City of Redwood City

Climate Action Plan

April 22, 2013

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

Acknowledgements

Redwood City City Council
Alicia Aguirre, Mayor
Jeffrey Gee, Vice Mayor
Ian Bain, Council Member
Rosanne Foust, Council Member
Jeff Ira, Council Member
Barbara Pierce, Council Member
John Seybert, Council Member

City Manager
Robert Bell

Redwood City Staff
Malcolm Smith, Public Communications Manager
Deanna La Croix, Executive Assistant to the City Manager
Vicki Sherman, Environmental Initiatives Intern
Steve Davis, Building Official
Brian Lee, Senior Civil Engineer
Carlos Espinoza, Senior Building Coordinator
Jessica Manzi, Senior Transportation Coordinator
Susan Wheeler, Management Analyst
Rhonda Coffman, CDBG/HOME Coordinator
Stephen De Jong, GIS Coordinator
Steven Parker, Landscape Architect
Terence Kyaw, Assistant Public Works Director
Daniel Burton, Facilities Maintenance Section
Tom Baxter, Senior Building Maintenance Worker
Ken Webber, Fleet Supervisor
Mike Gibbons, Right-of-Way Superintendent
Debra Ivazes, Public Works Technician
Valerie Matonis, Community Services Manager

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

RICAPS Steering Committee: Elizabeth Claycomb (City of Pacifica), Erin Cooke (City of Cupertino), Brandi de Garmeaux (City of Portola Valley), Shelly Reider (City of Millbrae), Jim Shannon (City of San Bruno)

RICAPS Project Consultant: KEMA Services, Inc.

RICAPS Staff: Richard Napier (C/CAG), Kim Springer (County of San Mateo), Susan Wright (County of San Mateo)

Table of Contents

EXECUTIVE SUMMARY

Climate change is a global problem and only through local solutions designed to meet the needs of our community can we mitigate and adapt to its impacts and protect the environment. While the challenge of climate change is unprecedented, local-level solutions can reduce emissions, increase efficiency, promote economic development, and improve quality of life for residents. Together, we can conserve our scarce resources, thereby saving our families and companies money, increasing the resilience of our economy and emergence of new markets that prioritize green technologies.

The City of Redwood City has taken a significant step toward a more sustainable future with this Climate Action Plan. The Plan has identified a variety of areas and opportunities to reduce GHG emissions within the community and City operations that, along with statewide efforts, can achieve a reductions of 15 percent below 2005 levels by 2020. From the baseline year of 2005 to the target year of 2020, this Plan recommends that the City:

- Achieve a 15% energy use reduction compared with Title 24 in residential and commercial new construction with adopted and updated Green Building Codes
- Achieve a 15% energy use reduction in existing residential buildings and commercial facilities by targeting a 20% participation rate in residential and commercial energy audit, rebate and incentive, and upgrade programs
- Achieve a 5% energy use reduction in commercial facilities participating in the upcoming Green Business Program with an overall 20% participation rate
- Achieve a 15% energy use reduction in targeted municipal facilities by performing energy audits and upgrades on half the existing square footage
- Replace half the existing unmetered streetlights with more energy efficient LED lighting and document the energy and cost savings
- Install over 900kW of solar power generation capacity for municipal facilities
- Achieve a 22% reduction in water consumption through water-efficient appliances and fixtures rebates, adopted water ordinances, and the ongoing Recycled Water Project

- Implement the Regional Bicycle Share and Last Mile Connection Pilot Programs and document the emissions impacts

- Complete the bikeways identified for Redwood City in the San Mateo County Comprehensive Bicycle and Pedestrian Plan and increase local bikeways

- Achieve up to an 8% reduction in Vehicle Miles Traveled (VMT) by updating parking policies and management strategies, including the Downtown Parking Management Plan

- Achieve and document an overall 5% participation rate in the Employee Commute Program

- Achieve an 85% solid waste diversion rate through a single use bag ordinance, commercial recycling, construction and demolition recycling, and yard waste recycling

The Climate Action Plan proposes 15 quantifiable emissions reduction measures for Redwood City to achieve the 2020 target. These measures were selected from a set of 39 measures developed for jurisdictions in the San Mateo County region by the City and County Association of Governments (C/CAG) and promoted through the countywide Regionally Integrated Climate Action Planning Suite (RICAPS) initiative. A summary table of the measures and an implementation timeline to the target year of 2020 are provided on pages 20-22 in Chapter 2.

The City of Redwood City is poised to reap the benefits of a clean energy economy, with policies that can increase the demand for local green jobs. While an important first step, this Plan will remain a living document, to be updated as technology and policies progress, to support the City's efforts to manage GHG emissions for a sustainable future for all.

1. Climate Action Strategies

The City of Redwood City is pleased to present the following Climate Action Plan (Plan). This Plan is designed to be a blueprint of our community's response to the challenges posed by climate change. Redwood City has committed to taking steps to reduce our emissions, implementing current environmental programs and services – and creating new ones – that support our community and families in doing the same.

This Plan describes the measures the City is taking to lead by example in reducing communitywide GHG emissions and recommends new measures that will make our municipal government an even more efficient and resource conservation-minded organization. The Plan recommends continuing to implement, monitor, and evaluate a number of communitywide programs that can effectively reduce our emissions, such as the "smart" development patterns put forth in the City's 2010 General Plan, our new Green Building Codes, and our Complete Streets program. It outlines a schedule for reviewing and updating measures the City is currently taking, including our Water Use and Solid Waste Ordinances, Parking Policies and Management Strategies, and Commute Alternatives Program, not only to increase their effectiveness in reducing emissions, but also to better meet the changing needs of the City's businesses and residents. It recommends continuing pilot programs that are currently in progress, such as the Regional Bicycle Share and Last Mile Connection Pilot Programs, extending the LED Street Light Replacement Program, and reintroducing the Green Business Program piloted by the County of San Mateo. Finally, the Plan outlines a set of measures for the City to consider undertaking in the future, as we assess our progress toward meeting our emissions targets over time.

The sections below describe 15 specific measures to reduce Redwood City's GHG emissions to 15 percent below 2005 levels by 2020. Certain measures aim to reduce emissions from the community at large, while other measures focus specifically on municipal operations. The first section describes the measures that focus on municipal operations, and the second section describes measures for the whole community. All measures are assumed to lead to specific, quantifiable reduction of GHG emissions, except for the supporting measures such as inventorying emissions and updating the Plan. The final section introduces adaptation planning, which is the next step after climate action planning.

1.1 Municipal Measures

The measures for reducing emissions associated with municipal operations are divided into three categories corresponding to the major emissions sectors: energy, transportation, and solid waste. Since this Climate Action Plan supports and implements our General Plan, the applicable General Plan goals are included before the descriptions of the municipal measures as well. It is important to note that the City of Redwood City is already in the process of implementing all of the municipal measures proposed below to varying degrees, and in some cases, this Plan simply recommends continuing implementation of existing measures.

1.1.1 Energy in Municipal Operations

Buildings and facilities energy is the sector with the most immediately achievable and affordable reduction opportunities, and energy efficiency is typically the most cost-effective measure for GHG reductions. Thus, a sensible energy policy seeks to first maximize energy efficiency and then to look to generating electricity with low-carbon fuels and renewable resources. This is refered to as the principle of "reduce, then produce." This section identifies the City's General Plan goals and describes three measures for municipal operations that will promote energy efficiency, as well as renewable energy, in both new and existing municipal facilities.

General Plan Goal (NR-4): Maximize energy conservation and renewable energy production to reduce consumption of natural resources and fossil fuels.

Municipal Facilities Energy Audit and Retrofit Program

Category	Measure	Description	Reductions ($MTCO_2e$)
1.Energy	EM5 Municipal Facilities Energy Audit and Retrofit Program	Continue auditing City facilities for energy efficiency opportunities and implement energy efficient retrofits. Participate in San Mateo County Energy Watch, leverage benchmarking and GHG inventories to identify EE upgrade opportunities, track energy performance, and leverage other programs that provide funding.	87

Since 2001 Redwood City has participated in a number of energy efficiency programs that target municipal facilities for projects such as lighting and HVAC retrofits, including an ABAG program that replaced older fluorescent lighting in sixteen public facilities saving the City over $40,000 a year on energy costs. Most recently the City has been participating in the San Mateo County Energy Watch Comprehensive Energy Audit Program in 2012-13. Five City facilities were audited to identify potential energy efficiency retrofit projects. By implementing projects in just three of these facilities, the City could save over $30,000 a year in energy and maintenance costs. Staff is determining which projects will move forward in the next two years, and the implementation schedule is still in the planning phases. This Plan proposes continuing

participation in the audit and retrofit programs for municipal facilities that are funded by state, regional, county and utility programs. It further recommends targeting half the existing facilities for audits and implementation of energy savings projects by 2020 with 15 percent energy savings overall. Depending on staff time and resources, this Plan also recommends exploring using energy service companies for additional audit and retrofit opportunities beyond the publicly funded programs.

Unfortunately, rising electricity costs can cut into the dollar savings from implementing energy efficiency projects in municipal facilities. Figures 1 and 2 show that the 15 percent energy savings target could represent as much as a $59,793 reduction in annual electricity costs over 2010, assuming the price of electricity remains the same as in 2010, but it would result in a $37,926 increase from the City's 2005 electricity cost due to an almost 20% increase in electricity costs from 2005 to 2010. If electricity costs do continue to rise, or if new buildings are added to the municipal portfolio, implementing efficiency projects becomes an effective cost control measure for the City.

Figure 1: Municipal Facilities Electricity Use (kWh) with 2020 project estimate

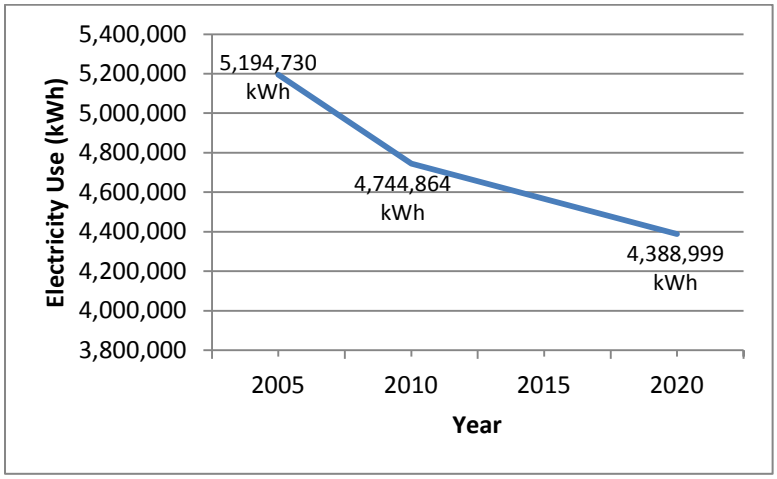
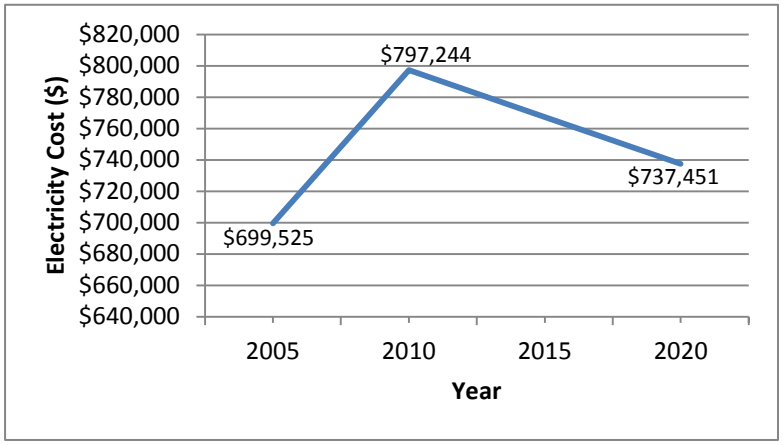


Figure 2: Municipal Facilities Electricity Cost ($) with 2020 project estimate



Figures 3 and 4 show the City's natural gas usage and cost with project estimates and presents another case for energy efficiency projects. Due to a pool closure, a number of energy efficiency projects, and a 25 percent drop in natural gas prices, the City's natural gas usage and cost dropped markedly between 2005 and 2010. Thus, a 15 percent energy reduction in half the existing facilities by 2020 could represent as much as a $93,823 reduction in annual natural gas costs from 2005, if natural gas were to remain at the 2010 price**.**

Figure 3: Municipal Facilities Natural Gas Use (therms) with 2020 project estimate

