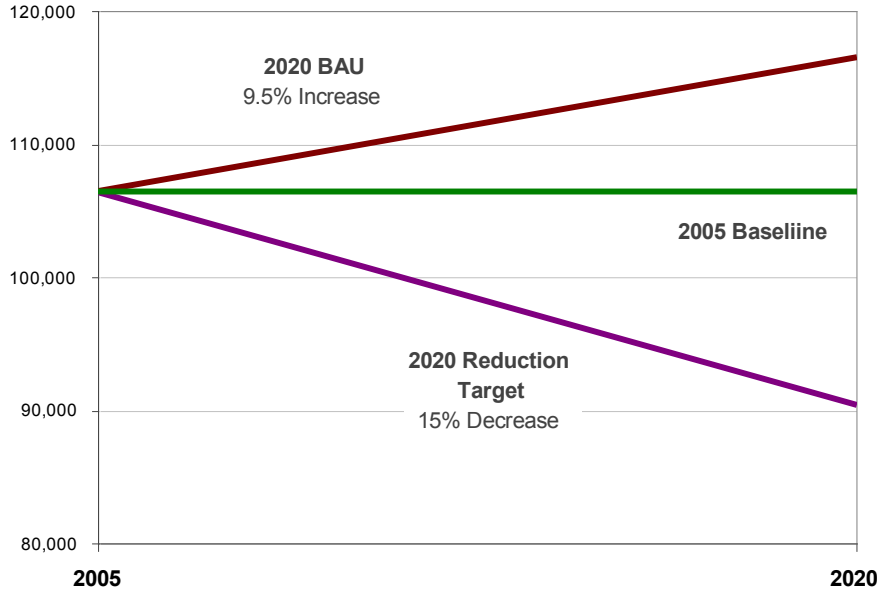
Analysis contained within California Energy Demand 2008-2018: *Staff Revised Forecast*[6], a report by the California Energy Commission (CEC), shows that commercial floor space and the number of jobs have closely tracked the growth in energy use in the Commercial Sector. ABAG projects job growth will increase from 7,410 jobs in 2005 to 7,740 in 2020. Using this growth projection of 330 jobs, it was calculated that the average annual growth in energy use in the commercial sector between 2005 and 2020 would be 0.29 percent.

For the transportation sector, the Metropolitan Transportation Commission (MTC) projects that county-wide vehicle miles traveled in Marin County will increase at a rate of 0.78% a year between 2006 and 2020, or approximately 12.4% between 2005 and 2020.[7]

2.4 Greenhouse Gas Emissions Reduction Target

This Climate Action Plan proposes an emissions reduction target of 15% below 2005 levels by 2020, which is consistent with the State's direction to local governments in the AB 32 Scoping Plan.[8] Figure 7 provides a comparison of the business-as-usual forecast for 2020 to the 2005 baseline year and the 15% reduction target. Figure 7 is also a depiction of Larkspur's challenge in attempting to meet its reduction targets. Emissions will continue to increase along the business-as-usual scenario while reduction efforts are initiated. Achieving the target is therefore more than a 15% decrease – rather, it is a 22.4% reduction from projected 2020 emissions levels in Larkspur.

Figure 7: Emissions Reduction Target



6 http://www.energy.ca.gov/2007publications/CEC-200-2007-015/CEC-200-2007-015-SF2.PDF

7 Transportation 2035 Plan for the San Francisco Bay Area - Travel Forecasts Data Summary

8 California Air Resource Board, "Climate Change Scoping Plan," December 2008, p. 27, http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf, accessed 3/31/10.

3. ACTIONS TO REDUCE GREENHOUSE GAS EMISSIONS

3.1 Summary of Greenhouse Gas Reduction Strategies

The mitigation measures presented in this chapter, as summarized in the tables below, achieve greenhouse gas emissions reductions in the community of 11,550 metric tons CO2e or approximately 11% below the 2005 baseline of 106,222 metric tons CO2e. When state reductions are added, emissions in Larkspur would be approximately 27% — enough to allow the City to surpass a reduction target of 15% below the 2005 baseline by 2020.

Within government operations, the City could achieve reductions of 134 metric tons CO2e, or nearly 35% below 2005 levels of 540 metric tons CO2e, by implementing all of the specific, measurable actions listed in the following sections. It is noted that a wide range of programs that exceed the City's reduction goal have been included to allow for the consideration and prioritization of each program, based on its estimated cost, annual savings, and GHG reduction benefit, during the review of new programs, development projects, and funding opportunities. State actions would reduce emissions by another 13.5%, and programs to offset emissions could reduce emissions by an additional 29%.

Table 5: Mitigation Measures for Community Emissions

Section		GHG Reductions (Metric Tons)
3.2	Natural Systems, Carbon Sequestration and Emissions Offset	1,261
3.3	Land Use and Transportation	4,891
3.4	Green Building, Energy Efficiency and Renewable Energy	3,669
3.6	Waste Reduction, Recycling, and Zero Waste	776
3.7	Water and Wastewater	953
	SUBTOTAL	11,550
	% below 2005 levels	10.9%
3.8	State Actions	17,022
	% below 2005 levels	16.0%
TOTAL		28,572
Cumulative % below 2005 levels (Goal: 15% below 2005 levels)		26.9%

Table 6: Mitigation Measures for Government Operations Emissions

Section		GHG Reductions (Metric Tons)
3.2	Natural Systems, Sequestration (exculding Offset Emmisions)	1.9
3.3	Land Use and Transportation	34.4
3.4	Green Building, Energy Efficiency and Renewable Energy	89.4
3.5	Green Purchasing	1.8
3.6	Waste Reduction, Recycling, and Zero Waste	6.2
3.7	Water and Wastewater	0.2
	SUBTOTAL	133.9
	% below 2005 levels	24.8%
3.8	State Actions	72.8
	% below 2005 levels	13.5%
3.2	Offset Emissions	154.8
	% below 2005 levels	28.7%
TOTAL		361.5
Cumulative % below 2005 levels (Goal: 15% below 2005 levels)		66.9%

3.2 Natural Systems, Carbon Sequestration and Emissions Offset

The natural environment has been extensively altered by human civilization, often with little consideration for how natural systems function, depriving us of the important benefits they offer. Clearing and draining of wetlands, forestlands, grasslands and other open space for agricultural production or urban development decreases or eliminate the capacity of those natural systems to store carbon. 30 percent of annual GHG emissions globally are due to deforestation.[9] The carbon dioxide stored in soil, trees, and other vegetation is released into the atmosphere when forestland and open space is converted to other uses. Restoration of these natural areas, and establishment of new ones, has the potential to tie up or sequester greenhouse gas emissions in the form of soil and wood carbon.

This section of Larkspur's Climate Action Plan highlights carbon sequestration through the restoration and establishment of natural areas, and composting rather than landfilling food waste as ways to reduce and offset the City of Larkspur greenhouse gas emissions.

Table 7: Section 3.2 Community Mitigation Measures

Mitigation Measures for Community		
Measure		GHG Reductions (Metric Tons)
3.2.C1	Increase Trees and Vegetation to Achieve a Net Gain of 100 Trees	4
3.2.C2	Offset Emissions for Electricity and Natural Gas Use	1,257
	TOTAL	1,261
	% Reduced from 2005 Levels	1.2%

Table 8: Section 3.2 Government Operations Mitigation Measures

Mitigation Measures for Government Operations				
Measure		Cost to Implement	Annual Savings	GHG Reductions (Metric Tons)
3.2.G1	Increase Public Trees and Vegetation to Achieve a Net Gain of 50 Trees	$100 per tree	n/a	1.9
3.2.G2	Offset Emissions for Electricity and Natural Gas Use	$1,200 per year	n/a	89.7
3.2.G3	Offset Emissions from City Vehicles	$900 per year	n/a	65.1
	TOTAL			156.7
	% Reduced from 2005 Levels			29.0%

9 "Deforestation causes global warming," Food and Agriculture Organization of the United Nations, 2006, http://www.fao.org/newsroom/en/news/2006/1_0 00385/index.html

Recommended Programs:

1. Continue to enforce policies and programs that regulate the removal and replacement of significant trees and preclude the sale of exotic and invasive plants.

2. Develop and implement a community-wide tree-planting program for streets and parks to significantly increase the carbon storage potential of trees and other vegetation in the community.

