City of Roseville

Communitywide Sustainability Action Plan

CITY OF ROSEVILLE CALIFORNIA

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AECOM

Placer County AIR POLLUTION CONTROL DISTRICT

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EXECUTIVE SUMMARY

Our choices regarding where we live and how we travel, build and consume goods and services within our community all contribute to increased air pollutant and greenhouse gas (GHG) emissions. Unlike most other jurisdictions in the Sacramento region, Roseville is both a full-service City that operates its own utilities, and a growing community anticipating both new residents and jobs. Roseville's daytime population swells in response to its high employment base, which creates greater mass emissions. The community is still growing, and anticipating both demands and benefits associated with new housing and jobs. In tandem with this growth, Roseville residents and businesses recognize the need to incorporate the concept of sustainability in ongoing decisions about how to make the built, environmental, and economic systems in our community more durable, resilient and functional and with less impact on ecological systems, particularly as they relate to major global issues such as diminishing resources.

The main objective of the City of Roseville Communitywide Sustainability Action Plan (SAP) is to set forth a comprehensive strategy to address emerging sustainability issues related to land use patterns, transportation, building design, energy use, water demand, and waste generation. The SAP outlines a road-map to reduce GHGs and air pollutant emissions within the community (i.e., vehicle emissions, emissions related to energy production) and to promote economic growth based on clean technology and sustainable practices.

There are several reasons why Roseville is proposing a communitywide SAP now, including the following:

- Adopting locally relevant measures and actions to meet regulatory obligations established by federal, state and regional agencies;
- Reducing emissions of GHGs and air pollutant emissions using cost-effective energy efficiency and conservation;
- Increasing energy independence by investing in clean, renewable energy sources;
- Promoting healthy lifestyles by facilitating opportunities for walking and biking ;

- Stimulating the local economy by creating an environment conducive to attracting green technology employers; and fostering a community attractive to intellectual resources to fill employment needs.
- Saving community dollars by implementing measures that increase energy and water efficiency.

The table below provides a brief summary of the regulatory framework that underlies the communitywide SAP strategies, measures and actions.

TABLE ES-1: Existing Regulations

Climate Change	Energy	Water	Solid Waste
Executive Order S-3-05: Establishes a long-range GHG reduction target of 80% below 1990 levels by 2050. **Assembly Bill 32:** Requires California to reduce statewide GHG emissions to 1990 levels by 2020. **Climate Change Scoping Plan:** Outlines the State's Plan to achieve the GHG reductions required in AB 32. No specific emission reduction target is established for local jurisdictions, but the Scoping Plan recognizes cities and counties as "essential partners" within the overall statewide effort. **Senate Bill 375:** Establishes regional emission targets for cars and light-duty trucks to reduce regional vehicle miles traveled. Local jurisdictions can benefit from California Environmental Quality Act (CEQA) streamlining if certain conditions are met. **Senate Bill 97:** Requires climate change impact analysis under CEQA and directs the California Resources Agency to certify and adopt guidelines for mitigating GHG emissions or the effects of GHG emissions.	**Senate Bill 1771:** Requires the California Energy Commission (CEC) to prepare an inventory of the state's GHG emissions and a methodology to provide information on the costs and methods for reducing GHGs. Also, establishes the California Climate Action Registry to serve as a certifying agency for companies and local governments, to quantify and register their GHGs for possible future trading systems. **Senate Bill 1078**: Establishes a Renewable Portfolio Standard requiring electricity providers to increase purchases of renewable energy resources by one percent per year until a portfolio of 20% per year is attained. **Senate Bill 1378:** Requires the CEC and California Public Utilities Commission to establish performance standards for baseload generation. **Assembly Bill 811:** Enables public financing options for energy efficiency and renewable energy production. **Assembly Bill 1890:** Requires the collection of ratepayer funds to be used for energy efficiency and demand reduction.	**Senate Bill 7:** Requires the State to achieve 19% and 20% reductions in per capita water use by 2015 and 2020 respectively. Non-compliance by local water providers will make them ineligible for state grant or loan funding, and water rights would need to be renegotiated. **Urban Water Management Planning Act:** Requires efficient use of available water supplies a plan for 25-year water supply reliability. The plan must describe how to respond during normal, dry and multiple dry years. **Assembly Bill 1881:** The Department of Water Resources (DWR) requires each jurisdiction to either adopt DWR's model landscape ordinance or adopt a jurisdiction-specific ordinance with similar requirements. Establishes water budgets and plant types for communitywide landscapes. **Senate Bill 407:** Requires that water-conserving plumbing fixtures replace non-compliant fixtures as a condition of property transfers or improvements.	**Assembly Bill 939:** Requires the City to divert a minimum of 50% of its waste stream to beneficial reuse or recycling. Roseville has exceeded this minimum requirement for many years by investing in a Materials Recovery Facility and communitywide programs. **Senate Bill 1016:** Establishes a new per capita disposal measurement system which uses two factors: a jurisdiction's population (or in some cases employment) and its disposal as reported by disposal facilities. In this new measurement, jurisdictions like Roseville must work toward decreasing the average pounds of waste disposed of per person per day. A decreasing number is an indication of success.

The Air Quality and Climate Change Elements of Roseville's 2025 General Plan also includes goals and policies that guide the City's approach to addressing sustainability. Since these are cross-cutting issues addressed by several elements of the General Plan, the SAP as a whole is considered an implementation measure for the policies described in this element. This structure allows the City to update the SAP on an ongoing, as-needed basis to ensure that Roseville's sustainability efforts reflect both current legislation and emerging best practices without need for a General Plan amendment.

The City's approach to sustainability and emissions reduction is similar to the climate change planning process being followed by more than 50 other California jurisdictions. This process includes:

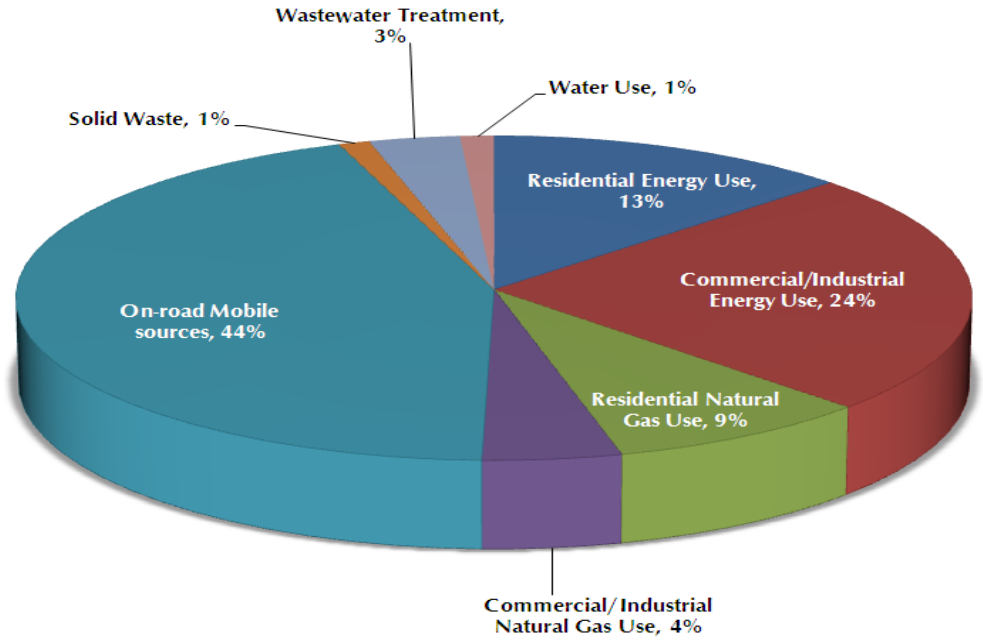
- Completing a baseline emissions inventory and projecting future emissions,
- Identifying a communitywide reduction target,
- Preparing a plan to identify strategies and measures to meet the reduction target,
- Identifying targets and reduction strategies in the plan and evaluating its environmental impacts pursuant to CEQA,
- Monitoring the effectiveness of reduction measures and adapting the plan to changing conditions, and
- Adopting the plan in a public process following environmental review.

Baseline Greenhouse Gas Inventory and Business-as-Usual Projections

The baseline GHG inventory identified communitywide emissions of approximately 1,202,383 metric tons of carbon dioxide equivalent emissions (MT CO_2e). This baseline includes both municipal emissions (i.e., those emissions directly attributable to City government operations) identified in the City of Roseville Greenhouse Gas Emissions Reduction Plan Analysis, and communitywide emissions (i.e., those emissions attributable to all sources in the community). According to the City of Roseville Greenhouse Gas Emissions Reduction Plan Analysis, municipal emissions for 2006 were approximately 28,858 MT CO_2e.

Under a forecasted business-as-usual scenario, communitywide GHG emissions would increase by approximately 15% between 2008 and 2020 to accommodate the Roseville General Plan's build-out population of 151,199. Under this scenario, communitywide GHG emissions would be 1,385,942 MT CO2e/year by 2020.