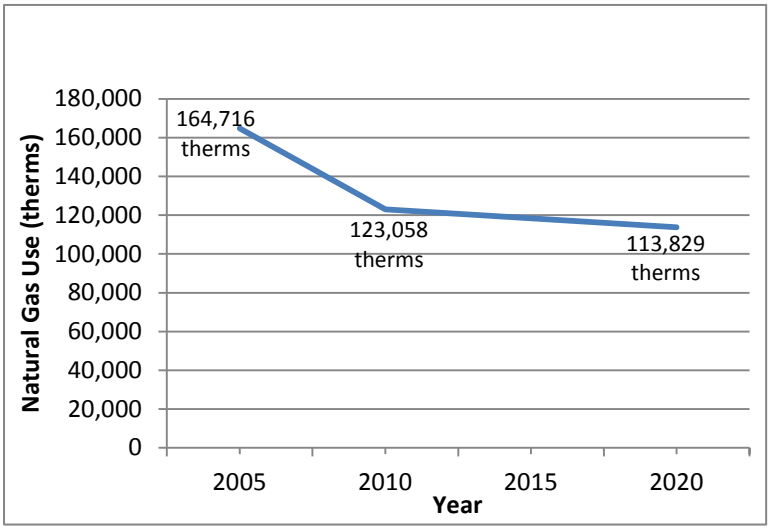
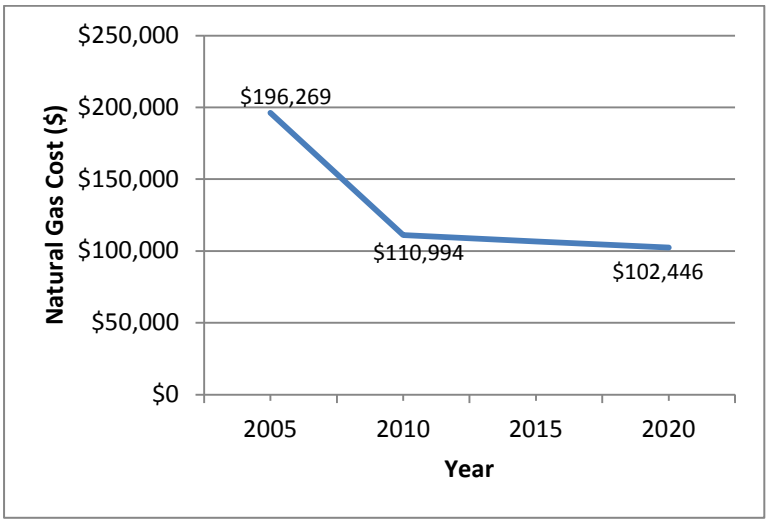


Figure 4: Municipal Facilities Natural Gas Cost ($) with 2020 project estimate



It is evident from the previous figures that the City is making good progress on municipal energy efficiency, but it is not certain if this pace of progress will be able to offset future energy costs. By committing to energy efficiency in public facilities, the City creates a hedge against rising energy costs, positions itself to take advantage of renewable energy opportunities, and also acts

as a model for community participation in similar residential and commercial energy efficiency programs.

Energy Efficient Public Lighting

Category	Measure	Description	Reductions ($MTCO_2e$)
2.Energy	EM1 Energy Efficient Public Lighting Program	Replace street, parks and parking lot lighting with efficient lighting (LEDs, induction, etc).	50

Along with buildings and facilities, public lighting (streetlights, park lighting, and parking lot lights) accounts for a significant amount Redwood City's municipal electricity usage. While the City has made progress in reducing the energy consumption of municipal facilities and certain types of public lighting, such as traffic signals and parks lighting, this is not yet the case with streetlights. This Plan proposes to replace 2,618 streetlights (half of the existing unmetered streetlights, and approximately 30 percent of the total City streetlights) by 2020 with LEDs. Two pilot LED replacement projects have been identified for possible implementation in 2013 to determine resident response to various lighting types, and one of these pilot areas was completed in January 2013. Depending on pilot program results and technology improvements over time, the wattage could potentially be reduced even further by increasing the number of lights replaced. For example, future retrofits could include the remaining unmetered streetlights, metered streetlights, and outdoor lighting in parks and parking lots.

Replacing 30 percent of the existing streetlights with LEDs would reduce their electricity consumption by 32 percent. If electricity rates remained the same as 2010, this would represent a cost savings in 2020 of $29,568 from the City's 2010 streetlight costs. Figures 5 and 6 show that, because of electricity rate increases since 2005, the City would actually pay $46,235 more than in 2005 for consuming 175,859 fewer kWhs of electricity.

Figure 5: Streetlight Electricity Use (kWh) with 2020 project estimate

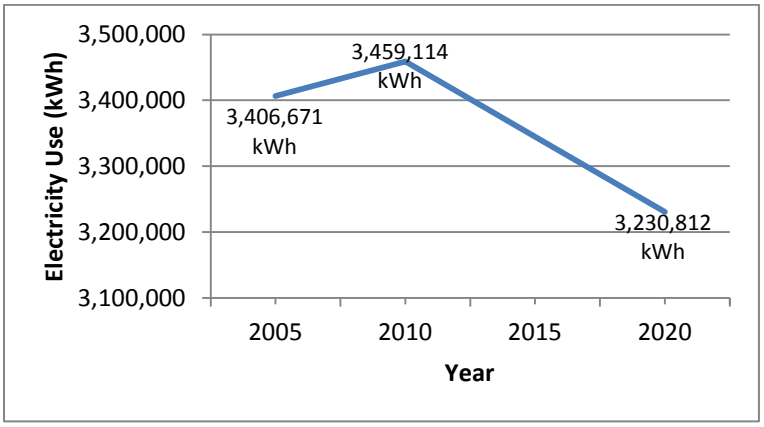
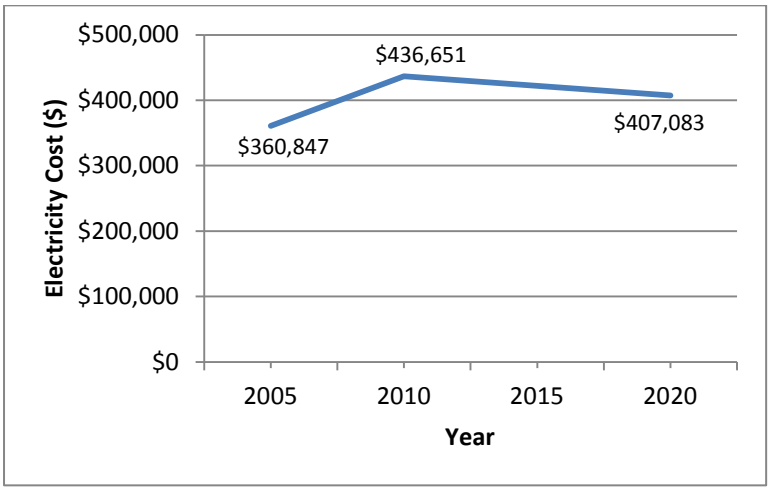


Figure 6: Streetlight Electricity Cost ($) with 2020 project estimate



Because of the high cost of street light replacements, this Plan proposes that the City take a phased approach to implementing energy efficient streetlighting and consider utilizing audit and retrofit programs such as San Mateo County Energy Watch or energy service companies to bundle these projects with energy efficiency projects in buildings and facilities for improved returns. Implementing these two energy efficiency measures positions the City to take optimal advantage of renewable energy opportunities by allowing for smaller system sizes, thus making projects more cost effective.

Renewable Energy for Municipal Facilities

Category	Measure	Description	Reductions ($MTCO_2e$)
3.Energy	EM4 Renewable Energy for Municipal Facilities	Complete installation of solar or other renewable energy projects at select City facilities and install where feasible. Set installation goal of 900 kW.	195

Between 1999 and 2009, the community of Redwood City installed over 500 kW of solar capacity. Given the current state and federal plans for renewable energy and the rapid market changes, this Plan proposes that the City accelerate solar deployment by installing 900 kW at municipal facilities by 2020. The City conducted a solar assessment of several facilities in 2012 and identified potential for 902 kW, from which one facility was selected for possible funding through a group procurement process. As City buildings and facilities are audited and retrofitted for greater energy efficiency, renewable energy becomes more cost effective due to reduced system sizes, so these sites will become more attractive candidates for solar installation. Solar leases or Power Purchase Agreements can help the City avoid the high cost of direct purchase for renewable energy systems while accelerating solar deployment and controlling utility costs by stabilizing them over a contract term. These options provide high profile opportunities for the City to promote similar programs for businesses and residents, as well as promoting evolving solar market opportunities such as crowdfunding for the community.

1.1.2 Municipal Fleet and Employee Commute

In Redwood City, 49 percent of emissions stem from transportation. Travel on local roads and state highways represent 17 percent and 26 percent of the City's total emissions respectively. Thus, reducing transportation emissions is a critical component of the climate action strategy. On the municipal side, transportation emissions largely come from either the municipal fleet or from employee commute. The City of Redwood City has already adopted a number of municipal fleet measures that reduce emissions, including adopting an efficient fleet policy, replacing fleet passenger vehicles with hybrid vehicles, and fueling diesel vehicles with bio-diesel (B20).

The City has also taken advantage of past grants made available for Electric Vehicle (EV) charging infrastructure, installing 22 charging stations available to the public at City facilities including Main Library, Redwood Shores Library, Red Morton Community Center, and Jefferson and Marshall Street Garages. State and federal agencies are now beginning to focus on large-scale deployment of EV infrastructure and transition to EV fleets. At this preliminary stage, this Plan recommends monitoring state and federal programs for EV deployment without advancing a specific fleet measure. The City can assess opportunities for future fleet measures over the next two years in conjunction with the roll-out of the Governor's recently released ZEV (Zero Emissions Vehicles) Action Plan, taking advantage of any further grants for infrastructure or fleet transition if possible, while focusing on the City's existing Employee Commute Program.

General Plan Goal (BE-31): Encourage developments and implementation of strategies that minimize vehicle trips and vehicle miles traveled.

Employee Commute Program

Category	Measure	Description	Reductions ($MTCO_2e$)
4.Transportation and Land Use	TM3 Employee Commute Program	Monitor and evaluate commute alternatives program to increase use of public transportation, carpooling, biking, and walking.	5

Redwood City's Employee Commute Program incentivizes alternative transportation to work by subsidizing employees' commuter checks. While the program appears to be popular and well-subscribed, this Plan proposes developing a monitoring and evaluation plan to determine the current participation rates and develop ways to improve participation, potentially integrating elements of programs such as the Regional Bicycle Share and Last Mile Connection pilots in order to promote alternative commute opportunities to the community at large.

1.1.3 Solid Waste from Municipal Operations

Reducing the amount of waste deposited into the landfill through material reuse, reduction, and recycling is an important strategy Redwood City can initiate to reduce GHG emissions. Some landfills capture as much methane as possible and combust it for electricity generation. However, for many landfills, much of the methane leaks to the atmosphere, a primary source of GHG emissions in the waste category. Greenhouse gas emissions are also associated with product supply chains, so waste reduction and recycling become powerful tools for reducing emissions all along the consumer materials' lifecycle. To address the issues of escalating waste production, Assembly Bill 341, passed in 2011, now requires local jurisdictions to meet a solid waste diversion goal of 75 percent by the year 2020 and includes requirements for mandatory commercial recycling. The City has the opportunity to lead by example on solid waste and promote waste reduction programs to the community by phasing in municipal zero waste programs ahead of state ordinances. This section identifies the General Plan goal and describes the municipal solid waste measure that will address the State's mandate, reduce GHG emissions from solid waste, and promote zero waste to the community.

General Plan Goal (BE-45): Minimize the volume of solid waste that enters regional landfills.

Solid Waste Diversion Target

Category	Measure	Description	Reductions ($MTCO_2e$)
5.Solid Waste	WC1 Raise Solid Waste Diversion Rate	Increase participation in recycling programs and ensure weekly collection of recyclables and organic waste to achieve an 85 percent waste diversion goal by 2020.	13,968

Redwood City has consistently been ahead of the curve on solid waste diversion, achieving a 55 percent diversion rate in the 2005 baseline year and exceeding 60 percent in recent years. The City has adopted an ordinance banning polystyrene foodware and a single use bag ordinance effective in 2013. Because of measures like these, not only is the AB 341 mandate of a 75 percent diversion rate by 2020 achievable for Redwood City, but this Plan proposes setting an 85 percent diversion rate goal for 2020. To help promote and meet that goal, the Plan proposes incrementally implementing a zero waste policy for municipal operations for marketing in advance of community programs and ordinances aimed at zero waste. Zero waste refers to an approach to minimizing solid waste through a variety of source reduction, reuse, recycling, and composting policies and programs. Actions would include, but are not limited to, developing an Environmentally Preferred Purchasing (EPP) policy, establishing a Zero Waste policy for municipal events, and requiring municipal recycling of construction and demolition debris.