3. Encourage and, when feasible, require removal of concrete from creek channels and creek restoration and enhancement.

4. Encourage use of pervious paving materials when practical.

5. Continue to enforce zoning regulations for parking lot landscaping to increase shading and reduce thermal gain.

6. To the extent possible, require new development to be planned around existing trees and require new or replacement tree planting as carbon offsets where increased intensity of use, development or activity results in increased GHG emissions.

7. Continue to support the use of tax benefits for land deeds and the use of planning and zoning tools such as conservation easements and Transfer of Development Rights (TDR) to promote cluster development and secure "climate reserve" zones on tree covered undeveloped hillside parcels and other open space.

8. As may be necessary, investigate achieving further carbon reductions for city operations by purchasing carbon offsets or participating in a program such as ClimateSmart, after maximizing GHG reductions through conservation, energy efficiency and renewable energy measures.

9. Provide educational opportunities and creative incentives for community organizations and residents to reduce their carbon footprint.

10. Support and promote local farmers markets.

11. Partner with Master Gardeners and others to provide education and resources to residents on backyard gardening.

12. Encourage the creation of community gardens, including possible use of surplus City properties.

3.3 Land Use and Transportation

Transportation and land use development are strongly interrelated. The more suburban the development (i.e., low density housing which causes residents to live further from urban centers), the less viable are mass transit systems and other alternative modes of transportation such as walking or biking, and the more dependent residents become on the automobile. Studies have shown that people who live near transit drive between 20 and 40% less and that low-density suburban development generates twice as much GHG emissions per capita than a more dense urban development pattern. As a result, the transportation sector is one of the largest sources of GHG emissions. Though Marin County is known for its environmental consciousness, it is also known for its low-density developments, larger homes, multi-vehicle households, and consumerism. It also ranks among the highest in the U.S. in terms of per capita GHG emissions. Although many of the measures listed below are difficult to quantify, implementing them can significantly reduce the Community's emission totals.

Table 9: Section 3.3 Community Mitigation Measures

Mitigation Measures for Community		
Measure		GHG Reductions (Metric Tons)
3.3.C1	Encourage Compact, Transit-oriented Development	190
3.3.C2	Increase Walking and Biking for Local Trips	1,512
3.3.C3	Increase Public Transit Use	1,421
3.3.C4	Increase Ridesharing	497
3.3.C5	Accelerate Adoption of Electric Vehicles	1,271
	TOTAL	4,891
	% Reduced from 2005 Levels	4.6%

Table 10: Section 3.3 Government Operations Mitigation Measures

Mitigation Measures for Government Operations				
Measure		Cost to Implement	Annual Savings	GHG Reductions (Metric Tons)
3.3.G1	Replace City Vehicles with Electric Vehicles	As Replaced	n/a	13.0
3.3.G2	City Employees Commute by Alternative Means of Transportation	Cost of incentive Chosen	n/a	21.4
	TOTAL			34.4
	% Reduced from 2005 Levels			6.4%

Recommended Programs

1. Reduce and encourage the reduction of GHG emissions through the General Plan and environmental and project review processes by:

    a. Adopting policies that promote compact and efficient development, such as orienting new development to capitalize on transit system investments and services.
    b. Adopting policies that encourage a "balanced" community, where residents do not have to travel long distances for service needs.
    c. To the extent feasible, products are grown or manufactured locally or within the region; and growing food is given a priority over planting ornamentals.
    d. Establishing planning processes that encourage reducing GHG emissions, including the development of workforce housing and a diversity of housing types.
    e. Using transportation models and surveys to capture data for and accurately reflect all modes of transportation.
    f. Making reductions in vehicle-miles traveled (VMT) a high-priority criterion in evaluation of policy, program and project alternatives.
    g. Implementing transportation planning procedures that consider demand management solutions equally with strategies to increase capacity.
    h. As appropriate, analyzing impacts of development projects on safety, availability, and use of alternative transportation in CEQA documents.
    i. Adopting local CEQA Guidelines to explain how analysis of greenhouse gas emissions will be treated, such as thresholds of significance.

2. Educate residents and employees about the health and environmental benefits of walking, cycling, or taking public transit, and ride sharing, and information to assist in these modes of travel (e.g., information available in public places and employment centers regarding bus schedules, pedestrian pathways and trails, and the 511 Rideshare Program and related vanpool incentive programs).

3. Encourage the use of sustainable transportation modes by identifying where the Community's pedestrian, bicycle, and mass transit facilities are deficient and updating the community-wide pedestrian and bicycle plan and capital improvement program that maximizes the potential to:

    a. Continue improving bicycle infrastructure (e.g., Class 1, 2, and 3 paths)
    b. Update (e.g., include specifications for bicycle racks) and enforce bicycle-parking requirements for public and private developments.
    c. Improve commercial and residential pedestrian infrastructure (e.g., sidewalks, paths, and walkways) and expanded programs that encourage walking (e.g., safe routes to school program).
    d. Continue to improve mass-transit infrastructure (e.g., bus stops, transit stations, park and ride) and coordinate with the regional transit providers and the Transportation Authority of Marin (TAM) to pursue funding opportunities to expand local and regional bus service in range and/or frequency. Oppose reductions in transit service.
    e. Study the Larkspur Landing Circle area and enhance the opportunities presented by the location of the Larkspur Ferry, the Marin Airporter, and eventually the SMART train station.
    f. Support and encourage the implementation of TAM's vision for the future, "Moving Forward: A 25-Year Transportation Vision for Marin County."
    g. Increase bicycle and pedestrian safety through traffic calming devices and other measures to reduce traffic speeds and volumes, and design standards for multi-modal mobility and access.
    h. Encourage innovated ideas for allowing residents to swap/trade bicycles that no longer meet their needs for ones that do (e.g., potential for trading bike pulled kid-carts to someone that wants to use the cart to haul groceries.)

4. Green the City Fleet. Reduce greenhouse gas emissions from municipal fleet operations by purchasing or leasing high MPG, low carbon fuel or hybrid vehicles, or by using an external car sharing program in lieu of city/county fleet.

5. Provide agency employees with incentives to use alternatives to single occupant auto commuting, such as parking cash-out, flexible schedules, transit incentives, bicycle facilities, ridesharing services and subsidies, and telecommuting when practical.

6. When auto and truck transportation remain necessary, improve GHG emissions by:

    a. Implementing Intelligent Transportation Systems (ITS) for surveillance and traffic control, such as synchronized signals, transit and emergency signal priority, and other traffic flow management techniques, to improve traffic flow and reduce vehicle idling.
    b. Encouraging private development to encourage the use of hybrids, electric vehicles, and carpools.
    c. Working with school districts and private schools to encourage carpooling and participation in safe routes to school.
    d. Working with and encouraging the County in developing a community car-sharing, when determined to be feasible.
    e. Adopting and implementing a policy requiring limitations on idling for commercial vehicles, construction vehicles, buses and other similar vehicles, beyond state law, where feasible.
    f. Designing right-of-way widths to the minimum acceptable safety standards for both traffic calming and auto, bicycle and pedestrian safety.

7. Encouraging ownership of plug-in electric vehicles (EV) by providing EV charging station infrastructure, where appropriate, and encouraging property owners and developers to install EV charging stations in commercial and residential projects.

3.4 Green Building, Energy Efficiency And Renewable Energy

The two fundamental means for reducing emissions from electricity and natural gas use are decreasing consumption through efficiency and switching from fossil fuels to renewable sources. According to the U.S. Department of Energy, buildings account for approximately 39% of total energy use, over 12% of the total water consumption, 68% of total electricity consumption, and 38% of all carbon dioxide emissions annually in the United States.

Increasing the efficiency of buildings is the most cost-effective approach for reducing greenhouse gas emissions. Programs, which require minimum energy efficiency upgrade for home remodeling, such as increasing insulation and sealing heating ducts, have demonstrated energy savings of up to 20%.

New construction techniques and building materials, known collectively as "green building," can significantly reduce the use of resources and energy and creation of waste in our homes and commercial buildings. Green construction methods can be integrated into buildings at any stage, from design and construction, to renovation and deconstruction.