Figure ES-1: ***2020 Communitywide GHG projection***



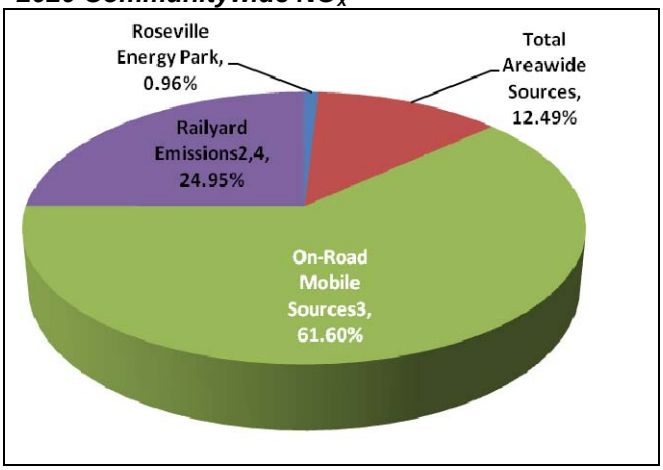
BASELINE CRITERIA AIR POLLUTANTS INVENTORY AND BUSINESS-AS-USUAL PROJECTION

A communitywide criteria air pollutant emissions inventory and business-as-usual projections for NOx and PM10 were also developed for 2008 and 2020 respectively. The NOx and PM10 inventory is broken into major and minor categories that follow the format of criteria air pollutant inventories developed by the California Air Resources Board (ARB) for counties, air basins, and the state. This includes the following emission categories:

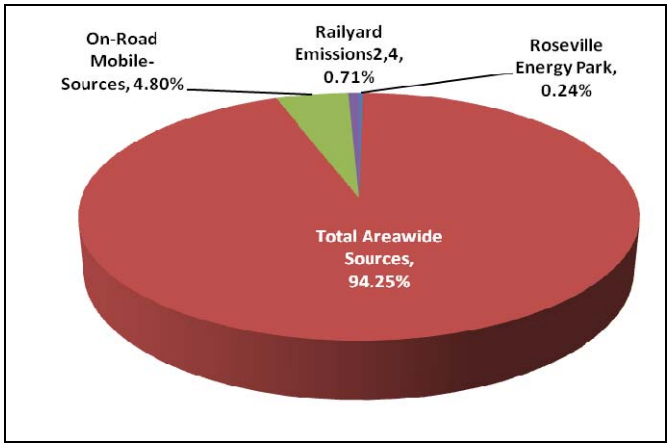
- stationary sources (Roseville Energy Park is considered separately)
- area sources: residential, commercial and industrial gas combustion; wood stoves and fireplaces; and paved road dust
- mobile sources: on-road and railyard emissions

The baseline NO_x inventory identified a communitywide emissions total of 3,061 tons in 2008 with a projected decrease of approximately 42% by 2020. The baseline PM_{10} inventory identified a communitywide emissions total of 1,275 tons in 2008, with a projected 22% increase in 2020. Please refer to the figure below for 2008 and 2020 comparison of criteria air pollutants emissions by source.

Figure ES-2:
2020 Communitywide NO_x



PM_{10} Projection



EMISSION REDUCTION TARGET

Adopting a GHG emission reduction target is an important step in assessing the effectiveness of the SAP as it relates to climate change. Following the model recently established by the Bay Area Air Quality Management District (BAAQMD), the State is now acknowledging that local jurisdictions should establish a GHG reduction target capable of meeting AB 32 goals.

Continuing growth in the Roseville community provides opportunity to continually improve jobs and housing balance. ***This plan establishes an efficiency-based reduction of 6.0 MT CO_2e per service population (from the baseline of 7.5 MT CO_2e per service population) by 2020.*** This efficiency-based target bears testimony to the community's commitment to grow and expand in an efficient and sustainable manner. Since transportation sources are the main generators of NO_x and PM_{10}, GHG reduction measures related to vehicle efficiency and reduced vehicle miles traveled (VMT) will also generate corresponding reductions in both NO_x and PM_{10}.

Implementing the recommended SAP measures would enable a communitywide mass GHG emissions reduction of approximately 74,060 MT CO_2e per year, which would correspond to 6.0MT CO_2e per service population per year (SP/yr) in 2020. This would be equivalent to 8.7MT CO_2e per capita and a 9.1% increase of mass emissions from 2008 levels.

Statewide reductions from implementation of Assembly Bill 1493 (Pavley), Low Carbon Fuel Standard (LCFS), and the Renewable Energy Portfolio Standard (RPS) were also considered during target establishment. Combined with

the effects of implementation of AB 1493, LCFS and the RPS, the recommended SAP measures would enable a communitywide mass GHG emissions reduction of approximately 192,100 MT CO_2e per year, which would correspond to 5.5 MT CO_2e/SP/yr in 2020. This would be equivalent to 7.9 MT CO_2e per capita and a 0.7% reduction below 2008 emission levels.

As shown in the table below, implementing recommended SAP measures are sufficient to achieve Roseville's communitywide GHG emission reduction target of 6.0 MTCO_2e/SP/yr in 2020. Emission reduction and energy-efficiency of the plan measures is increased further when combined with the effects of the statewide measures.

TABLE ES-2: Reduction Potential of Plan Measures

Reduction Potential of Recommended Sustainability Action Plan Measures and Statewide Legislation				
	2008	**2020**		
	Baseline	**Business-as-Usual**	**With SAP Measures**	**With SAP Measures and Statewide Reductions**
Population	109,154	151,199		
Employment	51,200	67,227		
Service Population	160,354	218,426		
Mass GHG Emissions (MT CO2e)	1,202,383	1,385,942	1,311,882	1,193,842
Mass GHG Emissions Reduced	--	--	-74,060	-192,100
Relationship to Baseline (%)	--	+15.3%	+9.1%	-0.7%
Per Capita MT CO2e/yr	11.0	9.2	8.7	7.9
Per Service Population MT CO2e/yr	7.5	6.3	6.0	5.5

Notes:
Electricity use estimates are for 2009 and 2019 based on data from Roseville Electric.
2008 and 2020 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM traffic model.
2008 service population (population + employment) of 160,354 (population from General Plan = 109,154 and employment from Roseville Electric demand projection = 51,200).
2020 service population (population + employment) of 218,426 (interpolated from 2015 General Plan population = 151,199 and employment from Roseville Electric demand projection = 67,227).
Railyard emissions include only those generated in the portions of the railyard located in Placer County. Emissions associated with pass-through trips are not included.
Source: Data compiled by AECOM 2010.

PLAN STRUCTURE AND LAYOUT

The recommended SAP measures were developed by:

- Evaluating existing community conditions and sustainable initiatives already underway,
- Identifying emissions reduction opportunities within the community
- Reviewing best practices from other jurisdictions and organizations that increase resource efficiency and protect the environment
- Incorporating state and regional laws, guidelines, and recommendations
- Considering ways to attract clean technology businesses in the community to bring social, environmental and economic benefits to the City

After reviewing a wide range of potential measures with the Green Team and Sustainability Action Plan Committee, the recommended measures presented in this plan were selected based on the following criteria:

- Would the community support and adopt the measure?
- What is the cost of implementation to the City along with private costs and savings?
- Is it technically possible to implement the measure?
- What are the other community benefits (e.g., quality of life, jobs, improved health) beyond reducing emissions?

Communitywide SAP measures are organized within six sustainable action strategies, identified below:

Transportation - these measures build on General Plan policies to design the City street network to efficiently accommodate all modes, users, and ability levels.

Land Use and Green Building – these measures promote efficient land use patterns, preserve open space, and encourage alternative modes of travel other than single-occupancy vehicles.

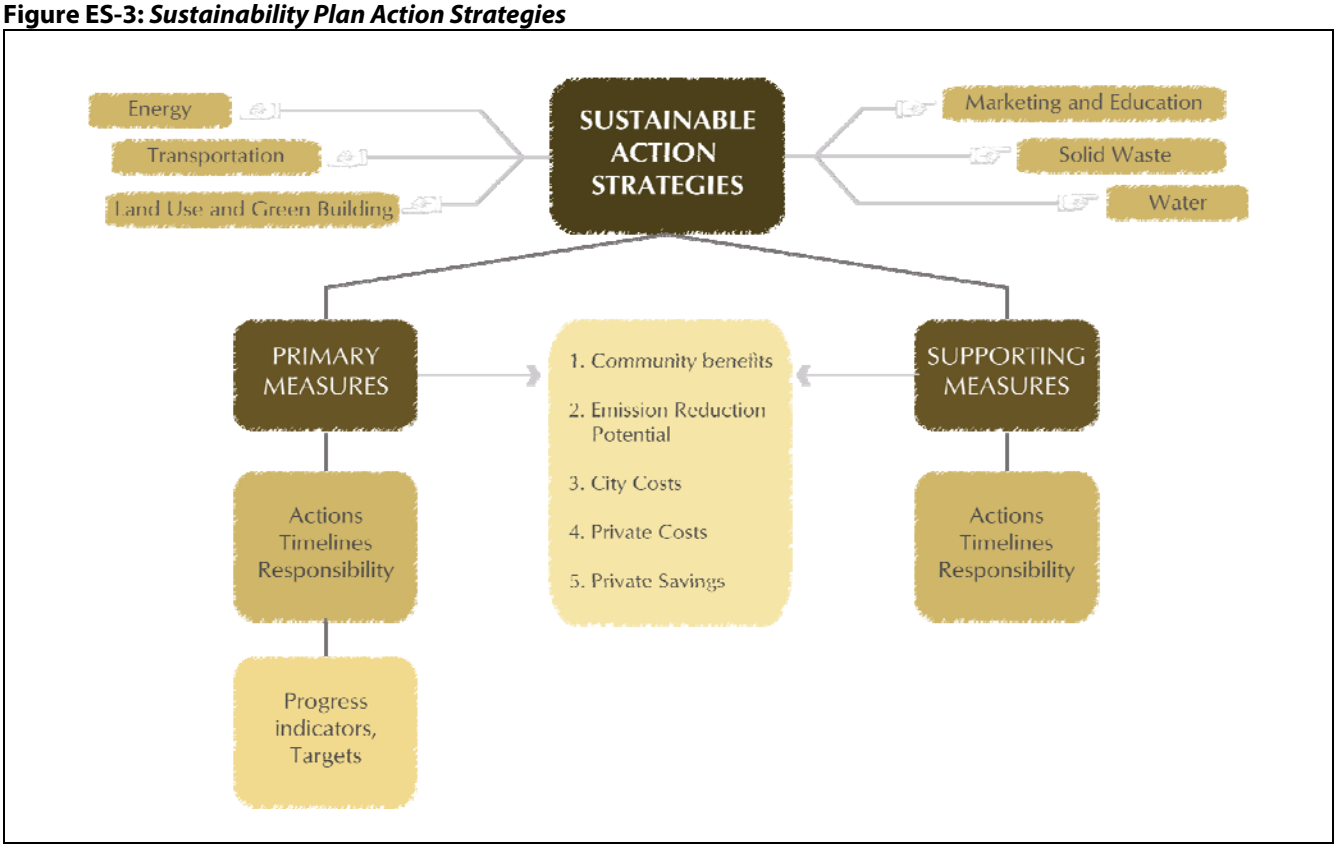
Energy – these measures strive to promote energy efficiency and conservation, and encourage the use of renewable energy.

Waste – these measures identify ways to reduce waste and increase reuse, recycling, and composting opportunities.

Water – these measures promote water demand management, while also identifying ways to minimize wastewater generation and stormwater runoff to enhance water quality and the aquatic environment.

Marketing and Education – these measures support development of a robust community outreach program, to increase the level of community awareness regarding sustainability issues and community acceptance of recommended SAP measures.

Figure ES-3: *Sustainability Plan Action Strategies*



Each sustainable action strategy includes two types of measures: primary and supporting. Primary measures generate directly attributable GHG reductions based on current technology, empirical studies and available data.