1.2 Community Measures

As with the municipal measures, the measures for reducing communitywide emissions are divided into the same three categories corresponding to the major emissions sectors: energy, transportation and land use, and solid waste. The applicable General Plan goals are again included before the descriptions of the community measures. The City of Redwood City is likewise already in the process of implementing many of the community measures proposed below, and in some cases, this Plan simply recommends continuing implementation of existing measures.

1.2.1 Community Energy Efficiency and Renewable Energy

In the communitywide sector, as in the municipal sector, energy use in buildings and facilities provides the greatest opportunity for affordable emissions reductions. Because of the relative affordability of energy efficiency measures and the fact that the same principle of “reduce, then produce” applies in the community as in municipal operations, these measures focus on energy efficiency rather than renewable energy. Reducing energy use by implementing energy efficiency measures first means that renewable energy systems can be smaller and less expensive. This section identifies the related General Plan goal and describes the communitywide measures that will promote energy and water efficiency in both new and existing residential and commercial buildings.

General Plan Goal (NR-4): Maximize energy conservation and renewable energy production to reduce consumption of natural resources and fossil fuels.

Green Building Codes

Category	Measure	Description	Reductions ($MTCO_2e$)
6.Energy	EC1 Commercial Green Building Ordinance	Update building code to mandate higher building performance in commercial buildings. Mandate achievement of CALGreen Tier 1 energy performance. Consider additional mandatory requirements such as solar hot water or cool roofs. Seek to harmonize with regional Green Building Ordinances.	948
7.Energy	EC2 Residential Green Building Ordinance	Update building code to mandate higher building performance in residential buildings. Mandate achievement of CALGreen Tier 1 energy performance. Consider additional mandatory requirements such as solar hot water or cool roofs. Seek to harmonize with regional Green Building Ordinances.	1,085

Redwood City was ahead of state action in adopting commercial and residential Green Building Codes in 2009 that are equivalent to the state CalGreen Tier 1 energy and water use performance standards effective January 1, 2011. Although not called out in the preceding sections on municipal measures, the commercial code covers municipal facilities as well. This Plan takes into account emissions reductions associated with the application of these codes to estimated new building and renovation construction after the base year 2005 and proposes to update the codes in 2013-2014 (on the mandated 4-year cycle). This Plan also proposes, at that time, to consider adopting the BAWSCA water ordinances along with the Green Building Code update, as they are more streamlined and user-friendly than the existing state ordinance for both businesses and residents.

Residential and Commercial Rebates and Incentives Programs

Category	Measure	Description	Reductions ($MTCO_2e$)
8.Energy	EC4 Residential Energy Efficiency Programs (Energy Upgrade California)	Provide or encourage residential energy audits and retrofits, promote existing Federal, State, and utility rebates and incentive programs, and participate in additional programs as they become available.	3,313
9.Energy	EC5 Commercial Energy Efficiency and Demand Response Programs	Promote and assist with marketing and outreach for PG&E energy efficiency and demand response programs for the nonresidential sector. Leverage existing rebates/add additional rebates for energy efficient retrofits.	2,537

In addition to reducing emissions from applying Green Building Codes to construction and renovation projects, Redwood City also promotes and participates in a variety of rebates and incentive programs for conserving or reducing energy in existing residential and commercial buildings and facilities. These incentive and rebate programs are typically funded and managed by state, regional, and county agencies, as well as utilities, with the City providing marketing

and outreach support. This Plan takes into account reductions associated with the City's participation in Acterra's Green@Home program and the Energy Upgrade California program for residential energy audits and retrofits. It proposes continuing the Energy Upgrade California program during the current, funded two-year cycle, evaluating it in conjunction with the 2015 Emissions Inventory process, and making recommendations at that time on continuing, updating, or replacing the program. Agencies implementing the programs can track participation and report emissions reduction data. This Plan recommends targeting 20 percent participation rate among existing residential homes with 15 percent energy savings per household by the year 2020. For commercial energy consumers, it recommends that the City promote PG&E's commercial and industrial energy efficiency and demand-response programs, also targeting 20 percent participation rate among existing commercial buildings with 15 percent savings per business by the year 2020.

Green Business Program

Category	Measure	Description	Reductions ($MTCO_2e$)
10.Energy	A1 Green Business Program	Resume the Green Business Program, which allows local businesses to brand as green by following sustainable practices.	961

Along with the residential and commercial rebates, incentives, and programs offered by utilities, the City has also encouraged local businesses to conserve energy and water through their operations by participating in the San Mateo County Green Business Program. This program began as a six-month pilot program in 2007 and was expanded in 2008 to include more business sectors. The program was temporarily suspended after the pilot period; however, the County anticipates reinitiating the program in 2013. This Plan proposes reestablishing the program when the County reopens it and aiming for 5 percent energy and water reduction rate per business and a 20 percent participation rate by local businesses by 2020.

General Plan Goal (NR-2): Reduce water consumption through aggressive implementation of conservation policies and programs

Indoor and Outdoor Water Use Ordinances

Category	Measure	Description	Reductions ($MTCO_2e$)
11.Energy	EW2 Water Conservation Ordinance	Adopt Bay Area Water Supply and Conservation Agency (BAWSCA) Indoor Ordinance and enhance BAWSCA Outdoor Ordinance as part of Green Building Codes update in 2014.	6,456

A leader in water management, Redwood City successfully initiated a pilot water recycling project with South Bayside System Authority (SBSA) in 2000 to produce recycled water that

meets health requirements and goals for distribution for specific uses. In addition in 2008, Redwood City adopted a Recycled Water Use Ordinance that requires recycled water use in internal separate plumbing for urinals and internal cooling towers; external landscaping on new apartments, townhouses, and condominiums and existing and remodeled commercial and industrial buildings; and on industrial, commercial, and governmental projects. This Plan accounts for water use reductions identified in the City's Urban Water Management Plan, identifying a 22 percent reduction by 2020 in all City households, and proposes that the BAWSCA Indoor and Outdoor Water Use Ordinances are adopted at the time of, and along with, the next Green Building Code update in 2014.

1.2.2 Community Transportation and Land Use

While the municipal transportation section focused on vehicle fleet and employee commute measures, addressing communitywide transportation emissions is somewhat more complex. Not only does the City have a limited amount of control over the community's transportation-related emissions, it is also technically difficult to collect data and attribute emissions to the correct jurisdictions in a region. The City and County Association of Governments (C/CAG) of San Mateo County will be accounting for and addressing in large part the transportation emissions reductions of each city with the San Mateo County Transportation Climate Action Plan (T-CAP). The T-CAP was developed using the RICAPS template and is designed to complement the CAPs developed by San Mateo County local jurisdictions.

For Redwood City's part, the community transportation and land use measures are guided by the same General Plan goal as the municipal measures, but the emphasis is on smarter land use and development patterns, improved bicycle and pedestrian infrastructure, and innovative programs that promote alternative transportation modes. This section identifies the related General Plan goal and describes the communitywide measures that address emissions from the transportation sector.

General Plan Goal (BE-31): Encourage developments and implementation of strategies that minimize vehicle trips and vehicle miles traveled.

Smart Growth Development

Category	Measure	Description	Reductions ($MTCO_2e$)
12.Transportation and Land Use	TL1 Smart Growth Development	Continue to implement the policies and programs in City planning documents (e.g., General Plan, Downtown Precise Plan, Zoning Ordinance) to prioritize infill, higher density, transportation oriented and mixed use development.	3,275

Redwood City has been an area leader in developing infill, higher density, transportation-oriented and mixed-use development near transportation hubs and along transportation corridors. The award-winning General Plan, adopted in 2010, along with the 2011 Downtown Precise Plan and the Zoning Ordinance, include measures for increasing density and destination accessibility that result in decreased vehicle trips and vehicle miles traveled. This Plan accounts for the estimated emissions reductions associated with the existing General Plan, Downtown Precise Plan, and Zoning Ordinance and proposes to continue to implement, monitor, and evaluate the existing policies through 2020.

Complete Streets

Category	Measure	Description	Reductions ($MTCO_2e$)
13.Transportation and Land Use	TL2 Complete Streets Pedestrian/ Bicycle Infrastructure	Remake urban landscape to make walking and biking more desirable. Add bike lanes, bike parking, and traffic calming measures according to County and City bike plans.	5,570

For the City's existing Complete Streets Program, this Plan accounts only for the emissions associated with completing the remaining bikeways identified for Redwood City in the 2011 San Mateo Comprehensive Bicycle and Pedestrian Plan and proposes that the City complete the routes identified by 2020 in order to meet emissions reductions goals. However, since potential local routes that are not identified in the Comprehensive Plan can likewise contribute to emissions reductions, the City's next step is to identify and prioritize project areas to complete in phases up to 2020.

Car and Bike Share Programs

Category	Measure	Description	Reductions ($MTCO_2e$)
14.Transportation and Land Use	TL3 Bike and Car Share Programs	Pilot Regional Bicycle Share and Last Mile Connection programs.	1,188

The City is currently participating in the Regional Bicycle Share and Last Mile Connection Pilot Programs, which are scheduled to be rolled out in 2013-2014. Approximately 100 bicycles will be placed in and around downtown Redwood City to serve the Caltrain corridor from San Jose to San Francisco. This Plan accounts for emissions reductions associated with implementation of car and bike share programs in Redwood City and proposes that the City consider developing future recommendations for bike and car share programs after evaluating the pilots.

Parking Policies and Management Strategies

Category	Measure	Description	Reductions ($MTCO_2e$)
15.Transportation and Land Use	TL4 Parking Policies	Establish parking policies to increase use of walking, public transit and bicycling.	23,916

In addition to promoting alternative modes of transportation with the Complete Streets and Car and Bike Share Programs, Redwood City has also developed parking standards and parking management policies which address transportation-related emissions. In 2005, the City created the Downtown Parking Management Plan which helps reduce parking demand impacts on local and regional traffic levels with demand-based parking supply and pricing. The City has also updated parking requirements for new development in the Downtown area that allow for residential requirement reductions, parking maximums, unbundled parking, and shared parking. Staff is currently reviewing the Parking Management Plan to be updated in 2013. This Plan accounts for emissions reductions associated with refining and updating the Parking Management Plan to respond to current community needs and parking conditions. The Climate Action Plan recommends exploring additional parking management strategies such as bicycle infrastructure improvements, parking cashouts, and parking credits for carsharing.

1.2.3 Community Solid Waste

To meet the state mandate for local jurisdictions (a solid waste recycling goal of 75 percent by the year 2020 and a mandatory commercial recycling requirement), this Plan proposed in the municipal solid waste section to raise the diversion rate over time by gradually implementing zero waste policies and programs for municipal operations in advance of communitywide programs and ordinances. The description below is the complementary communitywide component of the same measure to raise the solid waste diversion rate.

General Plan Goal (BE-45): Minimize the volume of solid waste that enters regional landfills.

Solid Waste Diversion Target

Category	Measure	Description	Reductions ($MTCO_2e$)
5.Solid Waste	WC1 Raise Solid Waste Diversion Rate	Increase participation in recycling programs and ensure weekly collection of recyclables and organic waste to achieve an 85 percent waste diversion goal by 2020.	13,968

In addition to using the gradual establishment of municipal zero waste policies to promote communitywide waste reduction, recycling, and diversion, this Plan recommends that the City

coordinate with RethinkWaste to develop and adopt a construction and demolition (C&D) debris recycling ordinance and a monitoring and compliance plan in the near term (2013-2015), phasing in implementation of state commercial recycling requirements as programs, reporting, and evaluation methods develop over the midterm, and other measures such as yard waste ordinances, pay-as-you-throw tiered rate structures, and community zero-waste programs (95 percent community solid waste diversion rates) over the long term.