Table 11: Section 3.4 Community Mitigation Measures

Mitigation Measures for Community		
Measure		GHG Reductions (Metric Tons)
3.4.C1	Improve Energy Efficiency in Existing Residential Buildings	950
3.4.C2	Improve Energy Efficiency in Existing Commercial Buildings	699
3.4.C3	Reduce Energy Use in New Residential Buildings	277
3.4.C4	Reduce Energy Use in New Commercial Buildings	130
3.4.C5	Install Residential Renewable Energy Systems	693
3.4.C6	Install Commercial Renewable Energy Systems	920
	TOTAL	3,669
		3.5%

Table 12: Section 3.4 Government Operations Mitigation Measures

Mitigation Measures for Government Operations				
Measure		Cost to Implement	Annual Savings	GHG Reductions (Metric Tons)
3.4.G1	Install Energy Efficiency Upgrades in City Buildings	TBD	$16,200	28.3
3.4.G2	Install Renewable Energy Systems for City Buildings (PV)	$488,000	$13,600	18.4
3.4.G3	Upgrade Street Lighting to Energy-efficient Technologies (Induction)	$306,300	$20,400	37.0
3.4.G3	Upgrade Traffic Signals to Energy-efficient Technologies	$5,300	$3,600	5.7
	TOTAL			89.4
	% Reduced from 2005 Levels			16.6%

Recommended Programs

1. Update and strengthen the City's Green Building Ordinance and apply green building requirements to new residential, commercial and civic construction and remodeling projects to increase energy efficiencies. For the remodel of existing homes, the Building Official should provide homeowners information regarding the benefits of energy retrofits, but be allowed some discretion relative to applying the green building requirements.

2. Develop a citywide Green Building promotional campaign. Educate City staff and policy makers about best practices; provide checklists and specification guidelines for contractors; post green building information on the City's website.

3. Provide incentives to development projects that meet or exceed specified standards under green building programs such as Build It Green.

4. Train existing staff (and possibly offer a pay incentive for certification or accreditation) or contract out for expertise in LEED and GPR (e.g., projects not designed by a LEED accredited architect/engineer could pay a fee for review by someone with LEED expertise).

5. As part of the Green Building Ordinance update, require energy efficiency audits for residences and businesses during major remodeling projects. Consider requirements and incentives for minimum energy efficiency upgrades.

6. Replace lamps in street and parking lot lighting with energy-efficient technologies, such as LED and induction lighting.

7. Support efforts of PG&E to maximize residential and business subscription rates for energy efficiency programs and to promote conservation and renewable energy use.

8. Adopt policies and incentives to encourage residents and businesses to install solar/renewable energy systems.

9. Research and consider possibilities for residential wind power generators and for location of solar collectors.

10. Participate in a countywide or regional assessment district bond-financing program to assist homeowners in funding installation of energy efficiency upgrades and renewable energy systems.

11. Complete energy efficiency upgrades to City facilities as recommended by the Marin Energy Management Team, to include:

    a. Re-roof Fire Station No. 15 (#1) with energy efficient roofing.
    b. Replace the HVAC and diesel generator at Fire Station No.15 (#1) with more efficient equipment.
    c. Replace windows in City Hall and Fire Station No.15 (#1).
    d. Enclose the understory of City Hall and provide understory insulation.

12. Install photovoltaic panels at City facilities, such as the south-facing roof of City Hall and the two fire stations.

13. Upgrade incandescent bulbs in traffic signals and pedestrian signals to LED technologies.

3.5 Green Purchasing

By adopting environmentally preferable purchasing standards and goals, Marin cities can measurably reduce their GHG emissions, and enjoy co-benefits in the form of reduced toxic exposures, pollution prevention, and (in some instances) reduced operating costs. In addition, the purchase of environmentally preferable products and services, in conjunction with the efforts of other regional, state, and federal agencies, and the private sector, will help stimulate demand and enhance access to green products and services.

Many purchases that are environmentally preferable are also fiscally preferable. These include energy star certified appliances, high-efficiency lighting and HVAC units, duplexing printers, and more. Many cities also opt to use a portion of their savings from higher efficiency to procure products with reduced environmental harm.

Recommended Programs:

1. Prioritize purchases of products and services with superior environmental performance that are economically competitive on a life-cycle basis.

Table 13: Section 3.5 Government Mitigation Measures

Mitigation Measures for Government Operations				
Measure		Cost to Implement	Annual Savings	GHG Reductions (Metric Tons)
3.5.G1	Upgrade to Energy Star-Rated Office Equipment	At time of replacement	$980	1.3
3.5.G2	Switch to 30% Recycled Paper	$420/year	n/a	0.5
	TOTAL			1.8
	% Reduced from 2005 Levels			0.3%

2. Implement operational changes that can offset environmentally preferable product costs. Green purchasing policies also include operational steps for reducing environmental and economic costs derived from the use of products or services. For example, green policies call for periodic energy efficiency audits of major facilities.

3. Purchase products only when needed and not solely on a replacement schedule. Many durable manufactured goods – from computers to motor vehicles — embody much of the energy used (and carbon emitted) over their life span in their initial production. Optimizing purchasing schedules according to ongoing needs assessment, rather than a fixed replacement schedule, can lower environmental burden and cost.

4. Create an interdepartmental Green Purchasing Team.

5. Complete a Green Purchasing Policy & Implementation Plan.

6. Provide each City Department with an easy reference binder for finding “green” products and distributors.

7. Engage city staff in support of Green Purchasing goals and processes by including them in the review of draft documents to seek their comment and input.

8. Implement Green Purchasing reporting to capture GHG impacts.

9. Update City’s website to allow for electronic noticing to interested persons regarding City meetings, events, proposed projects, etc.

3.6 Waste Reduction, Recycling and Zero Waste

The reduction of waste, as well as the reuse and recycling of products, is key to reducing impacts on the environment. It is necessary to rethink what has traditionally been regarded as garbage and treat all materials as valued resources instead of items to discard. This requires shifting consumption patterns, more carefully managing purchases, and maximizing the reuse of materials at the end of their useful life.

Recommended Programs:

1. Adopt a policy to achieve zero waste going to landfills. The JPA has commissioned a Zero Waste Feasibility and Planning Study for the member agencies. Phase I is underway; Phase II is under consideration. The study will:

    - Evaluate existing programs.
    - Select and investigate options for program improvement and potential new programs to implement.
    - Prepare a final Zero Waste Feasibility and Planning Study for the member agencies

Table 14: Section 3.6 Community Mitigation Measures

Mitigation Measures for Community		
Measure		GHG Reductions (Metric Tons)
3.6.C1	Divert All Food Waste from Landfill	410
3.6.C2	Reduce All Other Solid Waste Disposal to Landfills by 25%	366
	TOTAL	776
	% Reduced from 2005 Levels	0.7%

Table 15: Section 3.6 Government Operations Mitigation Measures

Mitigation Measures for Government Operations				
Measure		Cost to Implement	Annual Savings	GHG Reductions (Metric Tons)
3.6.G1	Reduce Solid Waste Disposal to Landfills by 25%	n/a	n/a	6.2
	% Reduced from 2005 Levels			1.1%

Phase II would focus on the development of specific Actions Plans developed for each member agency to meet the Zero Waste goals.

2. Endorse an Extended Producer Responsibility resolution. The JPA proposes that the member agencies endorse an Extended Producer Responsibility resolution and sign the California Product Stewardship Council pledge to shift California's product waste management system from one focused on government funded and ratepayer financed waste diversion to one that relies on extended producer responsibility (EPR) in order to reduce public costs and drive improvements in product design that promote environmental sustainability.

3. Enhance existing waste reduction and recycling activities at City buildings and in the community.

4. Expand education to the public about the benefits of waste reduction, via informational materials, organized events and workshops, including backyard composting workshops, office paper recycling programs, and organized brush drop-off programs.

5. Adopt a Construction and Demolition Ordinance to comply with the JPA's model ordinance.

6. Strengthen recycling programs, purchasing policies, and employee education, to reduce the amount of waste produced in Larkspur.

7. Promote commercial and residential backyard composting. Recommended composting programs:

   a. Partner with Master Gardeners and others to provide education and resources to residents on backyard composting.
   b. Work with Marin Sanitary Service to develop commercial and residential food waste collection routes and to create centrally located facilities to process all green and food waste. Process this waste in anaerobic digesters for soil amendments and the production of biogas. Biogas is the gas produced by anaerobic digestion of organic matter and consists of 60-80 percent methane (natural gas), 30-40 percent carbon dioxide, and other trace gases such as hydrogen sulfide, ammonia and hydrogen. The predominance of methane means it can be used as a fuel source.
   c. Support Marin Municipal Wastewater District in its feasibility study of providing feedstock for biogas.

3.7 Water and Wastewater

Water demand in California is increasing because of population expansion. In addition, demand for water for irrigation rises with warmer temperatures. The actual impacts of the climate-induced change in water quality, quantity and demand will depend on the changes in water policy and operations, and on the water use patterns of all communities. Fortunately, there are a number of stewardship actions that cities and counties can take that reduce costs and improve the reliability and quality of our water resources.