Estimated GHG reduction potential, expressed in MT CO_2e per year, is provided for each primary measure. The 11 primary measures recommended within this plan outline a path toward meeting the City's reduction target of 6.0 MT CO_2e/SP/yr by 2020.

A number of supporting measures have also been included in the SAP. These measures are not quantifiable at this time, but they do facilitate and support the reduction potential of the primary measures. Emissions reduction potential for these supporting measures was not estimated due to one or more of three reasons: (1) insufficient data exists to quantify their reduction potential, (2) no reliable quantification methodology is currently available, and/or (3) the reductions are not directly related to the emissions inventory and therefore cannot be counted toward the communitywide 2020 GHG reduction target.

Both primary and supporting measures within each strategy outline short- (by 2013), mid- (by 2017) and long-term (by 2020) actions to support sustainable community development. Each action is also marked based on its applicability to either existing development or new development or both. The actions also identify responsible agencies and City Departments. Successful implementation of the action items will enable the community to meet its reduction target. Specific progress indicators and target dates are identified for primary measures only. Since the primary measures account for emissions reduction potential, these progress indicators will help to monitor performance during the implementation period.

Figure ES-4: ***Sustainable Action Strategy Reduction Potential***

Summary of GHG Reduction Potential by Sustainable Action Strategy

(without assuming statewide reductions from implementation of AB 1493 and LCFS)

	**TRANSPORTATION: 5 primary measures related to:** - rideshare and carpooling - transit expansion - bike-pedestrian enhancements - alternative fuel infrastructure - intelligent transportation systems	49,130 (MT CO_2e/year)	66% (Percent of Total)
	LAND USE AND GREEN BUILDING: 1 primary measure related to: - urban forestry All other measures support transportation measures related to alternative transportation modes.	1,580 (MT CO_2e/year)	2% (Percent of Total)
	**ENERGY: 3 primary measures related to:** - existing residential building retrofits - existing commercial building retrofits - new residential building energy efficiency - new commercial building energy efficiency	19,460 (MT CO_2e/year)	26% (Percent of Total)
	**SOLID WASTE: 1 primary measure related to:** - food waste to energy biomass project	1,090 (MT CO_2e/year)	1% (Percent of Total)
	**WATER: 1 primary measure related to:** - 20% per capita reduction in water use	3,520 (MT CO_2e/year)	5% (Percent of Total)
	**MARKETING AND EDUCATION:** No primary measure, but all the measures support performance of all other SAP measures.	- NA -	- NA -

Beyond reducing emissions, the recommended SAP measures also provide other important community benefits that support sustainable lifestyles and practices, such as -

- **Improved Air Quality** – Cutting GHG emissions can reduce air pollution. Less pollution allows for cleaner air and healthier families.
- **Increased Energy Independence** – Reducing emissions related to energy produced from non-renewable sources reduces our reliance on imported and expensive fossil fuels.
- **Creating Healthier Neighborhoods** – By designing land use to connect neighborhoods to commercial areas and public spaces, the City can support alternative transportation modes such as walking and biking – both of which can have positive effects on community health by promoting outdoor activities and exercise.
- **Creating Local Jobs** – Many strategies recommended in this plan are intended to facilitate job stimulation in the community, along with vocational training for energy efficiency retrofits, installing and maintaining renewable energy technologies, and installing water-conserving landscaping.
- **Saving Money** – Importantly, using less energy and water can translate into utility bill savings for residents and businesses.

Economics were a key consideration in determining the feasibility of recommended SAP measures. Cost to the City, as well as costs and savings to the residents or property owners were assessed as part of the analysis for each emission reduction measure. These costs and savings were categorized into very low, low, medium, and high ranges, as identified in the table below, based on the City of Roseville Capital Improvement Plan (~$34.8 million) and the FY 2011 City Budget (Direct Operating Expenditures [~$293.3 million]), as well as other precedents set by comparable California cities. As there is some uncertainty in any economic estimation of a SAP policy, many costs and savings are represented as a range or an order-of-magnitude estimate.

TABLE ES-3: Cost/Savings Assumptions

Costs/ Savings Analysis Assumptions	
City Costs (average annual)	Very Low: Less than $10,000 Low: $10,001 - $50,000 Medium: $50,001 - $100,000 High: Greater than $100,000
Private Costs and Private Savings (average annual)	Very Low: $0-$100 Low: $101-$250 Medium: $251-$500 High: Greater than $500

IMPLEMENTATION

The recommended communitywide SAP measures will be implemented in tandem with the municipal measures identified in the City of Roseville Greenhouse Gas Emissions Reduction Plan Analysis to achieve emission reductions that address both communitywide and municipal sources. The SAP reduction measures were developed considering the input of the Sustainability Action Committee and City staff.

For the SAP to successfully guide Roseville toward meeting its emissions reduction target, the City must play a prominent role in implementing the SAP programs and policies. The City also recognizes that empowering the public to participate in and ensure success of the measures and actions is important to ensure that there is community investment in actions that rely on community participation. The SAP outlines a community-based social marketing strategy to support these efforts,

To monitor successful implementation of the SAP and track its progress toward 2020, the communitywide GHG emissions inventory should be updated approximately every 4 years which would correspond with annual SACOG MTP update. During these updates, the community may also evaluate the performance of recommended measures, and investigate new measures that have not been recommended currently due to financial or technical constraints to determine their applicability in the future.

1 INTRODUCTION

PURPOSE AND SCOPE

Roseville residents and businesses recognize that the life choices we make today will affect the community resources in the future. "Sustainability" underlies the discussion of how to make the built and economic systems in our community more durable, resilient and longer-lasting and have less impact on ecological systems, particularly in relation to major global issues such as diminishing fossil fuel reserves and climate change.

The main objective of the Roseville Communitywide Sustainability Action Plan (SAP) is to set forth a comprehensive strategy to address emerging regulations regarding climate change, land use patterns, transportation, building design, energy use, water demand, and waste generation. The SAP outlines a road-map to reduce greenhouse gas (GHG) and criteria air pollutant emissions within the community (i.e., vehicle emissions, emissions related to energy production) and to promote economic growth based on clean technology and sustainable practices.

Roseville's communitywide SAP seeks to achieve the following primary objectives:

- Improve overall quality of life in the community by promoting smart growth and mobility principles that better connect the community, reduce air pollution, increase energy independence, reduce non-renewable energy and potable water consumption, reduce waste generation and increase waste diversion from landfills, and encourage healthy lifestyles;
- Outline various communitywide strategies and measurable implementation actions to meet the City's goal of reducing GHG emissions to meet the target of 6.0 MT CO2e per service population per year by 2020; and
- Demonstrate Roseville's ability to respond to and comply with California's GHG reduction legislation and regulatory guidance to cumulatively reduce the community's contribution to global climate change.

COMMUNITY RESPONSIBILITY FOR SUSTAINABILITY

There are several reasons why Roseville is considering development of a SAP now, including the following:

- Adopting locally relevant measures and actions to meet regulatory obligations established by federal, state and regional agencies;
- Reducing emissions of GHGs and air pollutant emissions using cost-effective energy efficiency and conservation;
- Increasing energy independence by investing in clean, renewable energy sources;
- Promoting healthy lifestyles by facilitating opportunities for walking and biking;
- Stimulating the local economy by creating an environment conducive to attracting green technology employers; and fostering a community attractive to intellectual resources to fill employment needs; and
- Saving community dollars by implementing measures to increase energy and water efficiency.

FORMATION AND PURPOSE OF THE SUSTAINABILITY ACTION PLAN COMMITTEE

In January 2010, the Roseville City Council appointed the Roseville Sustainability Action Plan Committee to "increase awareness of the City and community's sustainability efforts" and "assist in the preparation of a Community-wide Sustainability Action Plan." Based on the direction of the City Council the committee was intended to be diverse and representative of the community at large. Members represented business, non-profits, City Commissions, utilities, education, youth, citizens-at-large, building industry, and experts in the field of sustainability.

City objectives for the Committee's development of a Sustainability Action Plan included:

- Assist the City in complying with anticipated mandates to be implemented as a consequence of AB 32 and SB 375.
- Guide the way to reducing carbon and other regulated pollutants, and provide the associated ability to improve the quality of life in Roseville and surrounding communities, with significant community input.
- Position the City in a leadership role, and proactively prepare for state-mandated carbon reduction measures and goals in order to maximize options and flexibility.
- Where possible, implement guidance from the California Attorney General regarding GHG reduction policies and long-term planning.
- Enhance the City's ability to obtain grant funding as it seeks additional outside funding for assistance meeting State goals and mandates.

The committee was divided into six working groups based on interest and experience. Each working group related directly to the plan's sustainable action areas: transportation, land use and green building, energy, water, waste, and marketing and education. Since January, the committee has had monthly meetings and several working group meetings to review and discuss the SAP measures, costs, and implementation timelines. The committee has been instrumental in developing the recommended SAP measures, actions and targets.

Roseville Communitywide Sustainability Action Committee

CITY OF ROSEVILLE MUNICIPAL CLIMATE ACTION PLAN

The Roseville City Council adopted a Municipal Climate Action Plan in November, 2009. The plan applied to greenhouse gas emissions from city facilities and operations (e.g., buildings, vehicle fleets, treatment plants, and other infrastructure). The City Council approved a GHG reduction goal of 22.8 percent by 2035 using various measures. This community-wide plan compliments the Municipal plan by promoting greenhouse gas emission reduction from businesses and households that make up the community.

LEGISLATIVE FRAMEWORK

In 2005, Executive Order S-3-05 proclaimed that California is vulnerable to the effects of climate change. To combat those concerns, Governor Schwarzenegger signed the Executive Order, establishing a long-range GHG reduction target of 80% below 1990 levels by 2050.

Subsequently, Assembly Bill (AB) 32, the *California Global Warming Solutions Act of 2006* was signed. AB 32 requires California to reduce statewide GHG emissions to 1990 levels by 2020. AB 32 directed the California Air Resources Board (ARB) to develop and implement regulations that reduce statewide GHG emissions.

The *Climate Change Scoping Plan* (Scoping Plan), approved by ARB in December 2008, outlines the State's plan to achieve the GHG reductions required in AB 32. Though the Scoping Plan does not define the specific role local governments will play in meeting the State's GHG reduction goals, it identifies cities and counties as "essential partners" within the overall statewide effort. The Scoping Plan specifically encourages local governments to develop their own climate action or similar plans and has created a local government protocol to assist in the effort.