1.3 Adaptation

This Plan emphasizes climate action measures the City is already taking and proposes monitoring, evaluating, and updating programs to ensure targeted emissions reductions over time. While the City has taken significant action on climate change in the past 7 years, it becomes increasingly important to begin climate adaptation planning as well. The climate is changing rapidly. According to the World Meteorological Organization, in their news release "2000-2009, The Warmest Decade."[1]

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

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

At this point, adaptation planning may be most effective at the state and regional levels, due to the scale of resources needed to develop and implement a coordinated plan. This Plan proposes reviewing the 2009 California Climate Adaptation Strategy,[2] which was developed to guide California's efforts in adapting to climate change impacts, in conjunction with the 2015 GHG Emissions Inventory process and developing recommendations for the City's climate adaptation planning process. For more information on adaptation planning, see Appendix B.

[1] WMO 2010. *2000–2009, THE WARMEST DECADE* http://www.wmo.int/pages/mediacentre/press_releases/pr_869_en.html
[2] http://www.climatechange.ca.gov/adaptation/

2. Implementation

The preceding chapter outlines and describes the goals and measures for achieving the community's target of reducing emissions to 15 percent below 2005 levels by 2020. This chapter outlines the main components of the process for putting this Plan into action and identifies specific actions that are recommended for implementation.

2.1 Prioritizing and Selecting Measures for Action

There are a large number of measures and programs that Redwood City may implement to reduce GHG emissions. The 15 measures recommended in this Plan were prioritized and selected based on those that are likely to yield the greatest emissions reductions toward the City's target reduction, those that can be quantified using C/CAG tools, and those that are most feasible (already implemented or partially implemented, ongoing, or planned by the City).

The first step in the CAP process was to conduct a baseline emissions inventory and forecast. In November 2009, Redwood City's 2005 community and municipal GHG inventories were completed as part of a joint effort with ICLEI, Joint Venture Silicon Valley Network, and the County of San Mateo funded by C/CAG. For more information on the Greenhouse Gas Inventory and Forecast, see Appendix C. The second step in the process was to establish an emissions reduction target for the forecast year of 2020. The City's target was chosen to align with the state's target. The third step in the process was to determine the contribution that statewide emissions reduction initiatives will make toward meeting the City's reduction target, and the fourth step involved identifying additional measures that the City can feasibly take to reduce the emissions remaining after accounting for reductions from statewide initiatives. This included a review of the City's current programs and an estimate of associated emissions, as well as an evaluation of the 39 measures developed by C/CAG through the Regionally Integrated Climate Action Planning Suite (RICAPS) initiative. Appendix D identifies and describes the measures provided through RICAPS.

For future planning, Appendix E describes potential measures that the City can consider along with Adaptation Planning (Appendix B) when updating this Plan, as funding or other resources becomes available, or as the measures recommended in this Plan are implemented. A summary of all 15 recommended emission reduction measures is provided in Table 1 below, followed by a timeline of tasks associated with each measure in Table 2.

Table 1: Summary of Recommended Measures

Number and Category	Measure	Description	Reductions ($MTCO_2e$)
1. Energy	EM5 Municipal Facilities Energy Audit and Retrofit Program	Audit city facilities for energy efficiency opportunities and implement energy efficient retrofits.	87
2. Energy	EM1 Energy Efficient Public Lighting Program	Replace street, parks and parking lot lighting with efficient lighting (LEDs, induction, etc).	50
3. Energy	EM4 Renewable Energy for Municipal Facilities	Complete installation of solar or other renewable energy projects at select City facilities (such as the wastewater treatment plant) and install where feasible. Set installation goal of 900 kW.	195
4.Transportation and Land Use	TM3 Employee Commute Program	Monitor and evaluate commute alternatives program to determine participation rates and opportunities to increase participation.	5
5. Solid Waste	WC1 Raise Solid Waste Diversion Rate	Increase participation in recycling programs and ensure weekly collection of recyclables and organic waste to achieve an 85 percent waste diversion goal by 2020.	13,968
6. Energy	EC1 Commercial Green Building Ordinance	Update building code to mandate higher building performance in commercial buildings. Mandate achievement of CALGreen Tier 1 energy performance.	948
7. Energy	EC2 Residential Green Building Ordinance	Update building code to mandate higher building performance in residential buildings. Mandate achievement of CALGreen Tier 1 energy performance.	1,085
8. Energy	EC4 Residential Energy Efficiency Programs	Provide or encourage residential energy audits and retrofits, promote existing Federal, State, and utility rebates and incentive programs.	3,313
9. Energy	EC5 Commercial Energy Efficiency / DR Programs	Promote and assist with marketing and outreach for PG&E energy efficiency and demand response programs.	2,537
10. Energy	A1 Green Business Program	Establish voluntary program that allows businesses to brand as green by following sustainable practices.	961
11. Energy	EW2 Water Conservation Ordinance	Adopt Bay Area Water Supply and Conservation Agency (BAWSCA) Indoor Ordinance and enhance BAWSCA Outdoor Ordinance.	6,456
12.Transportation and Land Use	TL1 Smart Growth Development	Implement the policies and programs in City planning documents (e.g., General Plan, Downtown Precise Plan, Zoning Ordinance) to prioritize infill, higher density, transit-oriented and mixed-use development.	3,275
13.Transportation and Land Use	TL2 Pedestrian/ Bicycle Infrastructure	Remake urban landscape to make walking and biking more desirable. Add bike lanes, bike parking, and traffic calming measures.	5,570
14.Transportation and Land Use	TL3 Bike and Car Share Programs	Incentivize City Car Sharing Companies to open pods and participate in Bike Share program.	1,188
15. Transportation and Land Use	TL4 Parking Policies	Establish parking policies to increase use of walking, public transit and bicycling.	23,916
		Total:	63,554

Table 2: Climate Action Plan Measure Implementation Timeline

	Measure	FY2013/14 - FY2014/15	FY2015/16 - FY2016/17	FY2017/18 - FY2018/19	FY2019/20 - FY2020/21
1	Municipal Facilities Audit and Retrofit Program	**2013** Select projects from audit list and develop implementation schedule **2014** Implement selected projects	**2015** Explore the option of using energy service companies (ESCOs) for audits and upgrades, select and audit second round of facilities through CIP process **2016** Evaluate first round as part of GHG inventory and implement second round projects	**2017**Develop or refine measures as needed to achieve target reductions, consider selecting third round of facilities through CIP process **2018** Evaluate second round projects	**2019** Develop or refine measures as needed to achieve target reductions, consider selecting fourth round of facilities through CIP process **2020** Evaluate third round if selected
2	Energy Efficient Public Lighting Program	**2013** Develop phased plan for unmetered streetlights replacement by 2020, consider free technical support offered by CLTC through BACC **2014** Evaluate pilot area, identify funding, develop outreach plan, and bid out first project area	**2015** Continue implementation plan **2016**Evaluate program as part of GHG inventory process	**2017** Revise CAP per evaluation and recommendations **2018** Update program per recommendations	**2019** Continue program implementation **2020** Explore the option of phasing in metered streetlight replacements
3	Renewable Energy for Muncipal Facilities	**2013** Continue participation in RREP process **2014**Install solar at chosen facilities	**2015** Develop implementation plan for phasing in solar at other municipal facilities **2016** Evaluate project and issue recommendations as part of GHG inventory process	**2017** Revise CAP per evaluation and recommendations **2018** Update program per recommendations	**2019** Assess additional facilities or consider offset purchasing **2020** Implement next round projects or offset purchasing
4	Employee Commute Program	**2013** Review Employee Commute Program **2014** Develop monitoring and evaluation plan, determine participation rates, and develop measures for increasing participation as needed	**2015** Implement recommendations **2016** Evaluate program as part of GHG inventory	**2017** Revise CAP per evaluation and recommendations **2018** Update program per recommendations	**2019** Explore additional programs such as flexible work schedules as necessary **2020** Implement and evaluate programs or move focus to municipal fleet emissions
5	Raise Solid Waste Diversion Rate	**2013** Adopt Single Use Bag Ordinance and review JPA C&D Debris Recycling Ordinance **2014** Perform ordinance outreach and develop C&D monitoring and compliance plan	**2015** Adopt C&D Debris Ordinance and review other waste ordinances for phased adoption **2016** Evaluate adopted ordinances as part of GHG inventory process and perform outreach	**2017** Revise CAP per evaluation and review Commercial Recycling, Yard Waste, and FOG ordinances **2018** Continue ordinance review, monitoring and compliance, and adoption through 2020	**2019** Review Municipal Zero Waste Programs and consider raising diversion rate to 95% **2020** Review Communitywide Zero Waste Programs, consider raising diversion rate to 95%
6	Commercial Green Building Code Update	**2013** Review Green Building Code for update **2014** Update Green Building Code per State mandate	**2015** Train staff on updated Code **2016** Evaluate Code adoption as part of GHG inventory, make recommendations for next update	**2017** Review State Code Update **2018** Update Green Building Code per State mandate	**2019** Train staff on updated Code **2020** Evaluate Code adoption as part of GHG inventory
7	Residential Green Building Code Update	**2013** Review Green Building Code for update **2014** Update Green Building Code per State mandate	**2015** Train staff on updated Code **2016** Evaluate Code adoption as part of GHG inventory, make recommendations for next update	**2017** Review State Code Update **2018** Update Green Building Code per State mandate	**2019** Train staff on updated Code **2020** Evaluate Code adoption as part of GHG inventory
8	Residential Energy Efficiency Programs	**2013** Coordinate with utility to provide marketing and outreach for this program cycle **2014** Implement program	**2015** Implement program **2016** Evaluate program as part of GHG inventory and add measures as needed to achieve targets	**2017** Revise CAP per evaluation and recommendations **2018** Continue program implementation	**2019** Continue program implementation **2020** Evaluate program as part of GHG inventory and add measures as needed to achieve targets

Table 2, continued: Climate Action Plan Measure Implementation Timeline

	Measure	FY2013/14 - FY2014/15	FY2015/16 - FY2016/17	FY2017/18 - FY2018/19	FY2019/20 - FY2020/21
9	Commercial Energy Efficiency/Demand Response	**2013** Coordinate with utility to provide marketing and outreach for this program **2014** Implement program	**2015** Implement program **2016** Evaluate program as part of GHG inventory and add measures as needed to achieve targets	**2017** Revise CAP per evaluation and recommendations **2018** Continue program implementation	**2019** Continue program implementation **2020** Evaluate program as part of GHG inventory and add measures as needed to achieve targets
10	Green Business Program	**2013** Coordinate with County on implementing its 3-year program **2014**Implement program	**2015** Cotinue program Implementation **2016** Evaluate program as part of GHG inventory, add measures as needed to achieve targets	**2017** Revise CAP per evaluation and recommendations **2018** Continue program implementation	**2019** Continue program implementation **2020** Evaluate program as part of GHG inventory and add measures as needed to achieve targets
11	Water Conservation Ordinance	**2013** Coordinate water ordinance adoption with Building Code Update required in 2014 **2014**Determine responsibility for permit approval and train staff	**2015** Update UWMP per State mandate **2016** Collect data and evaluate results of Code adoption as part of GHG inventory process	**2017** Revise CAP per evaluation and recommendations **2018** Coordinate water ordinance update as need with Building Code Update	**2019** Train staff on permit review and approval process **2020** Update UMWP per State mandate
12	Smart Growth Development	**2013** Continue implementation per General Plan and Zoning **2014**Continue implementation per General Plan and Zoning	**2015** Continue implementation per General Plan and Zoning **2016** Evaluate results of GP/Zoning Ordinance as part of GHG inventory process	**2017** Revise CAP per evaluation and recommendations **2018** Continue program implementation	**2019** Continue program implementation **2020** Evaluate policies and programs as part of GHG inventory and add measures as needed to achieve targets
13	Pedestrian/Bicycle Infrastructure	**2013** Review Complete Streets Program **2014**Engage Advisory Committee, complete GIS overlay, and identify/prioritize projects to 2020	**2015** Continue program implementation **2016** Evaluate program as part of GHG inventory process	**2017** Revise CAP per evaluation and recommendations **2018** Update program per recommendations	**2019** Continue program implementation **2020** Evaluate policies and programs as part of GHG inventory and add measures as needed to achieve targets
14	Bike and Car Share Programs	**2013** Lead agency planning In progress **2014** Implement programs	**2015** Continue program implementation **2016** Evaluate program as part of GHG inventory process	**2017** Revise CAP per evaluation and recommendations **2018** Update program per recommendations	**2019** Continue program implementation **2020** Evaluate policies and programs as part of GHG inventory and add measures as needed to achieve targets
15	Parking Policies	**2013** Review Parking Policies and update Parking Plan **2014** Begin phasing in new parking policies	**2015** Implement updated plan **2016** Evaluate plan as part of GHG inventory process	**2017** Revise CAP per evaluation and recommendations **2018** Update program per recommendations	**2019** Continue program implementation **2020** Evaluate program as part of GHG inventory and add measures as needed to achieve targets
	CAP GHG Inventory	**2013** Dedicate staff for Climate Action Plan programs, complete 2010 Communitywide GHG Inventory **2014** Upload City data to online dashboard and issue Annual CAP implementation Report	**2015** Issue Annual CAP Implementation Report **2016** Perform 2015 GHG Inventory and issue Annual Report	**2017** Update CAP per GHG inventory results and issue Annual Report **2018** Issue Annual CAP Implementation Report	**2019** Issue Annual CAP Implementation Report **2020**Issue Annual CAP Implementation Report

2.2 Meeting Emissions Targets

The measures described in this Climate Action Plan, combined with statewide legislation and initiatives, will enable the City of Redwood City to meet its emissions reduction target of 15 percent below 2005 levels by 2020.