Recommended Programs:

1. Assess, maintain and repair existing plumbing fixtures, pipes, and irrigation systems in all agency buildings and facilities to minimize water use, including building and parking lot landscaping, public rest rooms and parks, golf courses and other recreational facilities. As feasible, upgrade and retrofit agency plumbing and irrigation systems with state-of-the-art water conserving technology.

2. Audit the City's water and stormwater pumps and motors to evaluate equipment efficiency and, as funding allows, replace least efficient equipment with more efficient units.

Table 16: Section 3.7 Community Mitigation Measures

Mitigation Measures for Community		
Measure		GHG Reductions (Metric Tons)
3.7.C1	Reduce Water Use in Community by 15%	953
	% Reduced from 2005 Levels	0.9%

Table 17: Section 3.7 Government Operations Mitigation Measures

Mitigation Measures for Government Operations				
Measure		Cost to Implement	Annual Savings	GHG Reductions (Metric Tons)
3.7.G1	Upgrade and Retrofit Water and Wastewater Pumps	TBD	$160	0.2
	% Reduced from 2005 Levels			0.04%

3. Retrofit existing agency buildings and facilities to meet standards for the LEED Standards Rating Systems for Existing Buildings (EB) or Commercial Interiors (CI).

4. Plant materials native to northern California and Marin County, and encourage the use of drought-tolerant plant material.

5. Minimize turf areas and avoid narrow turf areas, such as in parking strips. Encourage homeowners to avoid turf and replace existing turf areas.

6. Consider water heater upgrade incentives. Larkspur may develop incentive programs for updated water heater systems, such as tankless or on-demand.

7. Adopt retrofit program to encourage or require installation of water conservation measures in existing businesses and homes.

8. Require dual plumbing for use of recycled water for new commercial and/or residential developments.

9. Increase customer education programs on water conservation and intelligent irrigation systems.

10. Provide information related to greywater use and plumbing codes.

See Green Building, Energy Efficiency, and Renewable Energy section for additional water conservation goals.

3.8 State Actions

The following are state reduction strategies included in the AB 32 Scoping Plan and accounted for in the City's adjustment of the business-as-usual forecast. To clarify, the State of California has approved, programmed, and/or adopted these actions. Furthermore, they are programs or projects that require no local involvement. Incorporating them into the forecast and reduction assessment provides a more accurate picture of future emissions growth and the responsibility for action.

LOW CARBON FUEL STANDARD

The State is proposing to reduce the carbon intensity of transportation fuels consumed in California. To reduce the carbon intensity of transportation fuels, CARB is developing a Low Carbon Fuel Standard (LCFS), which would reduce the carbon intensity of California's transportation fuels by at least 10% by 2020 and 20% by 2035 as called for by Governor Schwarzenegger in Executive Order S-01-07. LCFS will incorporate compliance mechanisms that provide flexibility to fuel providers in how they meet the requirements to reduce greenhouse gas emissions. CARB estimates the Low Carbon Fuel Standard will reduce California's projected 2020 transportation emissions by 6.7%.

Table 18: Section 3.8 Community Mitigation Measures

Mitigation Measures for Community		
Measure		GHG Reductions (Metric Tons)
3.8.C1	PG&E Achieves 33% Renewable Portfolio Standard by 2020	7,817
3.8.C2	AB 1493 Pavley Standards	4,808
3.8.C2	Low Carbon Fuel Standard	4,397
	TOTAL	17,022
	% Reduced from 2005 Levels	16.0%

Table 19: Section 3.8 Government Operations Mitigation Measures

Mitigation Measures for Government Operations		
Measure		GHG Emissions Reducted (Metric Tons)
3.8.C1	PG&E Achieves 33% Renewable Portfolio Standard by 2020	31.1
3.8.C2	AB 1493 Pavley Standards	21.8
3.8.C2	Low Carbon Fuel Standard	19.9
	TOTAL	72.8
	% Reduced from 2005 Levels	13.5%

PAVLEY (AB 1493)

Assembly Bill 1493 (Pavley), signed into law in 2002, will require carmakers to reduce greenhouse gas emissions from new passenger cars and light trucks beginning in 2011. The California Air Resources Board adopted regulations in September 2004 that create two phases of increasingly stringent standards for car manufacturers between 2009 and 2020. The first phase, which has already been adopted, is expected to reduce California's projected 2020 transportation emissions by 7%.

RENEWABLE PORTFOLIO STANDARD (RPS)

Established in 2002 in Senate Bill 1078, the RPS program requires electricity providers to increase the portion of energy that comes from renewable sources to 20% by 2010 and to 33% by 2020. CARB estimates the RPS will reduce California's emissions from electricity use by 15.3% in 2020.

APPENDIX

Data Sources, Assumptions and Calculations

All 2005 greenhouse gas emissions data for community and government operations is from the City of Larkspur 2005 Greenhouse Gas Emissions Inventory, with emission factors as follows: (see right)

Emission Source	GHG	Emission Factor	Emission Factor Source
PG&E Electricity	CO2	0.489155 lbs/kwh	The certified CO2 emission factor for delivered electricity is publicly available at http://www.climateregistry.org/CarrotDocs/19/2005/2005_PUP_Report_V2_Rev1_PGE_rev2_Dec_1.xls
	CO2e	0.492859 lbs/kwh	PG&E
Default Direct Access Electricity	CO2	343.3 short tons/GWh	ICLEI/Tellus Institute (2005 Region 13 - Western Systems Coordinating Council/ CNV Average Grid Electricity Coefficients)
	CH4	0.035 short tons/GWh	
	N20	0.027 short tons/GWh	
Natural Gas	CO2	53.05 kg/MMBtu	PG&E/CCAR. Emission factors are derived from: California Energy Commission, Inventory of California Greenhouse Gas Emissions and Sinks: 1990-1999 (November 2002); and Energy Information Administration, Emissions of Greenhouse Gases in the United States 2000 (2001), Table B1, page 140.
	CH4	0.0059 kg/MMBtu	CCAR. Emission factors are derived from: U.S. EPA, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2000" (2002), Table C-2, page C-2. EPA obtained original emission factors from the Intergovernmental Panel on Climate Change, Revised IPCC Guidelines for National Greenhouse Gas Inventories: Reference Manual (1996), Tables 1-15 through 1-19, pages 1.53-1.57.
	N20	0.001 kg/MMbtu	

Population and household estimates and projections are from the Association of Bay Area Governments, "Projections and Priorities 2009: Building Momentum," August 2009

3.2 Natural Systems, Carbon Sequestration and Emissions Offset

Measure 3.2.C1: Increase Trees and Vegetation for a Net Gain of 100 Trees

Number of trees	100
Average sequestration per tree	83.52
Total CO2 sequestered	3.79

Data Source Notes and Assumptions: Average is based on tree species and diameters as listed on the County of Marin's "Trees Native to Marin County." Ordinance #3342, Attachment 1, http://www.co.marin.ca.us/depts/CD/Forms/00000049.pdf. Sequestration data from National Tree Benefit Calculator, www.treebenefits.com.

Measure 3.2.C2: Offset Emissions for Electricity and Natural Gas Use

	Electricity (kWh)	Natural Gas (therms)	GHG Emissions (metric tons)
Projected residential energy use in 2020	36,881,527	3,085,213	25,131
5% offset	1,844,076	154,261	1,257

Measure 3.2.G1: Increase Trees and Vegetation for a Net Gain of 50 Trees

Number of trees	50
Average sequestration per tree	83.52
Total CO2 sequestered	1.89

Data Source Notes and Assumptions: Average is based on tree species and diameters as listed on the County of Marin's "Trees Native to Marin County." Ordinance #3342, Attachment 1, http://www.co.marin.ca.us/depts/CD/Forms/00000049.pdf. Sequestration data from National Tree Benefit Calculator, www.treebenefits.com.

Measure 3.2.G2: Offset Emissions for Electricity and Natural Gas Use

	Electricity (kWh)	Natural Gas (therms)	GHG Emissions (metric tons)
All government operations in 2020	670,887	4,386	180.4
Reductions from other measures	291,728	1,167	90.8
Remaining to be offset	379,159	3,219	89.7
Annual cost to offset remaining electricity	$963		
Annual cost to offset remaining natural gas	$210		
Total	$1,173		

Data Source Notes and Assumptions: Assumes participation in PG&E's ClimateSmart program at 2009 costs of $0.00254 per KWh and $0.06528 per therm.