Senate Bill (SB) 97 (2008) identifies climate change as a prominent environmental issue that requires analysis under the California Environmental Quality Act (CEQA). SB 97 required the California Resources Agency to certify and adopt guidelines for mitigating GHG emissions or the effects of GHG emissions, as required by CEQA. These guidelines were adopted by the Resources Agency in 2010.

Additionally, SB 375 (2008) established a process whereby regional targets for reduced vehicle miles traveled (VMT) and GHG emissions will be established by ARB, in collaboration with Metropolitan Planning Organizations (MPOs) throughout the state, including the Sacramento Area Council of Governments (SACOG). Once determined,

these targets will apply to the transportation emissions sector. GHG reductions within other sectors remain within the purview and responsibility of local governments. SB 375 seeks to:

- Use the regional transportation planning process to help achieve AB 32 goals.
- Use CEQA streamlining as an incentive to encourage transit-oriented residential projects that help achieve AB 32 goals.
- Coordinate the regional housing needs allocation process with the regional transportation planning process, providing monetary incentives for sustainable development.

Other federal, state and regional regulations and requirements for grant fund eligibility have also emerged simultaneous with the climate change-related legislation discussed above. These requirements indirectly influence the need to create a communitywide strategy for a sustainable future. These regulations require that as a full-service city, Roseville prepare measures and implementation actions that respond to the growing concerns of potable water availability, landfill capacity and energy conservation. Such legislation also supports the sustainable land use and circulation principles underlying the climate change legislative framework discussed above. Therefore, the SAP provides a timely opportunity for the City to reassess current policies and programs to maintain and continue its community values and high-quality of life in the future.
Table 1-1 provides a brief summary of the regulatory framework that underlies the communitywide SAP strategies, measures and actions.

TABLE 1-1
Regulatory and Planning Framework at a Glance

Climate Change	Energy
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TABLE 1-1 (Continued) Regulatory and Planning Framework at a Glance	
Water	**Solid Waste**
Senate Bill 7: Requires the State to achieve 19% and 20% reductions in per capita water use by 2015 and 2020 respectively. Non-compliance by local water providers will make them ineligible for state grant or loan funding, and water rights would need to be renegotiated. **Urban Water Management Planning Act:** Requires efficient use of available water supplies and a plan for 25-year water supply reliability. The plan must describe how to respond during normal, dry and multiple dry years. **Assembly Bill 1881:** The Department of Water Resources (DWR) requires each jurisdiction to either adopt DWR's model landscape ordinance or adopt a jurisdiction-specific ordinance with similar requirements. Establishes water budgets and plant types for communitywide landscapes. **Senate Bill 407:** Requires that water-conserving plumbing fixtures replace non-compliant fixtures as a condition of property transfers or improvements.	**Assembly Bill 939:** Requires the City to divert a minimum of 50% of its entire waste stream to beneficial reuse or recycling. Roseville has exceeded this minimum requirement for many years by investing in a Materials Recovery Facility (MRF) system and communitywide programs such as, green waste and similar programs. **Senate Bill 1016:** Establishes a new per capita disposal measurement system which uses two factors: a jurisdiction's population (or in some cases employment) and its disposal as reported by disposal facilities. In this new measurement, jurisdictions like Roseville must work towards decreasing the average pounds of waste disposed of per person per day. A decreasing number is an indication of success.

RELATIONSHIP TO THE GENERAL PLAN

The Sustainability Action Plan (SAP) implements updated policies of the Roseville's *General Plan 2025* that identify ways to reduce communitywide GHG emissions in the following elements:

- Air Quality and Climate Change Element;
- Land Use Element;
- Circulation Element;
- Public Utilities Element;
- Parks and Recreation Element; and
- Open Space Element

The General Plan includes goals and policies that guide the City's approach to addressing sustainability and climate change. Since these are cross-cutting issues addressed by several elements of the General Plan, the SAP as a whole is considered an implementation measure for the policies described herein. This structure allows the City to update the SAP on an ongoing, as-needed basis to ensure that Roseville's sustainability efforts reflect both current legislation and emerging best practices. The existing General Plan goals that directly influence the formation of the SAP objectives and measures are highlighted on next page.

CIRCULATION ELEMENT

Level of Service Goal 1:

Maintain an adequate level of transportation service for all of Roseville's residents and employees through a balanced transportation system, which considers automobiles, transit, bicyclists, and pedestrians.

Transit Goal 1:

Promote a safe and efficient mass transit system, utilizing both rail and bus modes, to reduce congestion, reduce auto emissions, including emissions that contribute to climate change, improve the environment, and provide viable nonautomotive means of transportation in and through Roseville.

Transportation Systems Management Goal 2:

Reduce total vehicle emissions in the City of Roseville and the South Placer County region.

Bikeways/Trails Goal 1:

Provide a safe, comprehensive and integrated bikeway and trail system that encourages the use of bikes and walking for commuting, recreational and other trips.

LAND USE ELEMENT

Community Form Goal 2:

While recognizing that the automobile is the primary form of transportation, the City of Roseville should make a commitment to shift from the automobile to other modes of transportation.

Community Form Goal 6:

Roseville will strive to be a balanced community with a reasonable mix of land uses, housing types and job opportunities.

PUBLIC FACILITIES ELEMENT

Electric Utility Goal 1:

Maintain a municipal electric utility that provides an efficient, economical, and reliable electric system.

Electric Utility Goal 4:

Aggressively pursue cost-effective and environmentally safe alternative sources of energy and energy conservation measures.

Water System Goal 1:

Maintain a water system that adequately serves the existing community and planned growth level, ensuring the ability to meet projected water demand and to provide needed improvements, repairs, and replacements in a timely manner.

Water System Goal 4:

Actively pursue water conservation measures.

Wastewater and Recycled Water Systems Goal 3:

Actively pursue the use of recycled water where appropriate and expand recycled water distribution system to deliver and meet estimated demands of 4,900,400 acre-feet/year for landscape irrigation.

Solid Waste, Source Reduction and Recycling Goal 1:

Provide a healthy, safe, and economical system for solid waste collection and disposal.

Solid Waste, Source Reduction and Recycling Goal 3:

***C**ontinue to participate in local and regional approaches to source reduction, material recovery, recycling, and solid waste disposal.*

Water and Energy Conservation Goal 1:

Preserve scarce resources by recognizing the importance of conservation in water and energy management.

Water and Energy Conservation Goal 2:

Balance conservation efforts with water and energy supplies for the maximum benefit of Roseville's residents.

- City of Roseville General Plan 2025.

COMMUNITY PARTICIPATION

Roseville community members have a strong tradition of public engagement and participation to improve the community's daily life. The development of the SAP is a testimony to this communitywide participation and commitment to ensure a sustainable future for the city. Therefore, Roseville's SAP is ultimately ***your*** plan.

> *"California has set ambitious goals to address climate change and reduce greenhouse gas emissions. Because of the diversity of California's topography and different local climates, the effects of a changing climate on California communities are complex and will differ from community to community. And, because California communities themselves are different, reducing greenhouse gas emissions will also vary from community to community, as will adapting to climate change."*
>
> ***Source:***
> *How to Harness the Power of Your Community to Address Climate Change, California Air Resources Board and Institute for Local Government*

COMMUNITYWIDE PARTICIPATION

Opportunities for communitywide participation and input have also been part of the SAP development process. A public discussion and distribution of SAP–related information occurred as part of Roseville's Earth Day celebration (April 17, 2010) at the Utility Exploration Center's Mahany Park facility.

SAP measures presented at Earth Day event

WEBSITES

The City of Roseville maintains a high-quality social media website to connect with community members on various issues. Information regarding the SAP process and SAC proceedings is available on the City's website. The City also maintains Facebook and Twitter web pages to provide information related to community interests and concerns, such as announcing upcoming community events (e.g., energy and water efficiency-related Water Awareness Day, All Things Solar) and promoting alternative transportation options (e.g, Summer Youth Bus Pass, Commuter Bike program).

City's social media website

Being an Agent of Change

As an individual, affecting a large-scale change to solve global problems may seem daunting, but breaking it down into a three-step process (as shown below) illustrates the cumulative significance of many smaller individual actions. As members of the Roseville community, each step taken by an individual resident, business owner or employee will be part of the solution for a sustainable future.

Step 1:
Take Personal Action –
Identify daily choices to reduce your individual and family's carbon footprint.

Step 3:
Be the "Voice of Change"–
Learn more and share ideas with your friends and families about ways to reduce GHG emissions through simple changes in everyday habits and lifestyle.

Step 2:
Motivate the Community –
Bring your ideas and solutions to reduce GHG emissions to your local leaders' attention.

Ten Easy Ways to Make a Difference

1 

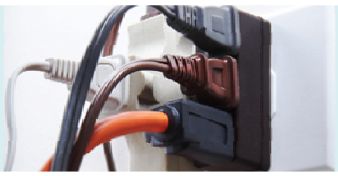
Drive Smart - Smart, smooth and safe driving techniques lead to average fuel savings of 5-10%. Switching off your engine if you have to stop for more than a minute saves fuel and reduces emissions. Check tire pressure at least once every two weeks to ensure adequate inflation and save money on fuel.

2 

Drive Less - Bike, take public transit or walk for short daily trips. Leaving your car home twice a week can save fuel and reduce related emissions. Also, if you need to take your car, plan ahead to combine errands, instead of making multiple trips.

3 

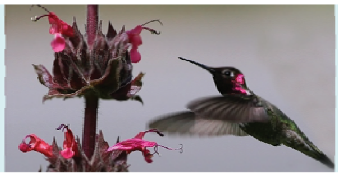
Dress for the Weather - Set your central thermostat at 68 degrees (65 at night) during winter days and at 78 degrees during summer. When indoors, dress warmly during winter months instead of turning up the heat and dress lightly in summer instead of turning up air conditioning. Use a fan to optimize air circulation.

4 

Use Energy Wisely - Turn off lights and unplug appliances when not in use. Many appliances continue to draw a small amount of power when they are switched off. These "phantom" loads occur in most appliances that use electricity, such as VCRs, televisions, stereos, computers, and kitchen appliances.

5 

Save Water - A leaky toilet can waste almost 200 gallons of water per day. Check for leaks regularly and fix them to save on water bills. Taking shorter showers and using less hot water saves both water and energy required for heating it. Wash only when you have a full load of clothes and dishes.