The table below shows the contribution of the three major statewide emissions reduction initiatives combined with the proposed CAP measures.[3] Based on the inventory and forecast, the City of Redwood City needs to achieve 206,627 $MTCO_2e$ of emissions reductions to meet its 2020 goal. The estimated reductions described and accounted for in this Plan, including those from statewide measures, equal 208,251 $MTCO_2e$, exceeding the minimum reductions required to meet the City's target.

Table 3: Meeting the 2020 Target

State Initiative	Sector	% Reduction from 2020 GHG Inventory	Reduction in City's Emissions
AB 1493 (Pavley)	Transportation	19.7%	75,806
LCFS	Transportation	7.2%	27,706
33% RPS	Electricity (Energy)	21%	41,185
A. Total Statewide Initiative Emissions Reductions (ER1 + ER2 + ER3)			144,697
B. Total City Climate Action Plan Reductions Measures			63,554
C. Total Expected Emissions Reductions by 2020 (A+B)			208,251
D. City of Redwood City Emissions Reduction Requirement for 2020			206,627
E. Meets/exceeds state goals? (C > D)			Yes

2.3 Management of GHG Reduction Strategy

Support is needed to direct the implementation of the Plan measures. This section details how the City can organize to put this Plan into action.

[3] AB 1493 (Pavley) refers to the Assembly Bill that directs the Air Resources Board to adopt standards that will achieve "the maximum feasible and cost-effective reduction of greenhouse gas emissions from motor vehicles," taking into account environmental, social, technological, and economic factors. LCFS refers to the State of California's Low Carbon Fuel Standard, which mandates a 10 percent overall reduction in the carbon intensity of transportation fuels by 2020. Lastly, 33% RPS refers to the California Renewable Portfolio Standard, which requires electric utilities to have 33 percent of their retail sales sourced from eligible renewable resources in 2020 and all subsequent years.

Hire, resource, or dedicate staff to act as an Environmental Initiatives Coordinator
The City can hire, resource, or dedicate staff to take primary responsibility for implementation of this CAP. If insufficient city funds are available, an existing staff member can take on this role and spend at least 50 percent of his or her time on CAP related business.

Continue to hold regular meetings of the Environmental Initiatives Subcommittee
The Environmental Initiatives Subcommittee can meet quarterly to monitor progress on CAP measures.

Maintain associations and partnerships that assist the City in implementing the CAP
The City can maintain existing associations and partnerships with agencies and organizations such as C/CAG, San Mateo County Energy Watch Program, Energy Upgrade California in San Mateo County, Joint Venture: Silicon Valley Network, PG&E's Sustainable Communities Team, Silicon Valley Leadership Group, Sustainable San Mateo County, and Sustainable Silicon Valley that can assist with funding and outreach for, monitoring and reporting on, and evaluating and updating CAP measures.

2.4 Public Participation and Community Engagement

There are significant opportunities for the City to leverage existing programs funded by the State of California, PG&E, and others to support community efforts to improve energy efficiency, install renewable energy technologies, facilitate transit/biking/walking initiatives, and support households and businesses in taking other actions. This Plan proposes that the City of Redwood City seek to distribute information widely on funding opportunities for residents and local businesses. Actions may include more information posted on the City website and marketing materials posted at key locations, including City Hall and libraries. Additional actions include partnering with PG&E and local water districts to further develop marketing presentations and workshops for the community. Funding opportunities that may support public participation and community engagement are listed in Appendix E.

3. Monitoring and Improvement

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

The following describes the monitoring and improvement program.

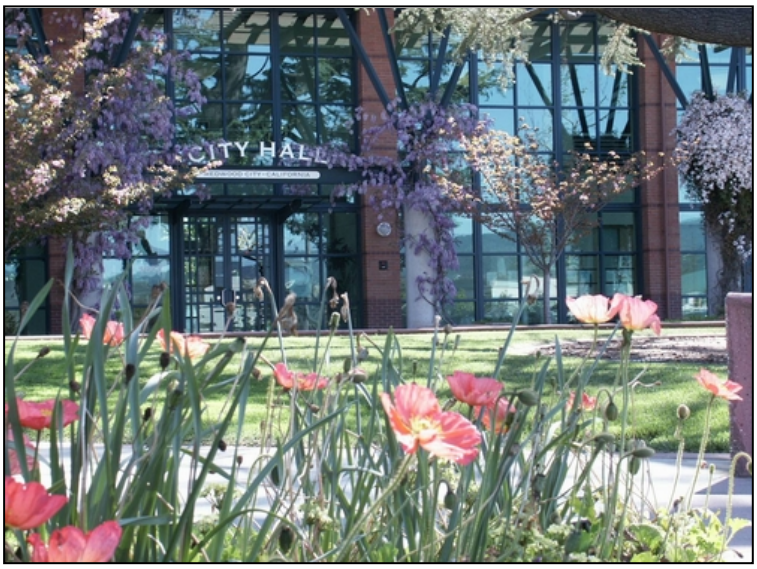
- Every year, the Environmental Initiatives Coordinator or designated staff will issue an Annual Climate Action Plan Implementation Report (ACAPIR), to update the City Council, residents, and other interested stakeholders as to the progress implementing the Plan measures. The ACAPIR will detail lessons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

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

- The Environmental Initiatives Coordinator or designated staff will conduct a full GHG inventory at least every 5 years according to the ICLEI community emissions protocol. The inventory will allow the city to understand how emissions levels are tracking in a top-down manner. PG&E can provide annual updates on electricity and natural gas usage to track associated GHG emissions.

- The Environmental Initiatives Coordinator or designated staff will update the Plan as needed based on the results of the GHG inventory. Redwood City may modify and/or add new measures to ensure that the city is on track to meeting its greenhouse gas reduction goals.

4. Conclusion



This Plan is a strategic approach to sustainability, offering a suite of recommended actions that will engage all members of Redwood City's community in this journey to safeguard our environment.

In line with the City Council's Strategic Initiative for Government Operations, to lead by example by implementing and supporting climate protection and sustainability programs, the Plan includes ideas for our City government to "walk the talk" by implementing practices that minimize the City's own impacts on the environment and that serve as an example for the energy efficiency, water conservation and alternative transportation programs and services our Climate Action Plan proposes to establish for our community.

This Climate Action Plan is an important step that builds on the City's current efforts in environmental stewardship and protection. The proposed efforts of Redwood City are small when compared to the collective action of our citizenry. Sustainability requires more than just environmental protection; it will take leadership and partnership to deploy these actions. We invite you to join Redwood City's transition to a clean environment, healthy community, and prosperous future.

Appendix A. Glossary of Terms

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

Appendix B. Adaptation Planning for Climate Impacts

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

Five important steps to effective adaptation planning are summarized below:

1. Increase Public Awareness; Engage and Educate the Community

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

2. Assess Vulnerability

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

3. Establish Goals, Criteria and Planning Principles

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

4. Develop Adaptation Plan

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

5. Ongoing Monitoring and Adaptive Management

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

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

Adaptation Strategies and Measures

Climate Change Impacts	Sample Adaptation Measures
Sea Level Rise Risks to existing facilities, natural systems, private property and public infrastructure	• Educate and engage the community on the need for long-range planning • Partner or collaborate with other jurisdictions and agencies to increase awareness and build community support for action • Identify funding mechanisms and seek public-private partnerships where interests converge • Use natural backshore wave-buffering processes to reduce wave erosion and run-up on levees • Increase or maintain the buffering capacity of tidal wetlands to protect against storm surges and keep pace with sea-level rise • Move levees further inland to allow marshes and mudflats to naturally transgress landward • Protect and restore wetlands that provide vital habitat and carbon storage, and allow for landward migration of habitat over time • Make modifications to low-lying wastewater treatment facilities. Consider opportunities for integrating wastewater treatments and wetlands • Avoid new development in areas at risk based on sea level projections • Do coastal armoring with levees and seawalls to protect vital infrastructure from erosion, inundation, and flooding
Extreme Heat Events Risks to public health and infrastructure	• Identify vulnerable communities and develop emergency preparedness plan • Establish cooling centers, especially for vulnerable populations • Reduce urban heat islands through use of cool roofs and other reflective surfaces • Do targeted tree planting and enact new requirements for shading in new parking lots and other large paved areas

	• Reduce risk of wildfires through fuels reduction in the urban-wild land interface
Regional Drought Risks to reliable water supply, and potential conflicts between urban and agriculture users	• Increase capacity for community water storage • Promote local water conservation • Make water conservation a top priority for agriculture in the region • Do water reclamation and reuse projects
Increased Flooding and Severe Weather Events Risks to public health, private property, public infrastructure, and ecosystems	• Integrate local flood management plans with adaptation planning • Identify vulnerable communities and develop emergency preparedness plans • Establish local land use policies that decrease flood risk; avoid building in high-risk areas • Make modifications to storm water system routing and storage. Develop storage areas for peak flows • Maximize use of bioswales and permeable surfaces in both greenscape and hardscape areas to improve aquifer recharge and mitigate flooding from storm water
Air Quality and Other Public Health Concerns	• Restrict use of fireplaces and open fires on high-risk days • Monitor potential threats to public health, including new diseases, and develop public awareness
Threats to Species, Ecosystems, and Ecosystem Services	• Design urban forest program to improve biodiversity, provide heat relief, and sequester carbon • Preserve wetlands, salt marshes, and other critical coastal habitats
Risks to Local Agriculture and Food Supply	• Promote conservation of local agricultural land • Promote the use of public and private land and rooftops for producing food • Promote the planting of fruit and nut trees • Support local farmers markets by providing incentives such as reduced costs for permits and support in attaining electronic benefit transfer (EBT) point-of-sale terminals • Provide incentives and remove regulatory obstacles to encourage animal husbandry and local food production and distribution • Provide and promote educational opportunities for residents at all levels of the educational system (preschool through college) to gain skills in organic gardening; fruit production; animal husbandry; food preservation and cooking; and affordable, healthy eating • Develop a city-run or city-supported food gleaning program that organizes volunteers or compensates workers to collect food from trees and shrubs on land owned by cities or within cities to distribute through food banks and other local distribution channels • Reduce food waste by implementing a local composting program where all food scraps, food-soiled paper, waxed cardboard, wood crates and landscape trimmings from markets, restaurants, homes, hotels, and schools, would be collected and made available for distribution to rural or urban gardeners

Appendix C. Baseline GHG Inventory and Forecast

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

1. Inventory Sources and Data Collection Process

An inventory of GHG emissions requires the collection of information (data) from a variety of sectors and sources. The emissions inventory completed for the City of Redwood City follows the standard outlined in the BAAQMD's GHG Plan Level Quantification Guidance (dated May 2012), as well as the Local Government Operations Protocol[4]. Table 1 summarizes the sectors, emissions sources, and energy types included in our GHG inventory.

Table 1: Sectors and Emissions in the GHG Inventory

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

* Some sectors may be updated in a new version of the BAAQMD GHG Plan Level Quantification Guidance.[5]

While the BAAQMD GHG Plan Level Guidance recommends the inclusion of GHG emissions from water processing and delivery that occurs outside of the city's boundary, these emissions are not included in Redwood City's baseline inventory due to lack of accurate data on water

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

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

usage in the City of Redwood City in the baseline year, and lack of data on the energy used for water processing and delivery in the baseline year. The following are emission sources that are mentioned in the BAAQMD GHG Plan Level Guidance, but were excluded from the City's inventory because they are inventoried separately or due to lack of data: Sea ports, non-road vehicle use (planes, trains, ships), and water travel. Air emissions at the Port of Redwood City were quantified with the Bay Planning Coalition through BAAQMD's "Green Ports Initiative."