Measure 3.2.G3: Offset Emissions from City Vehicles

Projected City vehicle emissions in 2020 (metric tons)	119.8
Emissions offset through other measures (metric tons)	54.73
Remaining GHG emissions to offset (metric tons)	65.1
Annual cost to offset vehicle emissions	$854

Data Source Notes and Assumptions: Assumes participation in Terrapass program at 2010 cost of $5.95 per 1,000 lbs.

3.3 Land Use and Transportation

Measure 3.3.C1: Encourage Compact, Transit-oriented Development

Number of new housing units projected, 2005-2020	350
Number of new housing units in transit-oriented development projected, 2005-2020	200
Vehicle miles traveled (VMT) on local roads, projected 2020	54,618,170
Number of households, projected 2020	6,220
Local VMT per household, projected 2020	8,781
20% reduction in local VMT for transit-oriented units	351,242
Estimated reduction in GHG emissions	190

Data Source Notes and Assumptions: Household projections from the Association of Bay Area Governments, "Projections and Priorities 2009: Building Momentum," August 2009. Number of new housing units and transit-oriented housing units provided by City of Larkspur Planning Department. Local Roads Vehicle Miles Traveled (VMT) 2005 Data: Harold Brazil, Air Quality Associate, Metropolitan Transportation Commission (MTC), as reported in the City of Larkspur 2005 Greenhouse Gas Inventory. Projected local VMT based on Travel Forecasts Data Summary: Transportation 2035 Plan for the San Francisco Bay, Metropolitan Transportation Commission, December 2008. Transportation greenhouse gas emissions are based on emission factors as reported in the City of Larkspur 2005 Greenhouse Gas Inventory as follows:

Emission Factors: Provided by the BAAQMD, using EMFAC 2007

Area	CO2 Rates (grams/mile)		CH4 Rates (grams/mile)		N2O Rates (grams/mile)	
	Gas	Diesel	Gas	Diesel	Gas	Diesel
Marin County	476	1,426	0.065	0.03	0.07	0.05
BAAQMD Average	463	1,389	0.063	0.03	0.07	0.05

continued:

Area	VMT Mix		CO2 Rates- (grams/gallon)		Fuel Usage		Fuel Efficiency (miles/gallon)	
	Gas	Diesel	Gas	Diesel	Gas	Diesel	Gas	Diesel
Marin County	95.50%	4.50%	8,628	9,957	89.20%	10.80%	18.1	7
BAAQMD Average	94.90%	5.10%	8,607	10,091	87.80%	12.20%	18.6	7.3

Measure 3.3.C2: Increase Walking and Biking for Local Trips

Average daily walking and bicycling for utilitarian purposes per Marin adult (miles)	0.67
Estimated annual walking and biking miles traveled in Larkspur, 2005	2,934,600
Increase walking and biking miles traveled for utilitarian purposes by 100% in 2020	3,105,785
Estimated reduction in GHG emissions (metric tons)	1,512

Data Source Notes and Assumptions: Average daily walking and bicycling data: Federal Highway Administration, "Interim Report to the U.S. Congress on the Nonmotorized Transportation Pilot Program SAFETEA-LU Section 1807," November 2007. According to this survey data, 11.8% of trips in 2007 were made by walking and 1.8% by bicycle, for a total mode share of 13.6%. Estimated annual walking and biking miles in Larkspur assumes same mileage for children, which were not surveyed due to privacy concerns.

Measure 3.3.C3: Increase Public Transit Use

Average daily transit miles per Marin adult	1.37
Estimated transit miles traveled in Larkspur, 2005	6,000,600
Increase transit miles traveled by 50% by 2020	3,175,318
Estimated reduction in GHG emissions (metric tons)	1,421

Data Source Notes and Assumptions: Average daily transit data: Federal Highway Administration, "Interim Report to the U.S. Congress on the Nonmotorized Transportation Pilot Program SAFETEA-LU Section 1807," November 2007. According to this survey data, 3.2% of trips in 2007 were made using public transit. Estimated transit miles traveled in Larkspur assumes same mileage for children, which were not surveyed due to privacy concerns.

Measure 3.3.C4: Increase Ridesharing

Projected vehicle miles traveled in Larkspur, 2020	130,715,332
Ridesharing as a percentage of vehicle miles traveled by Marin residents, 2007	1.7%
Increase ridesharing miles traveled by 50% by 2020	1,111,080
Estimated reduction in GHG emissions (metric tons)	497

Data Source Notes and Assumptions: Rideshare data: Federal Highway Administration, "Interim Report to the U.S. Congress on the Nonmotorized Transportation Pilot Program SAFETEA-LU Section 1807," November 2007.

Measure 3.3.C5: Accelerate Adoption of Electric Vehicles

Projected transportation GHG emissions, 2020	70,848
2% of emissions displaced by electric vehicles	1,417
Electric vehicle VMT, 2020	2,614,307
Electric vehicle emissions from electricity use	146
Estimated reduction in GHG emissions (metric tons)	1,271

Data Source Notes and Assumptions: Assumes electric vehicle energy efficiency of 4 miles per kWh. This measure counts transportation emissions reductions Larkspur could achieve by increasing the percentage of EVs in the community fleet 2% over State projections.

Measure 3.3.G1: Replace City Vehicles with Electric Vehicles

Vehicle	VMT	GHG Emissions (metric tons)	GHG Emissions from Electricity Use (metric tons)	Estimated Reduction in GHG Emissions (metric tons)
Saturn	6,174	2.16	0.34	1.82
Crown Victoria	6,000	3.84	0.33	3.51
Durango	8,079	8.15	0.45	7.70
TOTAL	20,253	14.15	1.12	13.03

Data Source Notes and Assumptions: VMT data from City of Larkspur 2005 Greenhouse Gas Emissions Inventory background data reports. Assumes electric vehicle energy efficiency of 4 miles per kWh.

Measure 3.3.G2: City Employees Commute by Alternative Means of Transportation

Employee commute GHG emissions, 2005 (metric tons)	214
10% reduction in GHG emissions (metric tons)	21.4

3.4 Green Building, Energy Efficiency and Renewable Energy

Measure 3.4.C1: Improve Energy Efficiency in Existing Residential Buildings

Number of households in 2005	6,160
Electricity use in residential sector in 2005 (kWh)	34,848,687
GHG emissions from residential sector in 2005 (metric tons)	23,746
Expected energy efficiency achieved	20%
Potential energy efficiency upgrade penetration	20%
Number of housing units improved	1,232
Estimated reduction in electricity use (kWh)	1,393,947
Estimated GHG reduction in electricity use (metric tons)	326
Total estimated GHG reduction (metric tons)	950

Measure 3.4.C2: Improve Energy Efficiency in Existing Commercial Buildings

GHG emissions from commercial sector in 2005 (metric tons)	17,463
Electricity use in commercial sector in 2005 (kWh)	42,242,418
Expected energy efficiency achieved	20%
Potential EE upgrade penetration	20%
Estimated reduction in electricity use (kWh)	1,689,697
Estimated GHG reduction in electricity use (metric tons)	433
Estimated GHG reduction (metric tons)	699

Measure 3.4.C3: Reduce Energy Use in New Residential Buildings

Projected increase in GHG emissions in residential sector 2005 – 2020 (metric tons)	1,385
Projected increase in electricity use in residential sector 2005-2020 (kWh)	2,032,840
15% reduction in electricity use due to CA 2008 Building Efficiency Standards 2010-2020	203,284
Additional 15% reduction in electricity use from Marin Green BERST 2010- 2020	203,284
Estimated reduction in electricity use (kWh)	406,568
15% reduction in energy use due to CA 2008 Building Efficiency Standards 2010-2020	139
Additional 15% reduction from Marin Green BERST Standards 2010- 2020	139
Total estimated GHG reduction (metric tons)	277

Data Source Notes and Assumptions: According to the CEC, the 2008 Building Efficiency Standards, which took effect on January 1, 2010, require, on average, a 15 percent increase in energy efficiency savings compared with the 2005 Building Efficiency Standards. California Energy Commission, 2009 Integrated Energy Policy Report, Final Commission Report, December 2009, CEC -100-2009-003-CMF, p.5. Marin Green BERST recommends an additional reduction from existing Title 24 Part 6 energy budget requirements for new single and two-family residential construction as follows: 500-3,999 sq. ft., 15%; 4,000 – 5,499 sq. ft., 20%; 5,500 – 6,999 sq. ft., 30%; over 7,000 sq. ft., net zero energy. The Marin Green BERST recommendation for new multi-family buildings is 15% below Title 24 energy budget requirements. This analysis assumes an average 15% across all residential building types.