6 

Plant Climate Appropriately - Plant a tree but choose an appropriate species that uses less water and maintenance. Climate appropriate gardens also attract local birds and critters. Learn to create rainwater gardens to infiltrate stormwater and reduce potable water demand. Set irrigation controls to match seasonal water needs.

7 

Reduce and Reuse Before Recycling - Look for creative ways to reduce trash and reuse an item before tossing it off to the recycle bin. For example, use reusable mugs at coffee shops and reusable water bottles during travel to reduce the use of disposable and single-use items such as plastic bottles.

8 

Create Your Own Reusable Shopping Bag - Reusing just one bag in your daily life (grocery/home shopping, trips to the beach/pool, gym, picnics, festivals, travel, etc.) can "eliminate" the use of approximately six plastic bags every week. Creating your own resusable bag can maintain your personal style and be durable for many uses.

9 

Buy and Eat Locally - Buying locally helps to reduce emissions related to transportation of the goods (including food) from distant places. Locally grown healthy food helps to maintain a seasonal variety of produce and recipes while saving fuel and cleaning the air from unnecessary transport-related emissions.

10 

Spread the Word - Learn about ways to reduce your carbon footprint and share information about the economic and environmental benefits of simple lifestyle changes with your friends, neighbors and co-workers. Take opportunities to encourage community leaders to establish environment-friendly policies and programs.

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2 THE PLANNING PROCESS

PLANNING STRATEGY

Roseville's communitywide Sustainability Action Plan (SAP) includes:

- Baseline emissions inventory for 2008 and a future emissions projection for 2020 for GHGs, PM_{10} and NO_x
- Business-as-usual 2020 projections for both GHGs and criteria air pollutants;
- An explanation of expected GHG reductions from statewide measures; and
- A community-wide GHG reduction target;
- Community-wide sustainable action strategies and measures capable of meeting the emission reduction target;
- An implementation approach that includes a discussion of potential emission reduction measures for GHGs and other air pollutants that can be carried out in tandem with the municipal measures identified in the City of Roseville Greenhouse Gas Emissions Reduction Plan Analysis.[1]
- Recommendations to monitor effectiveness of reduction measures and adapt the plan to changing conditions.

COMMUNITYWIDE BASELINE INVENTORY

Greenhouse Gas Baseline Inventory

A GHG emissions inventory was developed for communitywide GHG emission sources for the 2008 operational year. The baseline GHG inventory identified a communitywide emissions total of 1,202,383 metric tons of carbon dioxide equivalent emissions (MT CO_2e). This baseline includes both municipal emissions (i.e., those emissions directly attributable to City government operations) identified in the City of Roseville Greenhouse Gas Emissions Reduction Plan Analysis, and communitywide emissions (i.e., those emissions attributable to all sources in the community). Table 2-1 and Figure 2-1 identify the 2008 communitywide GHG baseline inventory across various economic sectors. Please refer to Appendix A for a description of inventory methods and assumptions.

[1] Including respirable particulate matter with an aerodynamic diameter of 10 micrometers or less [PM_{10}] and oxides of nitrogen (NO_x).

TABLE 2-1 2008 Communitywide Greenhouse Gas Inventory		
Community Sector	**Emissions**	
	MT CO_2e	**Percent**
Residential Energy Use[1]	156,267	13%
Commercial/Industrial Energy Use[1]	292,730	24%
Residential Natural Gas Use	102,996	9%
Commercial/Industrial Natural Gas Use	53,827	4%
On-road Mobile Sources[2]	530,088	44%
Solid Waste	13,110	1%
Wastewater Treatment	39,068	3%
Water Use	14,298	1%
Total Emissions	1,202,383	**100%**
Emissions Per Capita (MT/Person)[3]	11.0	
Emissions Per Service Population (MT CO_2e/Service Population)[4]	7.5	
Railyard Emissions[5]	25,927	

Notes: CO_2e = carbon dioxide equivalent; MT= metric tons.

1. Electricity use estimates are for 2009 based on data from Roseville Electric.
2. 2008 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM traffic model.
3. Based on 2008 population of 109,154 per City of Roseville's General Plan 2025, Housing Element.
4. Based on 2008 service population (population + employment) of 160,354 (population = 109,154 and employment from Roseville Electric demand projection = 51,200).
5. Railyard emissions include only those generated in the portions of the railyard located in Placer County. Emissions associated with pass-through trips are not included.

Source: Data compiled by AECOM 2010.

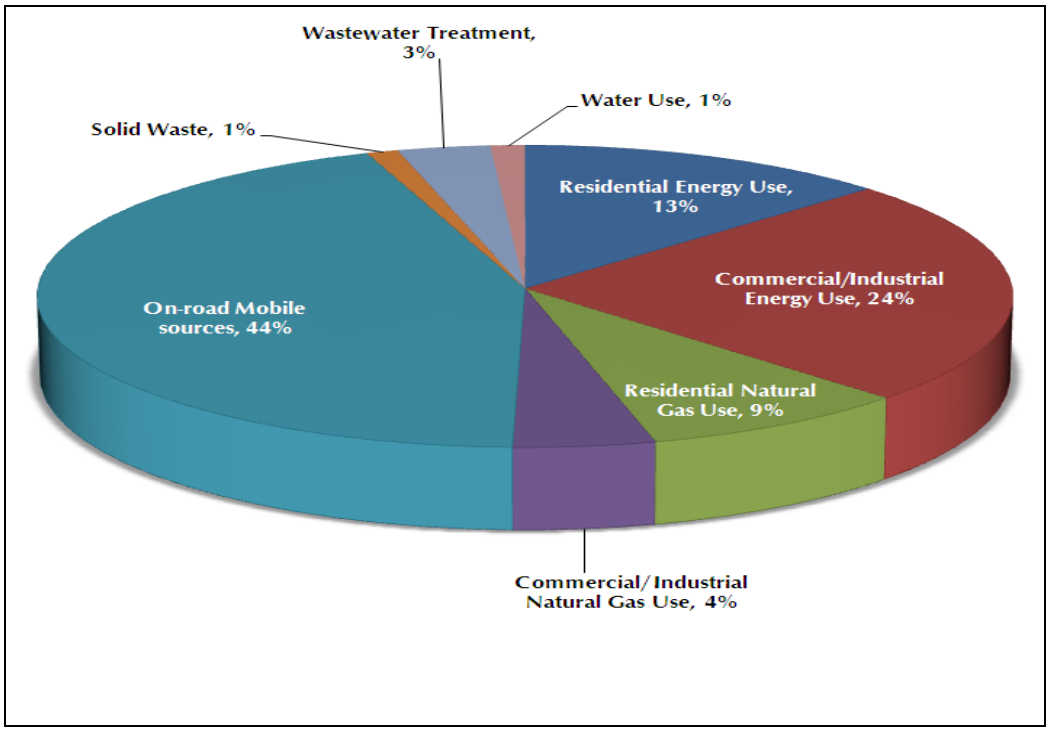


Figure 2-1: ***2008 Communitywide Greenhouse Gas Inventory by Sector***

The City previously completed a GHG emissions inventory for municipal operations for operational year 2006. Municipal GHG emission sources, which include government buildings, vehicle fleets, solid waste, streetlights, and other government-owned or operated facilities, can be considered a subset of the community-wide emissions inventory. According to the City of Roseville Greenhouse Gas Emissions Reduction Plan Analysis, the municipal emissions for 2006 were approximately 28,858 $MTCO_2e$. Figure 2-2 identifies the source of these emissions by type.

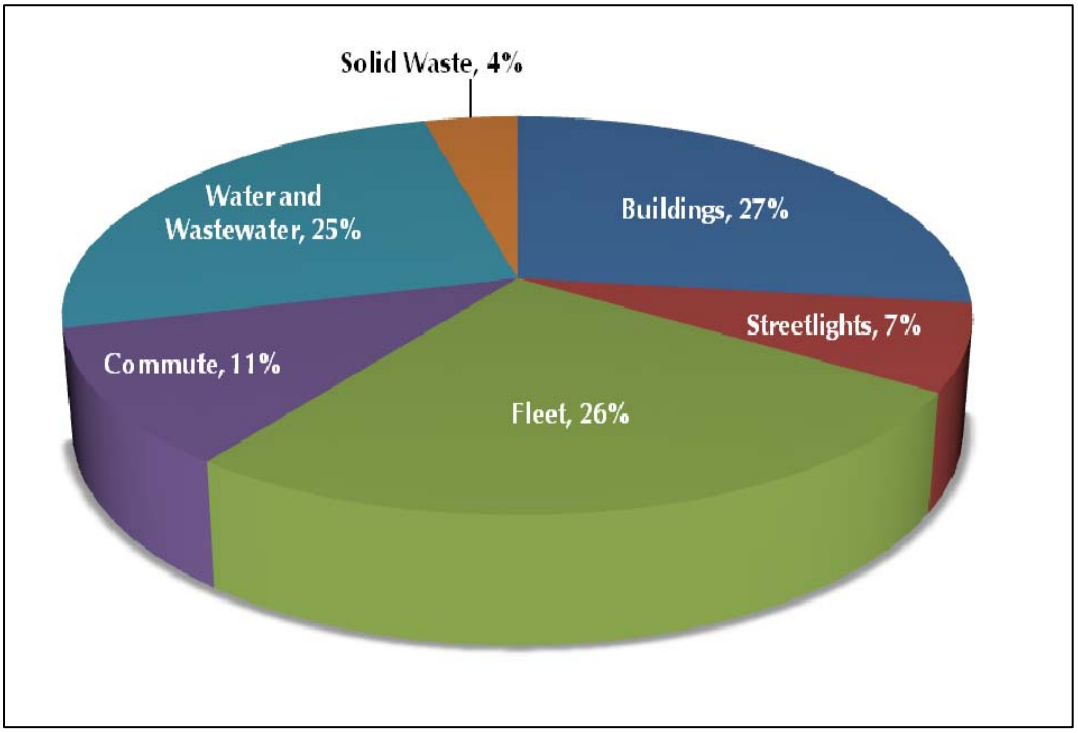


Figure 2-2: ***2006 Municipal Greenhouse Gas Inventory by Source***

Figure 2-3 identifies relative levels of 2008 communitywide GHG emissions by sector, based on existing zoning, building energy use, and transportation (excluding the Railyards emissions).