ICLEI recently developed the U.S. Community Protocol[6], which is the first U.S.-specific protocol for developing community-wide greenhouse gas emissions estimates. All future inventories should utilize this protocol. Future inventories will also utilize the most recent version of the Local Government Operations Protocol, as well as any updated guidance from the BAAQMD.

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

2. Baseline Emissions Inventory for 2005

In the base year of 2005, the City of Redwood City emitted approximately 669,787 metric tons of carbon dioxide equivalent ($MTCO_2e$) from the residential, commercial, industrial, transportation, waste, and municipal sectors.[7] Municipal sector emissions are calculated and reported because the City of Redwood City generally has more control over these emissions than emissions from the other sectors, and thus the City of Redwood City can implement specific policies and programs to reduce these municipal emissions. However, in the context of the community-wide inventory, the municipal emissions are included in the commercial/industrial sector. Burning fossil fuels in vehicles and for energy use in buildings and facilities is the largest contributor to Redwood City's GHG emissions. Table 2 provides a summary of total citywide (i.e. community and municipal) GHG emissions.

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

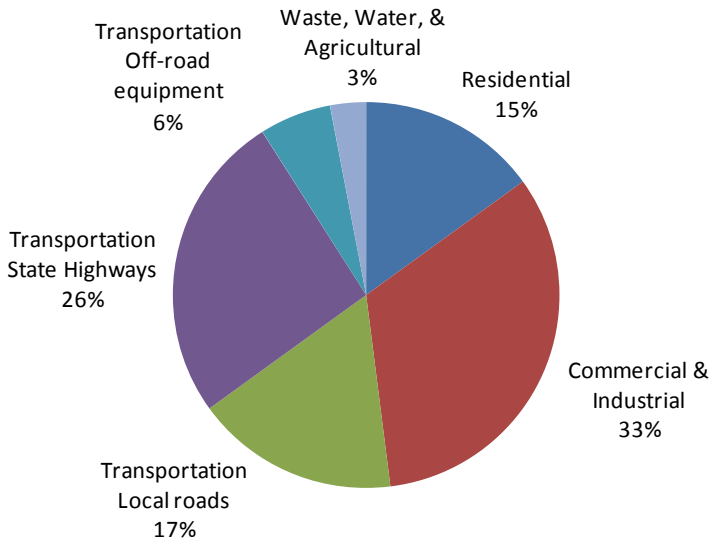
[7] Carbon dioxide equivalent is a unit of measure that normalizes the varying climate warming potencies of all six GHG emissions, which are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). For example, one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

Table 2: 2005 Community Emissions by Sector

Sector	Greenhouse Gas Emissions (metric tons CO_2e)	Percentage of Greenhouse Gas Emissions
Residential	99,144	15%
Commercial/Industrial	218,352	33%
Transportation – Local roads	114,370	17%
Transportation – State highways	175,367	26%
Transportation – Off-road equipment	39,554	6%
Generated Waste, Wastewater Treatment, and Ag Emissions	23,000	3%
TOTAL	**669,787**	100%

The residential, commercial, and industrial sectors represent emissions that result from electricity and natural gas used in both private- and public-sector buildings and facilities. The transportation sector includes emissions from private, commercial, and fleet vehicles driven within the City's geographical boundaries as well as the emissions from transit vehicles and the City-owned fleet. Off-road equipment includes lawnmowers, garden equipment, and construction, industrial, and light commercial equipment. Figure 2 shows the proportion of Redwood City's total GHG emissions from all major sources for 2005.

Figure 2: Community Emissions by Sector[8] (2005)



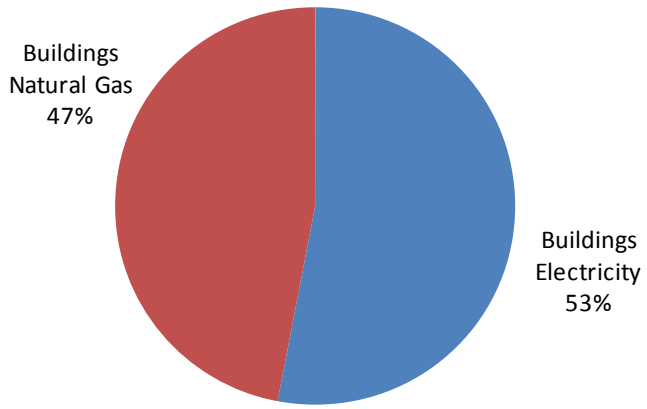
[8] While Redwood City's water emissions are not displayed separately in the chart above, they have been accounted for in the commercial/industrial and residential building energy sectors.

As shown above, the two largest categories of emissions are related to transportation (highway travel, local travel, and off-road equipment) and building energy use (both residential and commercial & industrial).

2.1 Electricity and Natural Gas Emissions

In 2005, electricity and natural gas use for buildings and facilities accounted for 48 percent of Redwood City's total emissions. Residential buildings accounted for 15 percent (99,144 $MTCO_2e$), commercial/industrial facilities (including municipal facilities) accounted for 22 percent (149,810 $MTCO_2e$), and direct access energy use accounted for 10 percent (68,542 $MTCO_2e$). Direct access is when end use customer buys electricity or natural gas on the wholesale market, rather than from PG&E. Of the total 317,496 $MTCO_2e$ emitted, 53 percent (169,446 $MTCO_2e$) was the result of electricity consumption, and 47 percent (148,050 $MTCO_2e$) was the result of natural gas consumption.

Figure 3: Building Energy Use – Fuel Type



It is important to note that emissions associated with the generation of electricity, which make up a significant portion of the greenhouse gasses associated with building energy, can vary widely from year to year. The GHG emissions associated with electricity use is based on an emissions factor specific to PG&E's territory and is calculated annually by PG&E and then made available to Cities. The source of the emission factor used for the 2005 baseline inventory is the PG&E Power/Utility Protocol (PUP) spreadsheet of the PG&E California Climate Action Registry Report. In future inventory years, the emission factor may be found in the Additional Optional Information tab of PG&E's Electric Power Sector report spreadsheet, which is part of PG&E's Report to The Climate Registry. PG&E's specific emissions factor is calculated by dividing PG&E's total emissions from their power plants (in pounds of CO_2) by the total amount of

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

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

Emissions from natural gas usage are calculated using the emissions factors from the Local Government Operations Protocol (version 1.0), Tables G.1 and G.3.

2.2 Transportation Emissions

In 2005, transportation emissions accounted for 49 percent of Redwood City's total emissions. Travel on local roads accounted for 17 percent (114,370 $MTCO_2e$), travel on state highways within city limits accounted for 26 percent (175,367 $MTCO_2e$), and emissions from off-road equipment, such as lawn and garden equipment and construction and industrial equipment, accounted for 6 percent (39,554 $MTCO_2e$). For off-road equipment, residential lawn and garden equipment emitted 1,539 $MTCO_2e$, and construction, industrial, and light commercial equipment emitted 38,015 $MTCO_2e$. Agricultural equipment emissions were not included in this sector.

On-road transportation emissions are based on figures for total VMT for the City of Redwood City provided by the Metropolitan Transportation Commission (MTC) and calculated from 2005 California Public Road Data, Highway Performance Monitoring System, State of California, Department of Transportation and Caltrans GIS data of state highway road segments divided into jurisdictional segments. Off-road equipment emissions data is calculated from the Bay Area Air Quality Management District, using EMFAC 2007 as a proxy for unavailable 2005 data.

Figure 4: Transportation Emissions – Highways v. Local Travel

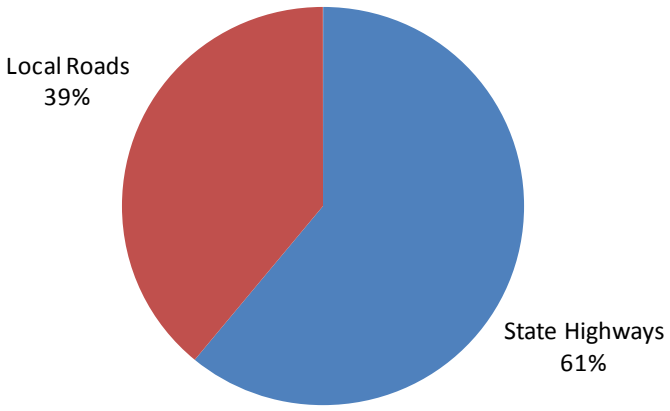
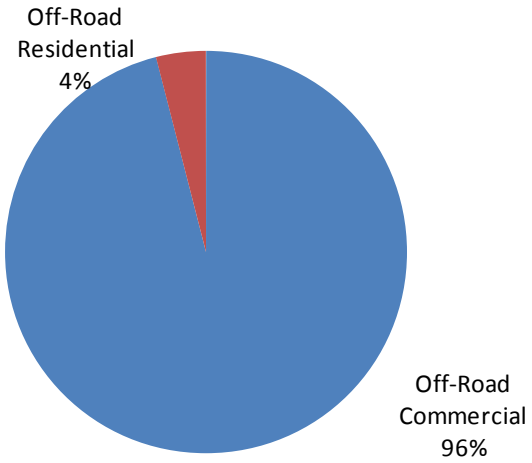


Figure 5: Transportation Emissions – Residential v. Commercial Off-road Equipment



2.3 Solid Waste

In 2005, Redwood City sent 112,998 tons of solid waste to landfills, resulting in 20,630 $MTCO_2e$. Another 253 $MTCO_2e$ of emissions are estimated from the 81,442 tons of alternative daily cover (ADC) used on the surface of the active face of municipal landfills to control odors, blowing litter, and scavenging. Together, landfilled solid waste and ADC accounted for approximately 3 percent of Redwood City's total emissions.

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

Table 3: Assumed Waste Composition[9]

Waste Type	Waste Share
Paper Products	21.0 %
Food Waste	14.6 %
Plant Debris	6.9 %
Wood/Textiles	21.8 %
All Other Waste	35.7 %
Total	**100 %**

2.4 Wastewater Treatment

Emissions from the wastewater treatment plant located in Redwood City are approximately 1,523 $MTCO_2e$/year, which is less than one-half of one percent of total emissions in 2005. There are three types of GHG emissions included: 1) stationary methane from incomplete combustion of digester gas, 2) process emissions from the wastewater treatment without nitrification/denitrification, and 3) process emissions from effluent discharge to rivers and estuaries. Emissions were calculated using LGOP's methodology for Wastewater Treatment Facilities.

2.5 Agriculture

Agriculture emissions totaled 594 $MTCO_2e$/year, which is 0.1 percent of total emissions in 2005, and are based on the total amount of agricultural land in Redwood City. Agriculture emissions are due to four categories of activities: Agricultural equipment, animal waste, soil management, and biomass burning.

2.6 Municipal Operations

In 2005, Redwood City's municipal operations generated 8,059 $MTCO_2e$, accounting for slightly over 1 percent of the city's total emissions. Table 4 shows that municipal buildings and facilities

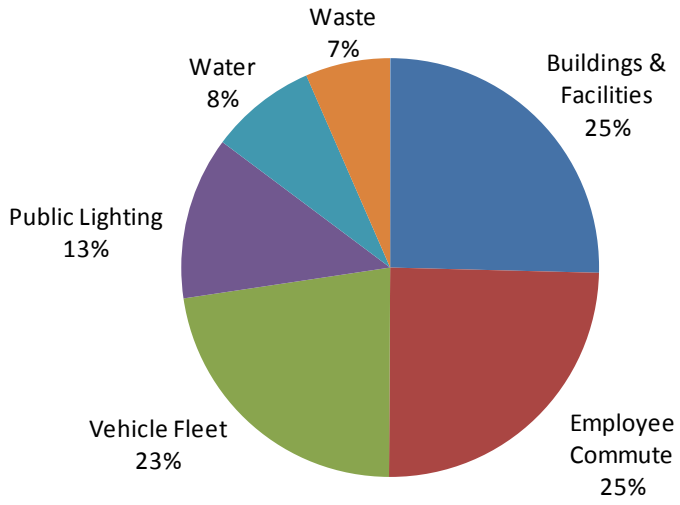
[9] Waste characterization: CIWMB 2004 Statewide Waste Characterization Study. This state average waste characterization accounts for residential, commercial and self-haul waste. http://www.ciwmb.ca.gov/Publications/default.asp?pubid=1097

were the largest source of emissions from government operations, accounting for over a quarter of the total, followed by employee commute at just under a quarter, vehicle fleet at 23 percent, and public lighting at 13 percent.