Measure 3.4.C4: Reduce Energy Use in New Commercial Buildings

Projected increase in GHG emissions in commercial sector 2005-2020 (metric tons)	778
Projected increase in electricity use in commercial sector 2005-2020 (kWh)	1,881,241
15% reduction in electricity use due to CA 2008 Building Efficiency Standards 2010-2020	188,124
Additional 15% reduction from Marin Green BERST Standards 2010- 2020	125,416
Estimated reduction in electricity use (kWh)	313,540
15% reduction in energy use due to CA 2008 Building Efficiency Standards 2010-2020	78
Additional 10% reduction from Marin Green BERST Standards 2010- 2020	52
Estimated GHG reduction (metric tons)	130

Data Source Notes and Assumptions: According to the CEC, the 2008 Building Efficiency Standards, which took effect on January 1, 2010, require, on average, a 15 percent increase in energy efficiency savings compared with the 2005 Building Efficiency Standards. California Energy Commission, 2009 Integrated Energy Policy Report, Final Commission Report, December 2009, CEC -100-2009-003-CMF, p.5. Marin Green BERST recommends an additional 15% reduction from existing Title 24 Part 6 energy budget requirements for new commercial construction over 5,000 sq. ft. This analysis assumes an average 10% reduction across all commercial building sizes.

Measure 3.4.C5: Install Residential Renewable Energy Systems

Annual electricity use in residential sector in 2005 (kWh)	34,848,687
GHG emissions from residential electricity use in 2005 (metric tons)	8,155
Number of households in 2005	6,160
Average annual residential energy use (kWh)	5,657
% potential solar energy of total electricity use	85%
Potential solar system penetration	10%
Potential number of homes	616
Estimated PG&E electricity saved (kWh)	2,962,138
Estimated GHG reduction (metric tons)	693

Data Source Notes and Assumptions: Number of Larkspur households in 2005 is based on estimates provided by the Association of Bay Area Governments (ABAG) Projections 2009. As of 5/15/10, Larkspur has 52 installed residential systems and a total capacity of 208 kW or approximately 4 kW per system (Marin Energy Management Team and California Solar Initiative data).

Measure 3.4.C6: Install Commercial Renewable Energy Systems

Annual electricity use in commercial sector in 2005 (kWh)	42,242,418
GHG emissions from commercial electricity use in 2005 (metric tons)	10,824
% potential solar energy of total electricity use	85%
Potential solar system penetration	10%
Estimated PG&E electricity saved (kWh)	3,590,606
Estimated GHG reduction (metric tons)	920

Measure 3.4.G1: Install Energy Efficiency Upgrades in City Buildings

Energy-Efficiency Project	Reduction in Annual Electricity Use (kWh)	Reduction in Annual Natural Gas Use (therms)	Estimated Project Cost	Annual Energy Cost Savings	Reduction in GHG emissions (metric tons)
Install energy-efficient lighting in City Hall and Fire Stations No. 15 and 16 (#1and #2), and Engineering Offices	77,940	--	Most completed	$12,872	17.42
Replace HVAC in City Hall and Fire Station No.15 (#1)	4,011	593	City Hall Completed	$1,146	4.07
Replace HVAC in Fire Station No. 16 (#2)	839	206	Completed	$139	0.19
Replace ductwork and Council Chamber ceiling in City Hall	2,521	63	Completed	$468	0.90
Enclose understory of City Hall and install under-story insulation	2,521	63	TBD	$468	0.90
Install Vending Miser	2,803	--	Completed	$463	0.63
Replace windows in Fire Station No. 15 (#1) and City Hall	10,381	261	TBD	$213	3.71
Reroof Fire Station No. 15 (#1) with energy-efficient DuroLast white roofing (1,500 sq. ft. estimated)	1,334	-9	TBD	$213	0.25
Replace existing roof over living quarters of Fire Station No. 16 (#2) and Children's Library with energy-efficient DuroLast white roofing. (1,500 sq. ft estimated)	1,334	-9	TBD	$213	0.25
TOTAL	103,683	1,167	TBD	$16,194	28.32

Data Source Notes and Assumptions: Proposed energy-efficiency projects and estimated project costs, net of rebates, based on preliminary Energy Management Studies prepared by the Marin Energy Management Team on August 12, 2005 and December 20, 2005. Ductwork in City Hall estimated to reduce energy use by 3.5%. City Hall understory improvements and insulation estimated to reduce energy use by 3.5%. Window replacement estimated to reduce energy use by 8%. Energy savings from cool roofs estimated with Roof Savings Calculator at www.roofcalc.com. Annual electricity cost savings based on the Average Total Rate for A-10 TOU Secondary service of .16515 per kWh from PG&E's A-10 Electric Rate Schedule, effective March 1, 2010. Annual natural gas cost savings based on PG&E's G-NR1 Schedule for Gas Service to Small Commercial Customers, effective May 1, 2010. Average rate of $0.81622 per therm based on estimated natural gas usage split of 25% summer use and 75% winter use.

Measure 3.4.G2: Install Renewable Energy Systems for City Buildings: PV

Facility	System DC Rating (kW)	System Size (sq. ft.)	Annual kWac Produced	Annual kWh Produced	Project Cost	Annual Cost Savings	Reduction in GHG Emissions (metric tons)
City Hall	26	3,600	19	35,596	$217,000	$5,879	7.96
Fire Station #1	11	1,500	8	15,060	$90,000	$2,487	3.37
Fire Station #2	22	3,000	17	31,810	$181,000	$5,253	7.11
TOTAL	59	8,100	44	82,466	$488,000	$13,619	18.44

Data Source Notes and Assumptions: Proposed PV systems and project costs based on Larkspur's April 25, 2006, application to the Internal Revenue Service for Clean Renewable Energy Bonds. Estimates for kWh production generated by the National Renewable Energy Laboratory's on-line PV Watts Version 1 Calculator for the San Francisco area at http://rredc.nrel.gov/solar/calculators/PVWATTS/version1/. Annual costs savings based on the Average Total Rate for A-10 TOU Secondary service of .16515 per kWh from PG&E's A-10 Electric Rate Schedule, effective March 1, 2010.

Measure 3.4.G3: Upgrade Street Lighting to Energy-Efficient Technologies: Induction Retrofit

Lamp Type	Quantity	Annual Energy Use (kWh)	Annual Cost	GHG Emissions (metric tons)	Potential Replacement Lamp	Annual Energy Use (kWh)	Annual Cost	GHG Emissions (metric tons)	Installation Cost	Reduction in Annual Energy Use (kWh)	Reduction in Annual Operat-ing Cost	GHG Emissions Reduction (metric tons)
Incandescent 189w	4	3,120	$399	0.70	CFL 42w	675	$399	0.15	$60	2,445	$0	0.55
HPS 50w 120v	18	4,536	$607	1.01	Induction 40w	3,024	$418	0.68	$8,100	1,512	$189	0.34
HPS 70w 120v	44	15,312	$2,011	3.42	Induction 40w	7,392	$1,022	1.65	Funded by grant	7,920	$989	1.77
HPS 70w 120v	486	169,128	$22,208	37.81	Induction 40w	81,648	$11,285	18.25	$218,700	87,480	$10,923	19.56
HPS 100w 120v	58	28,536	$3,693	6.38	Induction 70w	18,792	$2,476	4.20	Funded by grant	9,744	$1,217	2.18
HPS 100w 120v	17	8,364	$1,082	1.87	Induction 70w	5,508	$726	1.23	$9,095	2,856	$357	0.64
HPS 150w 120v	33	23,760	$3,041	5.31	Induction 85w	11,880	$1,557	2.66	$18,876	11,880	$1,483	2.66
HPS 200w 120v	67	64,320	$8,182	14.38	Induct. 120w	33,768	$4,317	7.55	$45,426	30,552	$3,864	6.83
HPS 250w 120v	2	2,400	$304	0.54	Induct. 150w	1,224	$157	0.27	$1,492	1,176	$147	0.26
HPS 70w 240v	21	8,568	$1,117	1.92	Induction 40w	3,528	$488	0.79	Funded by grant	5,040	$629	1.13
HPS 100w 240v	7	3,948	$509	0.88	Induction 70w	2,268	$299	0.51	Funded by grant	1,680	$210	0.38
HPS 150w 240v	2	1,656	$211	0.37	Induction 85w	720	$94	0.16	$1,144	936	$117	0.21
HPS 200w 240v	5	4,860	$618	1.09	Induct. 120w	2,520	$322	0.56	$3,390	2,340	$296	0.52
TOTAL	764	338,508	$43,981	75.68		172,947	$23,561	38.66	$306,283	165,561	$20,420	37.01

Data Source Notes and Assumptions: Potential replacement lamps and estimated installation costs provided by Republic ITS for illustrative purposes only; actual replacement lamps will require further analysis. Larkspur was awarded an Energy Efficiency and Conservation Bloc Grant in 2010 from the California Energy Commission to replace 130 existing HPS fixtures with induction lamps. Annual energy costs based upon PG&E's LS-2 Electric Schedule for customer-owned street and highway lighting, effective of March 1, 2010. The LS-2 schedule does not provide a rate for compact fluorescent (CFL) lamps, so no rate saving is realized for the incandescent lamp retrofit. The LS-2 schedule does not provide a rate for 70w induction lamps, so the 80w rate and lamp attributes were substituted.