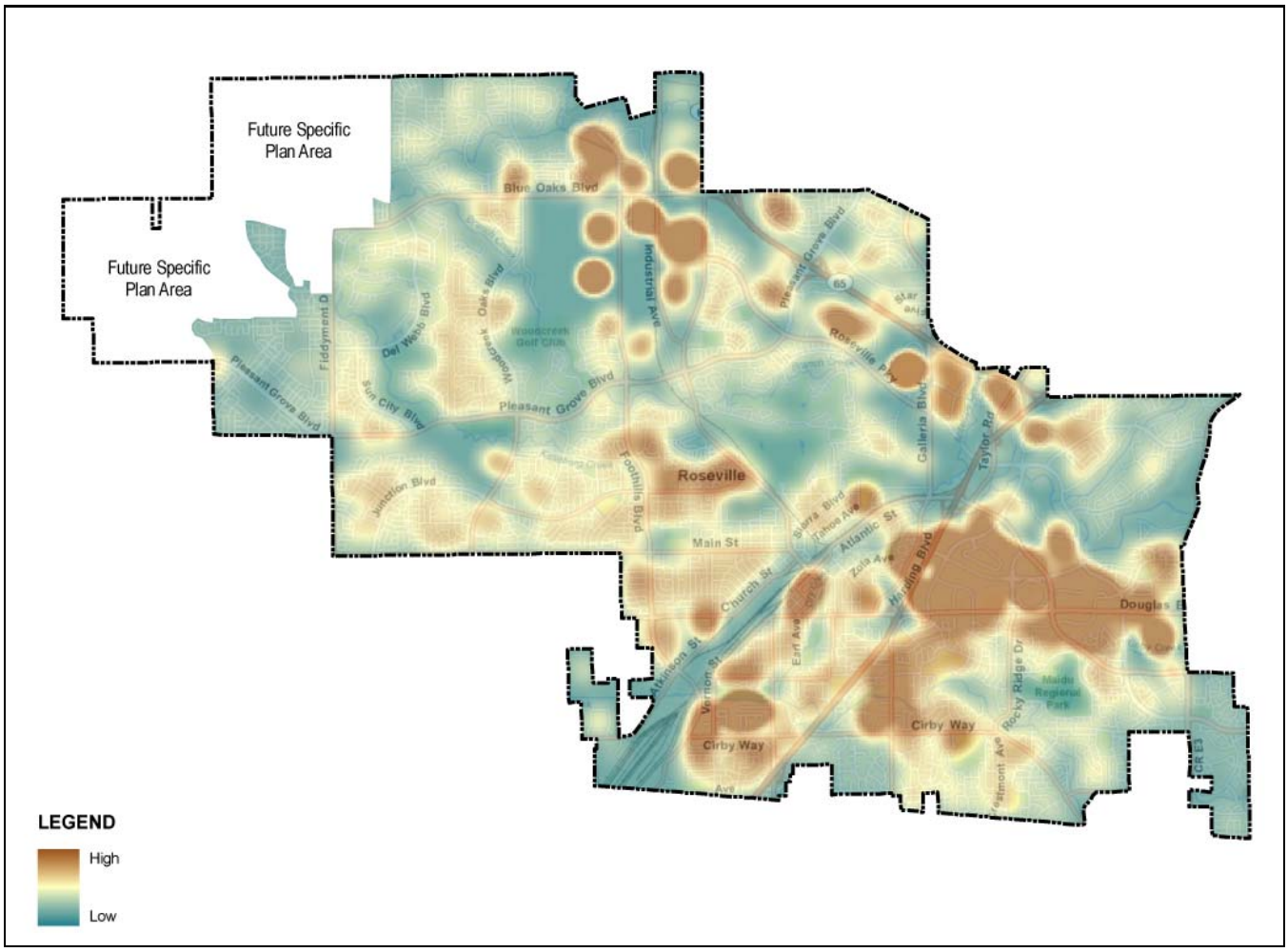


Figure 2-3: ***2008 Communitywide GHG Emissions Map by Sector (based on existing zoning, building energy use and transportation).***

CRITERIA AIR POLLUTANT BASELINE INVENTORY

A communitywide criteria air pollutant emissions inventory for NO_x and PM_{10} was also developed for the 2008 operational year. The NO_x and PM_{10} inventory is broken into major and minor categories that follow the format of criteria air pollutant inventories developed by the California Air Resources Board (ARB) for counties, air basins, and the state. This includes the following emission categories:

- stationary sources (Roseville Energy Park is considered separately);
- area sources: residential, commercial and industrial gas combustion; wood stoves and fireplaces; and paved road dust;
- mobile sources: on-road and railyard emissions.

Government-related NO_x and PM_{10} emission sources, which include government buildings, vehicle fleets, solid waste, streetlights, and other government-owned or operated facilities, are recognized as a subset of the communitywide emissions inventory. Table 2-2, Figure 2-4 and Figure 2-5 identify the 2008 communitywide NO_x and PM_{10} inventories across various sources. Please refer to Appendix A for a description of inventory methods and assumptions.

TABLE 2-2
2008 Communitywide NO_x and PM_{10} Inventory

Source	Emissions			
	NO_x (tons)	Percent	PM_{10} (tons)	Percent
Stationary Sources				
Roseville Energy Park[1]	15.10	0.49%	3.44	0.27%
Other Stationary Sources	5.42	0.18%	5.96	0.47%
Total Stationary Sources	20.51	0.67%	9.40	0.74%
Area wide Sources				
Residential, Commercial, Industrial Natural Gas Use	160.90	5.26	10.71	0.84
Wood Stoves/Fireplaces	35.51	1.16%	460.15	36.09%
Paved Road Dust		-	694.23	54.45%
Total Areawide Sources	196.41	6.42%	1,165.09	91.38%
On-Road Mobile Sources[2]	2,411.00	78.77%	89.41	7.01%
Railyard Emissions[3]	433.00	14.15%	11.10	0.87%
Total Emissions	3,061	100.00%	1,275	100.00%

Notes:

1 Electricity use emissions estimates are for 2009 based on data from Roseville Electric.

2 2008 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM traffic model.

3 Railyard emissions include only those generated in the portions of the railyard located in Placer County. Emissions associated with pass-through trips were not included.

Source: Data compiled by AECOM 2010.

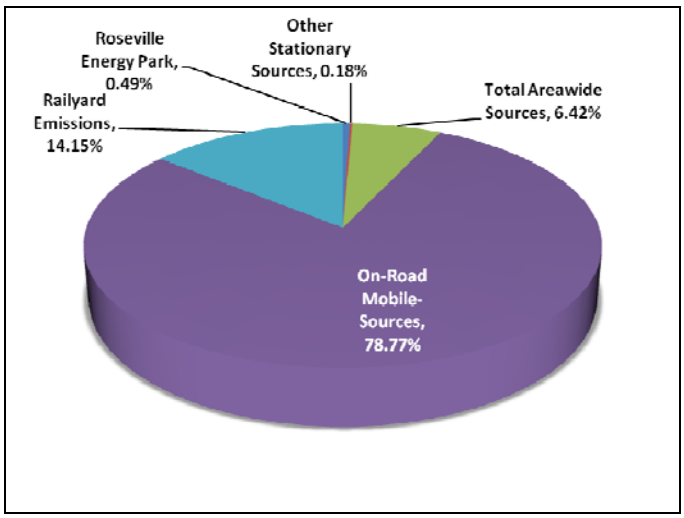


Figure 2-4: ***2008 Communitywide NO_x Emissions by Source***

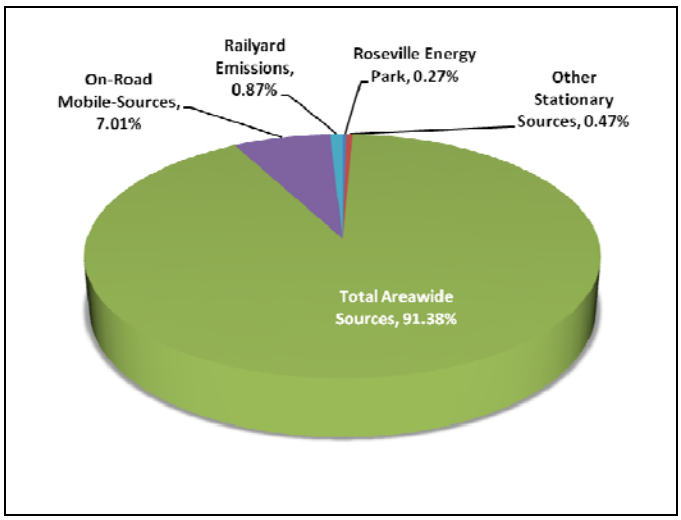


Figure 2-5: ***2008 Communitywide PM_{10} Emissions by Source***

BUSINESS AS USUAL PROJECTIONS

Communitywide GHG, NO_x and PM_{10} emission projections were prepared for a 2020 business-as-usual scenario (i.e., a scenario that assumes that recommended SAP measures will not be implemented.)

Greenhouse Gas Projections

Under a forecasted business-as-usual scenario, communitywide GHG emissions will increase by approximately 15 percent between 2008 and 2020 to accommodate the Roseville General Plan's build-out population of 151,199. Under this scenario, communitywide GHG emissions will be 1,385,942 MT CO_2e/year by 2020. Assuming that current practices continue, the community's 2020 GHG projection will consist primarily of transportation- and energy-related emissions from driving and energy use in residential and commercial buildings, similar to the 2008 baseline. These emissions make up approximately 93% of total projected emissions in 2020. The rest of the projected growth in GHG emissions occurs in the waste, water and wastewater sectors.

Table 2-3 identifies the 2020 business-as-usual GHG projection across the various sectors in the communitywide inventory. Figure 2-6 compares the 2020 GHG projection to the 2008 GHG baseline by sector. Please refer to Appendix A for a description of projection methods and assumptions.