Table 4: 2005 Redwood City Government Operations Emissions by Sector

Sector	Greenhouse Gas Emissions (metric tons CO_2e)
Buildings and Facilities	2,046
Employee Commute	1,991
Vehicle Fleet	1,818
Public lighting	1,011
Wastewater and Water Transport	664
Government-generated solid waste	529
TOTAL	**8,059**

Figure 6: Municipal Operations – Greenhouse Gas Emissions



2.7 Emissions Forecast for 2020

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

The projected business-as-usual GHG emissions are based on the emissions from the existing growth pattern and general plan prior to the adoption of this climate action plan. More specifically, business-as-usual emissions would occur if the City of Redwood City were to continue its 2005 patterns of travel, energy and water consumption, and waste generation and disposal. Therefore, the business-as-usual emissions are projected in the absence of any mitigation measures, policies or actions that would reduce emissions over time, including landmark state legislation described in section 1.3. Programs, policies, and measures implemented after 2005 are considered beyond business-as-usual. The projections from the baseline year of 2005 uses growth factors specific to each of the different economic sectors. Table 5 and 7 below summarizes the results of the forecast.

Table 5: Redwood City "Business as Usual" Emissions Forecast for 2020

Emissions Sources	2005 ($MTCO_2$)	2020 ($MTCO_2$)	Annual Growth Rate	Percent change from 2005 to 2020
Residential	99,144	111,421	0.78%	12.4%
Commercial/Industrial	218,352	254,541	1.03%	16.6%
Transportation	329,291	384,802	1.04%	16.9%
Waste	22,406	25,181	0.78%	12.4%
Ag Emissions	594	594	0.00%	0.0%
TOTAL	**669,787**	**775,946**	**0.99%**	**15.8%**

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

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

- For the commercial energy sector, the City of Redwood City relied on the analysis contained within "California Energy Demand 2008-2018: Staff Revised Forecast,"[10] a report by the California Energy Commission (CEC), which shows that commercial floor space and the number of jobs have closely tracked the growth in energy use in the commercial sector. Using regional job projections for City of Redwood City from ABAG's

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

Projections 2009,[11] it was calculated that the compounded annual growth in energy use in the commercial sector from 2005 to 2020 to be 1.03% percent.

- For transportation, the City of Redwood City relied on the Transportation 2035 Plan for the San Francisco Bay Area: Travel Forecasts Data Summary, in which the Metropolitan Transportation Commission projects that on-road vehicle miles traveled (VMT) will increase at an annual rate of 1.044 percent per year through 2020 in San Mateo County.[12] The recently passed federal Corporate Average Fuel Economy standards and the State of California's pending tailpipe emission standards could significantly reduce the demand for transportation fuel in Redwood City. An analysis of potential fuel savings from these measures has not been included in this business-as-usual forecast. Regardless of future changes in the composition of vehicles on the road as a result of state or federal rulemaking, emissions from the transportation sector will continue to be largely determined by growth in VMT.

- For waste-related emissions growth, the primary determinate for growth in emissions for the waste sector is population. Therefore, the compounded annual population growth rate for 2005 to 2020 of 0.78 percent (the same as the residential sector projection) was used to estimate future emissions in the waste sector.

3. Emission Reduction Targets

The *California AB 32 Scoping Plan* seeks to bring California to a low carbon future, reaching 1990 emissions levels by 2020. As part of that reduction, the plan asks municipal governments to reduce their emissions by at least 15 percent by 2020 compared with current levels (current levels are defined as 2008 levels or earlier). The plan also directs local governments to assist the state in meeting California's emissions goals. Many cities have consequently adopted community-wide emissions reduction targets at least 15 percent below 2005 levels by 2020. Some cities in the Bay Area have sought even stricter emissions targets. For example, since 2002, the City of San Francisco has sought to reduce its emissions to 20 percent below 1990 levels by 2012[13]. Seattle, Portland, and Denver have set similar targets. However, the vast majority of Bay Area cities have adopted the 2020 target of 15 percent reduction compared with 2005 levels as it is in line with State objectives and technically achievable.

This Climate Action Plan summarizes the actions that City of Redwood City is planning to take to reduce emissions within our community.

[11] http://www.abag.ca.gov/planning/currentfcst/regional.html#
[12] Report available at: http://www.mtc.ca.gov/planning/2035_plan/Supplementary/T2035-Travel_Forecast_Data_Summary.pdf
[13] City of San Francisco 2004. *Climate Action Plan*. http://www.sfenvironment.org/downloads/library/climateactionplan.pdf

3.1 Reductions from State-Level Actions

In addition to the actions outlined here, regulations aimed at reducing GHG emissions at the state and regional levels will also contribute to emissions reductions in Redwood City. For example, the California Renewable Portfolio Standard (RPS) mandates that 33 percent of electricity sold by the State's investor-owned utilities be generated from renewable resources by 2020. These actions were summarized in Section 1.5 of this report. The impact of state-level actions on reducing local emissions is significant, and is shown in relation to Redwood City's emissions baseline, business-as-usual forecast, and reduction target in Figure 7.

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

Table 6: Total Emission Reductions from State of California Programs

State Initiative	Sector	% Reduction from 2020 GHG Inventory	Reduction in City's Emissions
AB 1493 (Pavley)	Transportation	19.7%	75,806
LCFS	Transportation	7.2%	27,706
33% RPS	Electricity (Energy)	21%	41,185
A. Total Statewide Initiative Emissions Reductions			144,697

3.2 The City of Redwood City Reduction Target

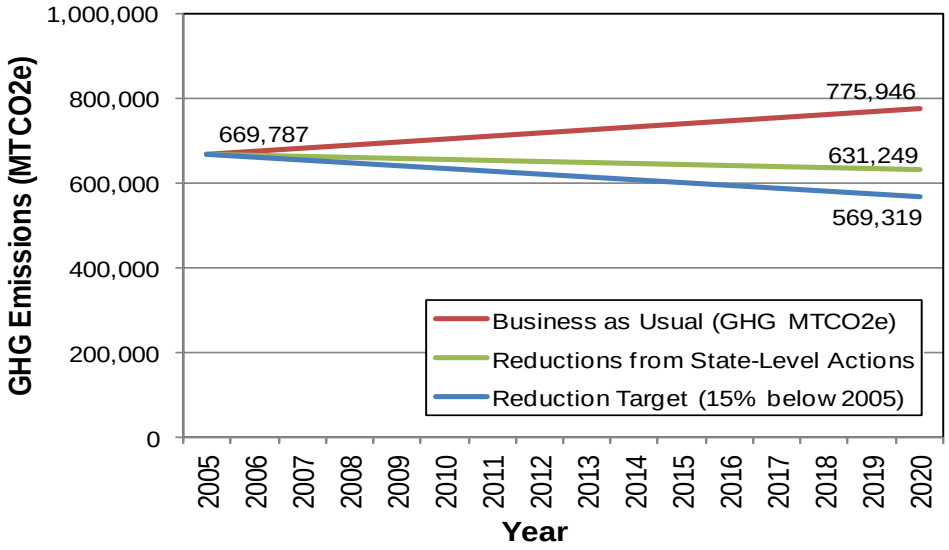
The City of Redwood City is committed to an emissions reduction target of 15 percent below the baseline 2005 levels by 2020. The goal was selected to be consistent with the AB 32 Scoping Plan and the Bay Area Air Quality Management District guidelines for a qualified GHG emission reduction strategy and because it is achievable by City-supported measures identified in the CAP.

The City of Redwood City is committing to reducing community-wide greenhouse gas emissions 15 percent below 2005 levels by 2020 by supplementing state-wide actions

Figure 7 below illustrates how the business-as-usual emissions are estimated to increase, thus widening the emissions reductions needed by 2020. The figure also shows the emissions reductions expected from state-level actions, and the reductions needed to reach the City of Redwood City's emission target. Approximately 70 percent of the emission reductions needed to achieve the City's target of 15 percent below 2005 levels by 2020 will come from state-level policies and actions, including the Low Carbon Fuel Standard (LCFS), which reduces the carbon intensity of transportation fuels,

and the Renewable Portfolio Standard (RPS), which requires that at least 33 percent of the total energy provided by utilities and other energy services comes from renewable sources such as wind, solar, and geothermal.

Figure 7. Redwood City GHG Reduction Target (15% below 2005 levels by 2020)



The baseline emissions, forecasted emissions, targeted emissions, and emissions needed to reach the target are shown in Table 7, and the forecasting data is shown on the worksheet on the following page.

Table 7: GHG Emissions Projection and Reduction Target

2005 Emissions ($MTCO_2e$)	2020 Target Emissions ($MTCO_2e$)	2020 BAU Emissions ($MTCO_2e$)	Required Reductions ($MTCO_2e$)
669,787	569,319	775,946	206,627

GHG Baseline Inventory (2005) and BAU Forecast

Sector	2005 ($MTCO_2e$)	Annual growth rate	2020 ($MTCO_2e$)	Percent change (2005 - 2020)	2050 ($MTCO_2e$)
Residential	99,144	0.78%	111,421	12.4%	135,976
Commercial/Industrial	218,352	1.03%	254,541	16.6%	326,919
Transportation*	329,291	1.04%	384,802	16.9%	495,825
Generated Waste	22,406	0.78%	25,181	12.4%	30,730
Ag Emissions	594	0.00%	594	0.0%	594
TOTAL	669,787	0.99%	775,946	15.8%	989,451

* Projected transportation VMT in 2020 data are not available, this table uses a default annual growth rate of 1.0440% for transportation. The data source for this annual growth rate is the Metropolitan Transportation Commission, December 2008. Transportation 2035 Plan for the San Francisco Bay Area: Travel Forecasts Data Summary. This growth rate is specific to the travel forecast for San Mateo County. The source document is available online here: http://www.mtc.ca.gov/planning/2035_plan/Supplementary/T2035-Travel_Forecast_Data_Summary.pdf

Sector	Year	Data:	Data sources:
Residential (Population)	2005	75,100	ABAG data
	2020	84,400	ABAG data
Commercial/Industrial (Jobs)	2005	50,200	ABAG data
	2020	58,520	ABAG data
Transportation (VMT)*	2005	593,000,000	Community baseline 2005 GHG inventory
	2020	0	

* 2020 VMT data are not available. This worksheet uses an average annual transportation growth rate for San Mateo County.

PRO-RATING of DATA to 2020

POPULATION	City's population:	2008	77,071
	City's population:	2030	92,013
	Annual growth rate:		0.81%
	Estimated population in 2020:		86,969
JOBS	Jobs in 2005:	2008	52,300
	Jobs in 2025:	2030	77,623
	Annual growth rate:		1.81%
	Estimated population in 2020:		68,458
TRANSPORTATION	VMT in 2005 from GHG inventory:		339,000,000
	Increase in VMT in 2025 from the General Plan		16,986,419
	Total VMT in 2025 in the General Plan DEIR:		355,986,419
	Annual growth rate:		0.24%
	Estimated VMT in 2020:		351,661,640

Required Reductions Needed to Reach the Target

The two potential emission reduction targets modeled here are:

- 2020 target: 15% below 2005 levels
- 2050 target: 80% below 2005 levels

Year	Population	Business-as-usual (GHG MTCO2)	Reduction Target (15% below 2005)	State Reductions	Required reductions (MTCO2e)
2005	75,100	669,787	669,787	669,787	--
2020	84,400	775,946	569,319	631,249	-206,627
2050	103,000	988,263	133,957		-854,305

Appendix D. RICAPS Menu of Measures

This section describes the 39 greenhouse gas reduction measures selected and developed by the City/County Association of Governments (C/CAG) Regionally Integrated Climate Action Planning Suite (RICAPS) initiative for jurisdictions in the San Mateo County region.