Measure 3.4.G3: Upgrade Street Lighting to Energy-Efficient Technologies: LED Retrofit

Lamp Type	Quantity	Annual Energy Use (kWh)	Annual Cost	GHG Emissions (metric tons)	Potential Replacement Lamp	Annual Energy Use (kWh)	Annual Cost	GHG Emissions (metric tons)	Replacement Cost	Reduction in Annual Energy Use (kWh)	Reduction in Annual Operating Cost	GHG Emissions Reduction (metric tons)
Incandescent 189w	4	3,120	$399	0.70	CFL 42w	675	$399	0.15	$60	2,445	$0	0.55
HPS 50w 120v	18	4,536	$607	1.01	LED 30.01 - 35	2,398	$340	0.54	$9,810	2,138	$267	0.48
HPS 70w 120v	44	15,312	$2,011	3.42	Induction 40w	7,392	$1,022	1.65	Funded by grant	7,920	$989	1.77
HPS 70w 120v	486	169,128	$22,208	37.81	LED 45.01 - 50w	94,478	$12,889	21.12	$269,730	74,650	$9,320	16.69
HPS 100w 120v	58	28,536	$3,693	6.38	Induction 70w	18,792	$2,476	4.20	Funded by grant	9,744	$1,217	2.18
HPS 100w 120v	17	8,364	$1,082	1.87	LED 60.01 - 65w	4,366	$583	0.98	$10,812	3,998	$499	0.89
HPS 150w 120v	33	23,760	$3,041	5.31	LED 95.01 - 100w	13,187	$1,721	2.95	$25,278	10,573	$1,320	2.36
HPS 200w 120v	67	64,320	$8,182	14.38	LED 115.01 - 120w	32,240	$4,176	7.21	$53,667	32,080	$4,006	7.17
HPS 250w 120v	2	2,400	$304	0.54	LED 175.01 - 180w	1,454	$186	0.33	$23,730	946	$118	0.21
HPS 70w 240v	21	8,568	$1,117	1.92	Induction 40w	3,528	$488	0.79	Funded by grant	5,040	$629	1.13
HPS 100w 240v	7	3,948	$509	0.88	Induction 70w	2,268	$299	0.51	Funded by grant	1,680	$210	0.38
HPS 150w 240v	2	1,656	$211	0.37	LED 95.01 - 100w	799	$104	0.18	$1,532	857	$107	0.19
HPS 200w 240v	5	4,860	$618	1.09	LED 115.01 - 120w	2,406	$312	0.54	$4,005	2,454	$306	0.55
TOTAL	764	338,508	$43,981	75.68		183,983	$24,993	41.13	$398,624	154,525	$18,987	34.55

Data Source Notes and Assumptions: Potential replacement lamps and estimated installation costs provided by Republic ITS for illustrative purposes only; actual replacement lamps will require further analysis. Larkspur was awarded an Energy Efficiency and Conservation Block Grant in 2010 from the California Energy Commission to replace 130 existing HPS fixtures with induction lamps. Annual energy costs based upon PG&E's LS-2 Electric Schedule for customer-owned street and highway lighting, effective of March 1, 2010. The LS-2 schedule does not provide a rate for compact fluorescent (CFL) lamps, so no rate saving is realized for the incandescent lamp retrofit. The LS-2 schedule does not provide a rate for 70w induction lamps, so the 80w rate and lamp attributes were substituted.

Based upon the comparative results of the LED and induction lamp retrofits, the induction lamp retrofit was chosen for estimated greenhouse gas reduction and cost estimates for Measure 3.4.G3. It is important to note that other considerations, including maintenance and lifetime replacement costs, as well as updated pricing at the time of replacement, may recommend alternative retrofits.

Measure 3.4.G4: Upgrade Traffic Signals to Energy-Efficient Technologies

Signal Type	Quantity	Existing Lamp (watts)	Annual Energy Use (kWh)	Annual Energy Cost	GHG Emissions (metric tons)	Proposed Replacement LED Lamp (watts)	Annual Energy Use (kWh)	Annual Energy Cost	GHG Emissions (metric tons)	Installation Cost	Reduction in Annual Energy Use (kWh)	Annual Energy Cost Savings	Reduction in GHG Emissions (metric tons)
8" Yellow Balls	2	69	302	$43	0.07	7.7	34	$5	0.01	Completed in 2007	268	$38	0.06
12" Yellow Balls	18	135	5,322	$750	1.19	12	473	$67	0.11	Completed in 2007	4,849	$684	1.08
12" Yellow Balls	29	135	8,574	$1,209	1.92	12	762	$107	0.17	$2,175	7,812	$1,101	1.75
12" Yellow Arrows	7	135	2,070	$292	0.46	9	138	$19	0.03	Completed in 2007	1,932	$272	0.43
12" Yellow Arrows	4	135	1,183	$167	0.26	9	79	$11	0.02	$300	1,104	$156	0.25
16" Pedestrian Signals	19	69	11,484	$1,619	2.57	11	1,831	$258	0.41	$2,850	9,654	$1,361	2.16
TOTAL			28,934	$4,079	6.47		3,317	$468	0.74	$5,325	25,618	$3,612	5.73

Data Source Notes and Assumptions: Existing and proposed lamp types, wattages and estimated installation costs provided by Republic ITS. Analysis assumes yellow lights are activated 25% of the time and pedestrian signals 100% of the time. Annual energy costs based upon PG&E's TC-1 Schedule for traffic control service, effective March 1, 2010.

3.5 Green Purchasing

Measure 3.5.G1: Upgrade to Energy Star-Rated Office Equipment

Equipment	Quantity	Estimated Energy Saving Per Unit (kWh)	Annual Energy Savings (kWh)	Annual Energy Cost Savings	Reduction in GHG Emissions (metric tons)
Monitor	21	30	630	$104	0.14
Computer CPU	34	138	4,692	$775	1.05
Imaging Equipment	16	12	192	$32	0.04
Refrigerator (small)	2	86	172	$28	0.04
Refrigerator (large)	2	106	212	$35	0.05
Television	1	49	49	$8	0.01
TOTAL			5,947	$982	1.33

Data Source Notes and Assumptions: Estimated energy savings based upon energy savings calculators developed by the U.S. Environmental Protection Agency and U.S. Department of Energy and available at www.energystar.gov. For estimating purposes, one-half of the City's monitors were assumed to be CRTs and one-half LCDs, and computers were assumed to have sleep settings activated. Based on industry studies, computers and monitors were assumed to be shut off at night 36% of the time. Annual electricity cost savings based on the Average Total Rate for A-10 TOU Secondary service of .16515 per kWh from PG&E's A-10 Electric Rate Schedule, effective March 1, 2010.

Measure 3.5.G2: Switch to 30% Recycled Paper

Paper purchased per year	600 reams
Paper weight	3,000 pounds
Paper cost @ $36 per case	$2,160
30% recycled paper cost @ $43 per case	$2,580
Additional cost	$420
GHG emissions reduction	1,107 pounds or .5 metric tons

Data Source Notes and Assumptions: As reported by Amy Koenig, the City purchases 20 lb. copy paper with no recycled content. GHG emissions reduction estimates were made using the Environmental Defense Fund Paper Calculator at www.papercalculator.org.