TABLE 2-3
2020 Communitywide Greenhouse Gas Projection

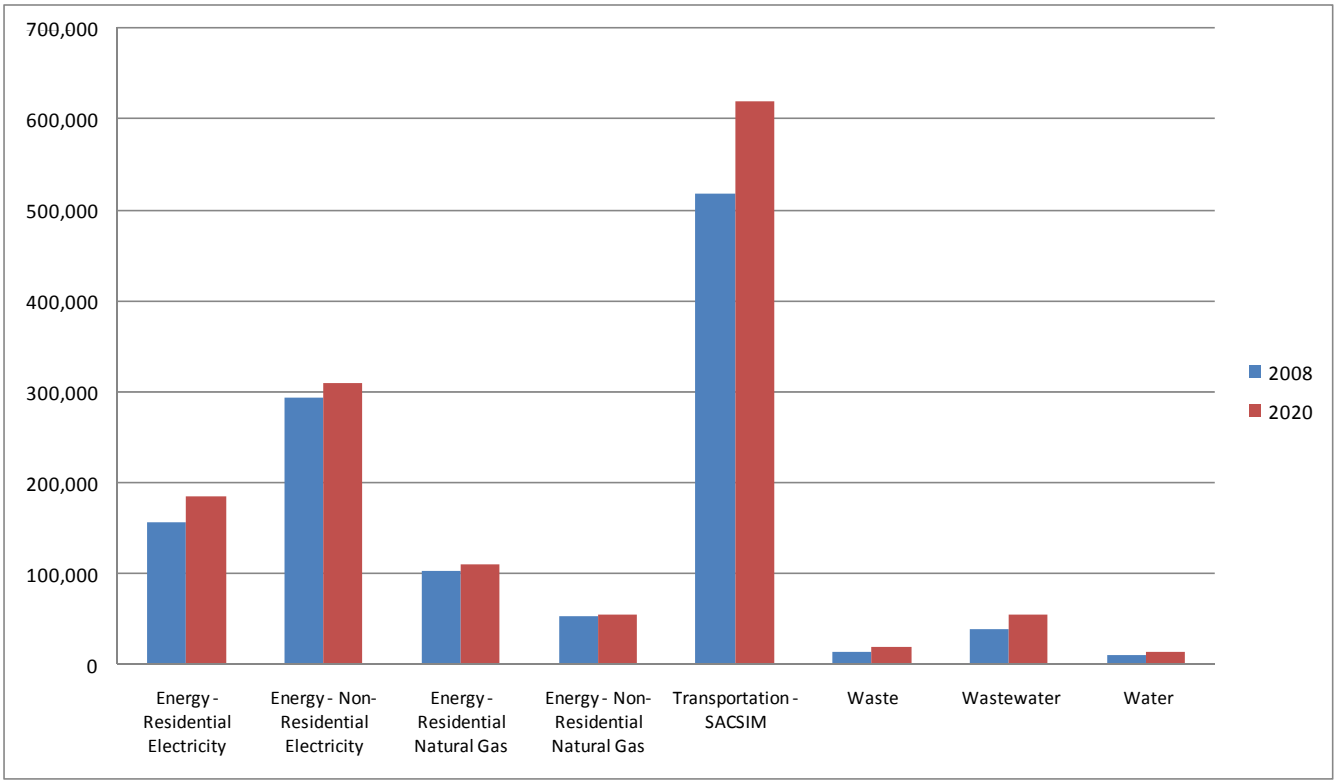
Community Sector	Emissions	
	MT CO_2e	Percent
Residential Energy Use[1]	185,639	13%
Commercial/Industrial Energy Use[1]	309,935	22%
Residential Natural Gas Use	110,412	8%
Commercial/Industrial Natural Gas Use	54,021	4%
On-road Mobile Sources[2]	633,494	46%
Solid Waste	18,521	1%
Wastewater Treatment	54,116	4%
Water Use	19,805	1%
Total Emissions	1,385,942	100%
Increase from 2008 Baseline	+183,559	+15. 3%
Emissions Per Capita (MT/Person)[3]	9.2	
Emissions Per Service Population (MT CO_2e/SP)[4]	6.3	
Railyard Emissions[5]	-	

Notes: CO_2e = carbon dioxide equivalent; MT= metric tons.

1. Electricity use estimates are for 2019, based on forecasts obtained from Roseville Electric.
2. 2020 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM traffic model.
3. Assumes a 2020 population of 151,199. 2020 population was linearly extrapolated from the 2015 estimated population of 133,680 identified in the City of Roseville's General Plan 2025, Housing Element.
4. Assumes a 2020 service population (population + employment) of 218,426 (interpolated from 2025 General Plan population = 151,199 and employment from Roseville Electric demand projection = 67,227).
5. No railyard emissions projection is available at this time.

Source: Data compiled by AECOM 2010.

Figure 2-6: ***2008 and 2020 Communitywide Greenhouse Gas Emissions by Sector***



CRITERIA AIR POLLUTANT PROJECTIONS

Under a forecasted business-as-usual scenario, communitywide NO_x emissions will decrease by approximately 42%, and PM_{10} emissions will increase by approximately 22% between 2008 and 2020. In some cases, NO_x and PM_{10} reductions are anticipated to occur despite a growing population and employment base due to federal and state programs and regulations (e.g., improved NO_x and PM_{10} controls for vehicles, low- or zero-emitting vehicle programs, and renewable energy portfolio requirements). Table 2-4 identifies the 2020 business-as-usual NO_x and PM_{10} projections across the various sources in the inventory. Figure 2-6 compares the 2020 NO_x and PM_{10} projections to the 2008 NO_x and PM_{10} baseline by source. Please refer to Appendix A for a description of projection methods and assumptions.

TABLE 2-4
2020 Communitywide NO_x and PM_{10} Projections

Source	Emissions			
	NO_x (tons)	Percent	PM_{10} (tons)	Percent
Stationary Sources				
Roseville Energy Park1	16.66	0.96%	3.80	0.24%
Other Stationary Sources2	-	-	-	-
Total Stationary Sources	16.66	0.96%	3.80	0.24%
Areawide Sources				
Residential, Commercial, Industrial Natural Gas Use	167.60	9.66%	11.25	0.72%
Wood Stoves/Fireplaces	49.19	2.83%	637.39	40.66%
Paved Road Dust			828.98	53.25%
Total Areawide Sources	216.78	12.49%	1,477.62	94.25%
On-Road Mobile Sources3	1,069.05	61.60%	75.244	4.80%
Railyard Emissions2,4	433.00	24.95%	11.10	0.71%
Total Emissions	1,736	100.00%	1,568	100.00%

Notes:

1 Electricity use emissions estimates are for 2019 based on forecasts obtained from Roseville Electric.

2 No projections are available at this time for stationary sources and the railyard.

3 2020 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM traffic model.

5 No railyard emissions projection is available at this time.

Source: Data compiled by AECOM 2010.

Figure 2-7:
2020 Communitywide NO_x Emissions by Source

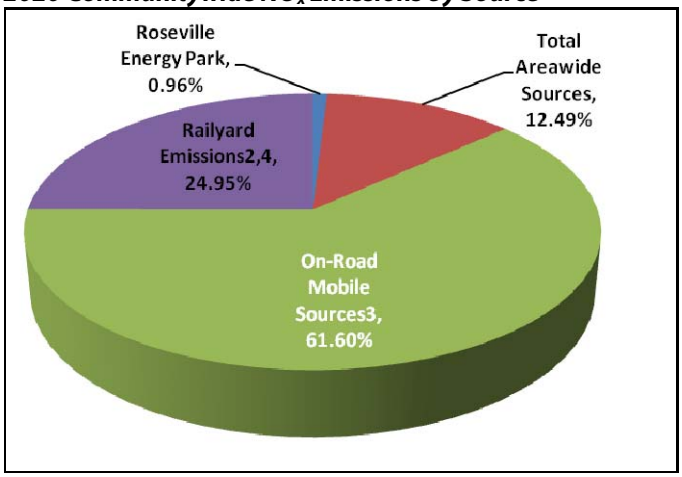


Figure 2-8:
2020 Communitywide PM_{10} Emissions by Source

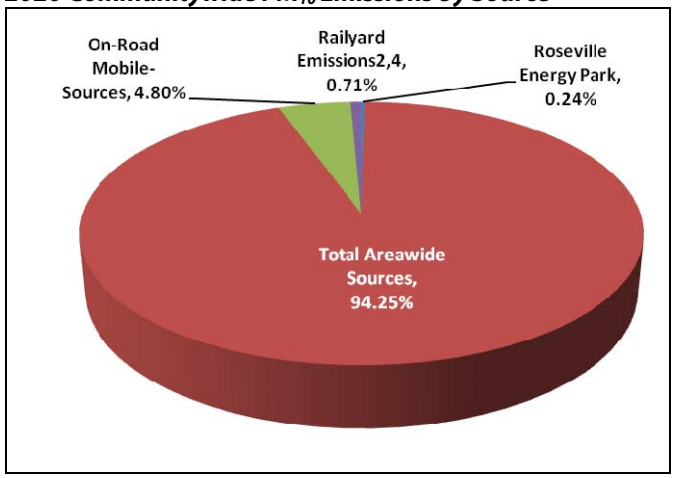
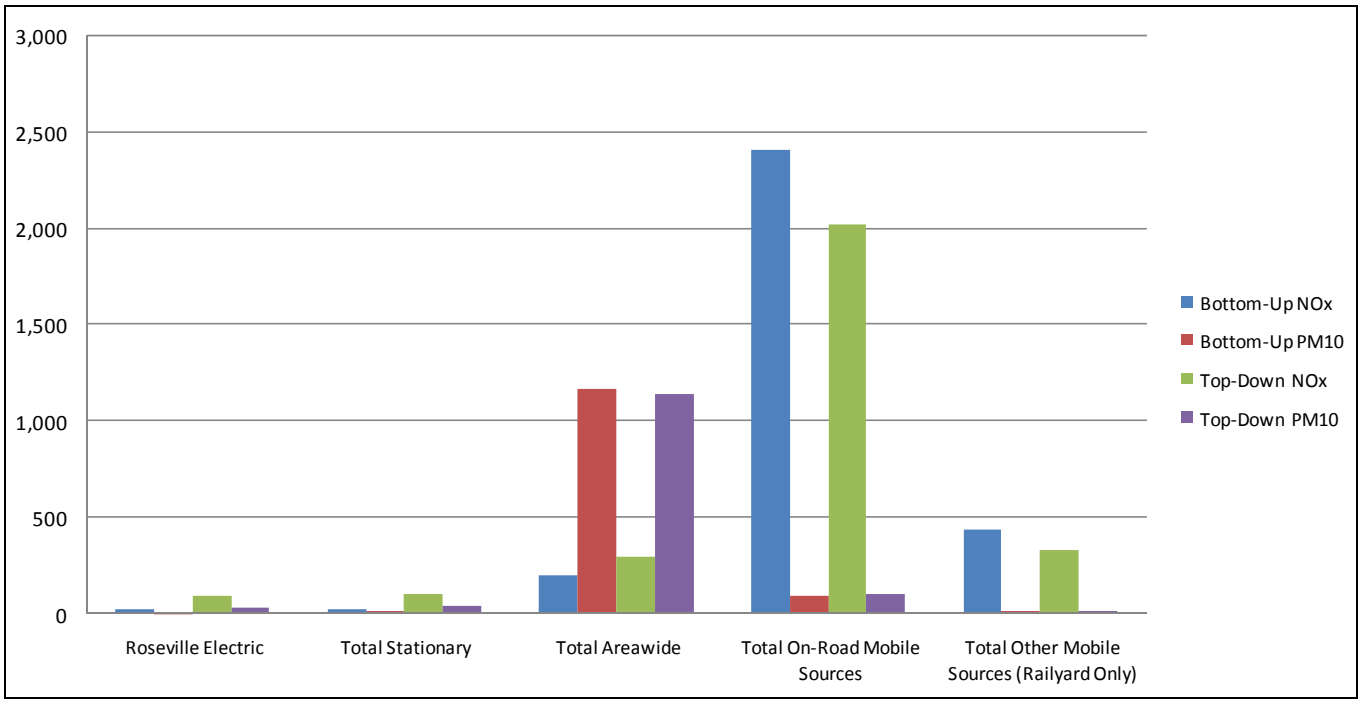