Category	Measure	Description
Energy (Community)	Commercial green building ordinance	Update building code to mandate higher building performance in commercial buildings. Mandate achievement of CALGreen Tier 1 energy performance. Include additional mandatory requirements such as solar hot water or cool roofs. Seek to harmonize with regional Green Building Ordinances.
Energy (Community)	Residential green building ordinance	Update building code to mandate higher building performance in residential buildings. Mandate achievement of CALGreen Tier 1 energy performance. Include additional mandatory requirements such as solar hot water or cool roofs. Seek to harmonize with regional Green Building Ordinances.
Energy (Community)	Incentivize solar energy installation	Provide financial incentives for solar PV and hot water system installation. Meet with local banks and discuss creative ways to partner for low cost financing of RE and EE projects. Provide free assistance for project developers through the PPA and interconnection process. Encourage bulk purchases.
Energy (Community)	Participate in Energy Upgrade Program and similar rebate/incentive programs	City provides or encourages residential and commercial energy audits and retrofits. Leverage existing rebates/add additional rebates for energy efficient retrofits.
Energy (Community)	Promote PG&E commercial and industrial energy efficiency/demand response programs	City promotes and assists with marketing and outreach for PG&E energy efficiency and demand response programs. Leverage existing rebates/add additional rebates for energy efficient retrofits.
Energy (Community)	Implement program for shade trees	Program to provide free shade trees for houses with eastern, western or southern exposure that heat up during the summer.
Energy (Community)	Funding for energy efficiency and renewable energy	Establish revolving funds to finance energy-efficiency retrofits at residences.
Energy (Community)	Funding for energy efficiency and renewable energy	Establish revolving funds to finance energy-efficiency retrofits at businesses.
Energy (Municipal)	Energy efficient street lighting	Replace street, signal lights, parks and parking lot lighting with efficient lighting (LEDs, induction, etc).
Energy (Municipal)	Environmentally preferred purchasing policy	Implement a sustainable purchasing policy that emphasizes recycled materials and Energy Star equipment.
Energy (Municipal)	Municipal green building policy	Mandate all new municipal buildings achievement of CALGreen Tier 1 energy performance. Consider achieving LEED Silver or Gold status.

Category	Measure	Description
Energy (Municipal)	Renewable energy installation on municipal property	Complete a feasibility study on the installation of solar or other renewable energy projects at select City facilities and install where feasible. Set a goal in order to make this more viable.
Energy (Municipal)	Energy efficiency in municipal buildings	Audit city facilities for energy efficiency opportunities and implement energy efficient retrofits. City participates in San Mateo County Energy Watch and leveraged benchmarking to identify opportunities for EE upgrades and track energy performance. Leverage other programs that provide funding.
Energy (Municipal)	Funding for energy efficiency and renewable	Establish revolving funds to finance energy-efficiency retrofits at public buildings.
Energy (Municipal)	Enroll in offset program	Offset city GHG emissions from electricity and natural gas.
Transportation and Land Use	Smart growth development	Establish a Smart Growth Policy that prioritizes infill, higher density, transportation oriented and mixed use development.
Transportation and Land Use	Walkable/bikeable street landscape	Remake urban landscape to make walking and biking more desireable. Bike lanes, bike parking, traffic calming, beautification, etc.
Transportation and Land Use	Bike and car sharing	Incentivize City Car Sharing Companies to open pods in town. Explore Bike Share program.
Transportation and Land Use	Parking Policies	Establish parking policies to increase use of walking, public transit and bicycling.
Transportation and Land Use	Preferred Parking Policy	Set up in planning review that new or redeveloped commercial sites establish "plug in" parking preferred spaces.
Transportation (Municipal)	Efficient fleet policy	Prioritize purchase of efficient vehicles and alternative fuel vehicles. Maintain existing vehicles for optimum mileage. Encourage staff to drive minimally and efficiently. Establish government operations idling policy.
Transportation (Municipal)	Flexible schedules	Establish alternative work schedules and telecommuting to reduce employee commute.
Transportation (Municipal)	Implement Public Employee Commuting Program	Establish commute alternatives program to promote and incentivize public transportation, carpooling, biking, etc.
Transportation (Municipal)	Adoption of low emission government vehicles	Target purchase of new or conversion of existing government vehicles to more efficient vehicles.
Waste (Community)	Set higher diversion rate goal.	Increase participation in recycling programs and ensure weekly collection of recyclables and organic waste.
Waste (Community)	Commercial recycling ordinance	Mandate businesses recycle and provide staff or contractor to verify compliance. (Support and enforce state law, which is at the state level).

Category	Measure	Description
Waste (Community)	Create Sustainable Vendor Policy at Public Events	Require recycling at major public events (of cardboard, paper, containers and food/organics). Require compostable/recyclable silverware and food take out packaging.
Waste (Community)	Yard Waste Ordinance	Adopt an ordinance (similar to C&D) requiring that all landscapers and landscape maintenance businesses recycle/divert yard waste. Provide residents and businesses with food scraps collection. Explore a ban on these organics from landfill.
Waste (Municipal)	Environmentally preferred purchasing policy	Implement a sustainable purchasing policy that emphasizes recycled materials.
Waste (Municipal)	Establish a zero waste policy	Government policy to achieve 95% diversion in city operations by 2020.
Water	Water conservation incentives	Promote existing and/or new rebates for water efficient appliances and fixtures.
Water	Water conservation ordinance	Adopt Bay Area Water Supply and Conservation Agency (BAWSCA) Indoor Ordinance if haven't already and enhance BAWSCA Outdoor Ordinance (all cities required to adopt).
All Sectors	Participate in County Green Business program	Establish voluntary program that allows businesses to brand themselves as green by following sustainable practices.
All Sectors	Green Lease Program	Covert all leased property to "green" leases by either working with landlords or moving facilities to locations supported by systems such as solar, close to transportation, and/or with features to support and enhance energy efficiency and water conservation.
Future - Energy	Residential energy conservation ordinance (RECO)	Require prescriptive energy efficiency measures (EE checklist) during title transfer stage based on sale price.
Future - Energy	Commercial energy conservation ordinance (CECO)	Require prescriptive energy efficiency measures (EE checklist) during title transfer stage based on sale price.
Future - Transportation and Land Use	Local food and produce	Provide space for community based farming and promote farmers markets.
Future - Waste	Pay-as-you-throw policy	Establish tiered rates for garbage that significantly incentivizes recycling and compost.
Future - Waste Reduction	Promote material re-use	City-Wide Swap Meet: Sponsor a city-wide swap meet to trade items people would otherwise throw away (San Francisco model) - include ewaste collection. Free classes on waste minimization and repair.

Appendix E. Future Opportunities for Emissions Reductions

This section identifies and describes an additional ten measures that can be explored and initiated by Redwood City as funding and resources become available and as the measures in the current Climate Action Plan are implemented or completed.

Category	Measure	Description
Energy	EC3 Incentivize solar energy installation	Provide financial incentives for solar PV and hot water system installation. Meet with local banks and discuss creative ways to partner for low cost financing of RE and EE projects. Provide free assistance for project developers through the PPA and interconnection process. Encourage bulk purchases, group procurement, and crowdfunding.
Energy	EC6 Implement program for shade trees	Coordinate with Urban Forest Master Plan update. Provide free shade trees for houses with eastern, western or southern exposure that heat up during the summer.
Energy	EC7 Funding for energy efficiency and renewable energy	Establish revolving funds to finance energy-efficiency retrofits at residences.
Energy	EC8 Funding for energy efficiency and renewable energy	Establish revolving funds to finance energy-efficiency retrofits at businesses.
Energy	EM6 Funding for energy efficiency and renewable energy	Establish revolving funds to finance energy-efficiency retrofits at public buildings.
Energy	EM7 Enroll in offset program	Offset city GHG emissions from electricity and natural gas.
Transportation and Land Use	TL5 Preferred Parking Policy	Continue to install EV Charging Stations at municipal facilities and consider setting in planning review that new or redeveloped commercial sites establish "plug in" parking preferred spaces.
Transportation and Land Use	TM2 Flexible schedules	Establish alternative work schedules and telecommuting to reduce employee commute.
Solid Waste	WC1 Set a 95% diversion rate goal.	Establish Zero Waste programs at community events and eventually communitywide.
Solid Waste	WC2 Establish a zero waste policy	Government policy to achieve 95% diversion in city operations by 2020.

Appendix F. Summary of Funding Sources

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

Federal Funding

American Reinvestment and Recovery Act (ARRA) Loan Program

http://www.energy.ca.gov/efficiency/financing/index.html

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

Federal Transportation Investment Generating Economic Recovery (TIGER) Grant

http://www.dot.gov/recovery/ost/.

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

State Funding

California Solar Initiative (CSI)

http://www.gosolarcalifornia.ca.gov/csi/index.php

The California Solar Initiative (CSI) is the solar rebate program for California consumers that are customers of the investor-owned utilities - Pacific Gas and Electric (PG&E), Southern California Edison (SCE), and San Diego Gas & Electric (SDG&E). Together with the rebate program for New Solar Homes and rebate programs offered through the dozens of publicly owned utilities in the state, the CSI program is a key component of the Go Solar California campaign for California.

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

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

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

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

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

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

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

Energy Conservation Assistance Account Program (ECAA)

http://www.energy.ca.gov/efficiency/financing/index.html

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

Energy Upgrade California

https://energyupgradeca.org/overview

The Energy Upgrade California program helps residential and commercial consumers and the building industry to access available rebate programs and financing options for energy efficiency and renewable energy projects. The program is a partnership among California counties, cities, non-profit organizations and the state's investor-owned utilities (Pacific Gas & Electric, Southern California Edison, Southern California Gas Company and San Diego Gas & Electric Company),

and publicly owned utilities. Funding for this effort comes from the American Recovery and Reinvestment Act (ARRA, also known as federal stimulus funds).

Utility Rebate Programs

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

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

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

PG&E San Mateo County Energy Watch Program
http://www.smcenergywatch.com
San Mateo County Energy Watch provides energy efficiency services and retrofits and assists businesses and moderately low-income households to identify cost-effective projects. The program's services include energy audits, special rebates and incentives.

PG&E Residential Appliance Rebates
http://www.pge.com/myhome/saveenergymoney/rebates/appliance/
PG&E offers rebates to customers who purchase qualifying energy efficient appliances, including dishwashers, hot-water heaters, and room air conditioners. Rebates range from $30 to $75 for qualifying appliances. PG&E and American Water are also currently offering a combined rebate of up to $250 for installing high-efficiency clothes washers.

PG&E LED Streetlight Replacement Program
http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ref/lighting/lightemittingdiodes/incentives/index.shtml
The City of Redwood City may be eligible for PG&E's LED streetlight replacement program which provides rebates to cities that replace existing streetlights with more energy efficient LED fixtures (up to $125 per fixture).

PG&E Commercial Appliance Rebates
http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ref/index.shtml
PG&E offers rebates to business customers on hundreds of products including refrigeration units, lighting fixtures, heating systems, food service appliances, boilers and water heaters, and insulation.

PG&E Home Energy Efficiency Improvements Rebates

http://www.pge.com/myhome/saveenergymoney/rebates/remodeling/

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

Local Energy Programs

Acterra's High Energy Homes Project

http://www.acterra.org/programs/highenergy/index.html

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

California Youth Energy Services

http://www.risingsunenergy.org

Since 2000, Rising Sun Energy Center has run CYES, a summer youth employment and community efficiency retrofit program in the Bay Area. CYES hires young people (ages 15-22) and trains them to become Energy Specialists, serving their communities with a FREE Green House Call. Energy Specialists install free energy and water saving devices, and provide personalized recommendations and education for further savings in homes. CYES provides services to all community members regardless of income. However, it was designed to serve hard-to-reach residents including renters, non-English speaking households, and low-moderate income households. It provides youth with opportunities for training and meaningful employment; which are often not adequately available to them. CYES youth receive employability skills training, paid summer employment, and the foundation for a green career. The program is operating in the City of San Mateo in summer 2011, and will be expanding further into San Mateo County in 2012.

Green@Home HouseCalls

http://www.acterra.org/programs/greenathome/index.html

Green@Home HouseCalls help fight climate change by saving residents energy, money and CO2. Trained volunteers meet with residents in their homes to install simple energy-saving

devices and create home energy conservations plans. Volunteers demonstrate environmentally friendly choices and foster a deeper awareness of the need for change. HouseCalls are available to all residents of participating cities whether you rent or own.

RightLights Program

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

Sustainable San Mateo County's Energy Ambassador Program

http://sustainabilityhub.net/contest/ea-parties/

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

At *Energy Ambassador Parties*, Sustainable San Mateo County uses the host's home as a case study. Guests have a chance to enjoy some refreshments, mingle with some like-minded people, and learn about the value of getting a home energy assessment and making energy efficiency improvements.

Sustainable San Mateo County's Personal Energy Review Program

http://sustainabilityhub.net/contest/per

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

Other Funding Opportunities

American Forests Global ReLeaf Grant Program

http://www.americanforests.org/global_releaf/

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

California ReLeaf Urban Forestry Grant Program

http://californiareleaf.org/programs/grants

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

Large Landscape Audit

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

Waste Audits by Recology

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