3.6 Waste Reduction, Recycling and Zero Waste

Measure 3.6.C1: Divert All Food Waste from Landfill

Projected landfilled waste in 2020 (tons)	10,226
Food waste in 2020; 14.6% of total (tons)	1,493
GHG emissions reduced from diverted food waste (metric tons)	410

Data Source Notes and Assumptions:
Estimated food waste based on the CIWMB 2004 Statewide Waste Characterization Study. This state average waste characterization accounts for residential, commercial and self-haul waste. http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097

CACP	CIWMB	% of Total	Methane Emissions (metric tons / short ton of waste)
Paper Products	All paper types	21	1.940
Food Waste	Food	14.6	1.098
Plant Debris	Leaves and Grass, Prunings and Trimmings, Branches and Stumps, Agricultural Crop Residues, and Manures	6.9	0.622
Wood/Textiles	Textiles, Remainder/Composite Organics, Lumber, and Bulky Items	19.8	0.549
All Other Waste	The other category includes all inorganic material types reported: Glass, Metal, Electronics, Plastics, Non-organic C&D, and Special/Hazardous Waste.	37.7	0.000

The 75% methane recovery factor is derived from the Local Government Operations Protocol, Chapter 9. The methane emission factors used in ICLEI's CACP Software were derived from the EPA WARM model. For quantification of emissions, only methane generation (or gross emissions) is taken into account. These emissions are estimated to take place over an extensive (up to 100 year) cycle, as anaerobically degradable organic carbon decomposes in a landfill. More information on the WARM Model is available at: http://epa.gov/climatechange/wycd/waste/calculators/Warm_home.html

Measure 3.6.C2: Reduce All Other Solid Waste Disposal to Landfills by 25%

Projected landfilled waste in 2020 (tons)	10,226
Food waste diverted (tons)	1,493
Remaining landfilled waste in 2020 (tons)	8,733
GHG emissions from remaining waste (metric tons)	1,464
25% reduction in remaining waste (metric tons)	366

Measure 3.6.G1: Reduce Solid Waste Disposal to Landfill by 25%

Projected landfilled waste in 2020 (tons)	96.8
GHG emissions from waste in 2020 (metric tons)	24.7
25% reduction in GHG emissions (metric tons)	6.2

Data Source Notes and Assumptions: Waste Characterization based on California Integrated Waste Management Board (CIWMB), derived specifically for the "Public Administration" sector, using the Business Waste Characterization portion of the CIWMB 1999 Statewide Waste Characterization Study: http://www.ciwmb.ca.gov/WasteChar/BizGrpCp.asp

CACP	CIWMB	% of Total
Paper Products	All paper types	39.4
Food Waste	Food	9.8
Plant Debris	Leaves and Grass, Prunings and Trimmings, Branches and Stumps, Remainder/Composite Organic	17
Wood/Textiles	Textiles (Under "Other Organic"), Lumber (Under "Construction and Demolition"), Remainder/Composite Construction and Demolition	6.7
All Other Waste	The other category includes all inorganic material types reported: Glass, Metal, Electronics, Plastics, Non-organic C&D, and Special/Hazardous Waste.	27.1

3.7 Water and Wastewater

Measure 3.7.C1: Reduce Water Use in Community by 15%

Per capita water use per day, FY 05/06 (gallons)	139
Water use in 2005 (gallons)	608,820,000
Projected water use in 2020 (gallons)	644,334,500
Indoor, hot water use (gallons)	129,511,235
15% reduction in hot water use (gallons)	19,426,685
Reduction in natural gas use (therms)	110,421
Reduction in electricity use (kWh)	1,550,249
Estimated reduction in GHG emissions (metric tons)	953

Data Source Notes and Assumptions: Per capita water use in Marin Municipal Water District FY 2005/2006 was 139 gallons per day, MMWD Report on Water Production and Related Statistics, June 30, 2008, p.12. Indoor water use assumed to be 67% of total water use (Dan Carney, MMWD) and hot water use 30% of indoor water us (EBMUD Indoor Water Conservation Study (p. 31), 2003; see http://www.ebmud.com/about_ebmud/publications/technical_reports/residential_indoor_wc_study.pdf). Analysis assumes 0.0098 therms to heat one gallon of water, 0.19 kWh to heat one gallon of water, and 58% of hot water heaters use natural gas (ICLEI CAPPA Beta).

Measure 3.7.G1: Upgrade and Retrofit Water and Wastewater Pumps

Projected electricity use in 2020 (kWh)	18,938
5% energy savings estimated (kWh)	947
Project cost	TBD
Annual cost savings	$162
Estimated GHG emissions reduction (metric tons)	0.21

Data Source Notes and Assumptions: Energy savings are estimated. Installation of a variable frequency drive on the pump motor could reduce energy use further, by up to 30%. Annual electricity cost savings based on an average of the summer and winter rate from PG&E's A-1 Electric Rate Schedule, effective June 1, 2010, of $0.17155 per kWh.

3.8 State Actions

Measure 3.8.C1: PG&E Achieves 33% Renewable Portfolio Standard by 2020

Projected community electricity use in 2020 (kWh)	81,005,186
Electricity use reduced from other measures (kWh)	10,356,496
Electricity use added back for electric vehicles (kWh)	2,614,307
Remaining electricity usage (kWh)	73,262,997
GHG emissions with 2005 PG&E emission factor (metric tons)	16,378
GHG emissions with projected 2020 PG&E emissions factor (metric tons)	8,561
Estimated reduction in GHG emissions (metric tons)	7,817

Data Source Notes and Assumptions: Projected 2020 PG&E CO2e emission factor of 0.25763 is based on PG&E's 2005 electric power mix as follows: 12% from renewable sources; 20% from large hydro; 24% from nuclear; 42% from natural gas; 1% from coal; and 1% from other GHG-emitting sources. Analysis assumes additional 21% renewable energy will displace GHG-emitting sources in the electric power mix. Many variables will affect the actual 2020 emission factor, including the availability of large hydro and nuclear electricity sources, and the GHG reduction potential calculated here assumes conditions will be similar to 2005.

Measure 3.8.C2: AB 1493 Pavley Standards

2020 CA transportation emissions MMTCO2e	225.4
Expected reduction in emissions MMTCO2e under phase one	16.4
% reduction	7.28%
Community transportation emissions, projected 2020 (metric tons)	70,848
GHG emissions reduced by other measures (metric tons)	4,769
Remaining GHG emissions (metric tons)	66,078
Estimated reduction in GHG emissions (metric tons)	4,808

Data Source Notes and Assumptions: California Air Resources Board, "Climate Change Scoping Plan: A Framework for Change," December 2008, p. 13. 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," Feb. 25, 2008, p. 13, http://www.energy.ca.gov/2008publications/ARB-1000-2008-012/ARB-1000-2008-012.PDF.

Measure 3.8C3: Low Carbon Fuel Standard

2020 CA transportation emissions MMTCO2e	225.4
Expected reduction in emissions MMTCO2e	15
% reduction	6.65%
Community transportation GHG emissions, projected 2020 (metric tons)	70,848
GHG emissions reduced by other measures (metric tons)	4,769
Remaining GHG emissions (metric tons)	66,078
Estimated reduction in GHG emissions (metric tons)	4,397

Data Source Notes and Assumptions: California Air Resources Board, "Climate Change Scoping Plan: A Framework for Change," December 2008, pp. 13 and 17.

Measure 3.8.G1: PG&E Achieves 33% Renewable Portfolio Standard by 2020

Projected government electricity use in 2020 (kWh)	670,887
Electricity use reduced from other measures (kWh)	384,222
Electricity use added back for electric vehicles (kWh)	5,063
Remaining electricity usage (kWh)	291,728
GHG emissions with 2005 PG&E emission factor (metric tons)	65.22
GHG emissions with projected 2020 PG&E emissions factor (metric tons)	34.1
Estimated reduction in GHG emissions (metric tons)	31.1

Measure 3.8.G2: AB 1493 Pavley Standards

2020 CA transportation emissions MMTCO2e	225.4
Expected reduction in emissions MMTCO2e under phase one	16.4
% reduction	7.28%
2020 government transportation emissions (metric tons)	333.8
GHG emissions reduced by other measures (metric tons)	34.4
Remaining GHG emissions (metric tons)	299.4
Estimated reduction in GHG emissions (metric tons)	21.8

Measure 3.8G3: Low Carbon Fuel Standard

2020 CA transportation emissions MMTCO2e	225.4
Expected reduction in emissions MMTCO2e	15
% reduction	6.65%
2020 government transportation emissions (metric tons)	333.8
GHG emissions reduced by other measures (metric tons)	34.4
Remaining GHG emissions (metric tons)	299.4
Estimated reduction in GHG emissions (metric tons)	19.9