Figure 2-9: ***2008 and 2020 Communitywide NO_x and PM_{10} Emissions by Source***



GREENHOUSE GAS EMISSION REDUCTION TARGET

Unlike most other jurisdictions in the Sacramento region, Roseville is both a full-service City that operates its own utilities, and a growing community anticipating both new residents and jobs. Roseville's daytime population swells given its high employment base, which creates greater mass emissions. The community is still growing, and anticipates new housing and jobs in future specific plan areas, including Sierra Vista and Creekview.

Adopting a GHG reduction target is an important step in assessing the effectiveness of the SAP as it relates to emission levels. Following the model recently established by the Bay Area Air Quality Management District (BAAQMD), the State is now acknowledging that local jurisdictions should establish a GHG reduction target capable of meeting AB 32 goals. Guidance provided by BAAQMD includes the following reduction target options:

- Option 1: Reduce emissions to 1990 levels by 2020, or
- Option 2: Reduce emissions 15 percent below baseline (2008 or earlier) emission levels by 2020, or
- Option 3: Meet the plan efficiency threshold of 6.6 MT CO2e/ service population/ year.

Option 1 was not considered during the development of a GHG reduction target as the inventory year for determining baseline emissions was after 1990. Therefore, relating the target to 1990 levels is not possible. Options 2 and 3 were both evaluated as potential reduction targets.

Option 2 recommends a mass emission-based reduction target of 15% below 2008 emission levels. This option originates from the 2008 ARB Climate Change Scoping Plan, which determined that a 15% reduction below current levels by local governments is capable of meeting AB 32 goals. This would require that Roseville reduce communitywide GHG emissions by 363,916MT CO_2e/year compared to business-as-usual by 2020 (i.e., to 1,022,026 MT CO_2e/year).

Option 3 recommends either a plan efficiency-based target of 6.0 MT CO_2e per service population (SP) per year (where "service population" is defined as the sum of population and employment). This option originates from the 2010 BAAQMD CEQA Guidelines (adopted June 2010). It is derived from statewide data, and thus is not representative solely of Bay Area conditions. This option allows highly efficient development projects that include both jobs and housing to contribute toward achieving AB 32 goals, even if they result in higher mass emissions.

Use of the 6.0 MT CO_2e plan-based metric assumes that the plan includes GHGs from all stationary sources in the community, including sources that the local government has no jurisdiction or authority to regulate, including, but not limited to, industrial sources, railyards, landfills, and through-vehicle trips.

Although railyard emissions are accounted for in Roseville's baseline GHG inventory, they are set aside for purposes of the SAP since they are not subject to City operational or discretionary control. The sectors included in Roseville's communitywide GHG inventory correspond well to those identified within the plan-based metric.

Due to development context in the City with an opportunity to continually improve jobs and housing balance as the City grows in new Specific Plan areas, and the contents of the baseline GHG emissions inventory, ***this plan establishes an efficiency-based reduction target of 6.0 MT CO_2e per service population per year by 2020.*** This efficiency-based target bears testimony to the community's commitment to grow and expand in an efficient and sustainable manner.

No particular emission reduction target was set for NO_x or PM_{10}. Since transportation sources are the main generators of NO_x and PM_{10}, GHG reduction measures related to vehicle efficiency and reduced vehicle miles traveled (VMT) will also generate corresponding reductions in both NO_x and PM_{10}. SAP measures capable of reducing these emissions are identified in Chapter 3 within the transportation strategy.

STATEWIDE GREENHOUSE GAS REDUCTIONS

Statewide reductions from implementation of Assembly Bill 1493 (Pavley), Low Carbon Fuel Standard (LCFS), and the Renewable Energy Portfolio Standard (RPS) were also considered during target establishment.

Assembly Bill 1493

AB 1493 will result in GHG emission reductions from on-road passenger motor vehicles sold in California. The emission reduction potential associated with implementation of AB 1493 vehicle emission standards would vary depending on the first regulated model year and vehicle turnover between the present fleet and the fleet in 2020. AB 1493 allows two model years of lead time for automakers to comply with the vehicle emission standards. Therefore, the earliest model year that could reasonably be expected to comply with AB 1493 would be model year 2012.

ARB estimates that implementation of GHG emission reduction standards for new passenger cars, pickup trucks and sport utility vehicles as described in AB 1493 would achieve an 18% increase in vehicle performance and therefore reduce overall GHG emissions from on-road mobile sources by 2020[2]. These upgraded vehicle standards could effectively reduce Roseville's transportation sector GHG emissions by 99,205 MT CO_2e/year.

Low Carbon Fuel Standard

LCFS regulates carbon-intensity in transportation fuels. LCFS requires that oil refineries and distributors ensure that the mix of fuel they sell in California meet the established declining targets for fuel-related GHG emissions. The City recognizes that implementation of LCFS will result in reductions for tailpipe emissions, and other associated emissions from production, distribution and use of transport fuels within the state.

Based on current available data, LCFS standards are projected to reduce overall statewide GHG emissions attributable to vehicle fuels by about 10%[3]. This increase in statewide vehicle-fuel efficiency could effectively reduce Roseville's transportation sector GHG emissions by another 53,429 MT CO_2e/ year.

Renewable Energy Standards

Renewable energy includes wind, solar, geothermal, or any "Renewable Portfolio Standard (RPS)-eligible" sources. SB 1078 and SB 107 have established increasingly stringent renewable energy requirements for California utilities. SB 1078 required utilities to provide at least 20% of their electricity from renewable resources by 2020. SB 107 accelerated the timeframe to take effect in 2010. Executive Order S-14-08 increased the RPS further to 33% by 2020.

Roseville Electric's 2019 emission factors for energy production already assume an increase in renewable energy sources, as required by the RPS. These factors were used to estimate GHG emissions attributable to Roseville's energy sector within the 2020 projections, as well as to calculate the reduction potential of electric energy-related SAP measures. Therefore, GHG reductions attributable to implementation of the RPS are already counted within the 2020 energy use projections and the energy-related SAP measures. They are not addressed individually alongside other statewide reductions (e.g., AB 1493, LCFS) to avoid double-counting.

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[2] *ARB, Pavley I + Low Carbon Fuel Standard Postprocessor User's Guide, v.1.0 (2010)*

[3] *Ibid.*

COMMUNITYWIDE GREENHOUSE GAS REDUCTION POTENTIAL

As identified in Table 2-5, implementing the recommended SAP measures would enable a communitywide mass GHG emissions reduction of approximately 74,060 MT CO_2e per year, which would correspond to 6.0 MT CO_2e/SP/yr in 2020. This would be equivalent to 8.7 MT CO_2e per capita but an increase of 9.1% emissions above 2008 emission levels by 2020.

However, combined with the effects of implementation of AB 1493, LCFS and the RPS, the recommended SAP measures would enable a communitywide mass GHG emissions reduction of approximately 192,100 MT CO_2e per year, which would correspond to 5.5 MT CO_2e/SP/yr in 2020. This would be equivalent to 7.9 MT CO_2e per capita and a 0.7% reduction below 2008 emission levels.

As shown in Table 2-5, implementing recommended SAP measures are sufficient to achieve Roseville's communitywide GHG emission reduction target of 6.0 MT CO_2e/SP/yr in 2020. With the combined effect of statewide reductions the efficiency of the plan is increased further.

TABLE 2-5
Reduction Potential of Recommended SAP Measures and Statewide Legislation

	2008	2020		
	Baseline	**Business-as-Usual**	**With SAP Measures**	**With SAP Measures and Statewide Reductions**
Population	109,154	151,199		
Employment	51,200	67,227		
Service Population	160,354	218,426		
Mass GHG Emissions (MT CO_2e)	1,202,383	1,385,942	1,311,882	1,193,842
Mass GHG Emissions Reduced	--	--	-74,060	-192,100
Relationship to Baseline (%)	--	+15. 3%	+9.1%	-0.7%
Per Capita MT CO_2e/yr	11.0	9.2	8.7	7.9
Per Service Population MT CO_2e/yr	7.5	6.3	6.0	5.5

Notes:
Electricity use estimates are for 2009 and 2019 based on data from Roseville Electric.
2008 and 2020 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM traffic model.
2008 service population (population + employment) of 160,354 (population from General Plan = 109,154 and employment from Roseville Electric demand projection = 51,200).
2020 service population (population + employment) of 218,426 (interpolated from 2015 General Plan population = 151,199 and employment from Roseville Electric demand projection = 67,227).
Railyard emissions include only those generated in the portions of the railyard located in Placer County. Emissions associated with pass-through trips are not included.
Source: Data compiled by AECOM 2010.

IMPLEMENTATION APPROACH

The recommended communitywide SAP measures will be implemented in tandem with the municipal measures identified in the City of Roseville Greenhouse Gas Emissions Reduction Plan Analysis to achieve communitywide GHG reductions that address both community-related and municipal-related emission sources. The SAP reduction measures are distributed among six sustainable action strategies: transportation, land use and green building, energy, waste, water, and marketing and education. The recommended measures, action items, implementation targets and responsible departments and agencies are presented in Chapter 3.

The Roseville Communitywide SAP represents the City and community's best attempt at responding to the need to improve air quality, reduce GHGs and integrate sustainability throughout community activities. However,

federal and State policies and requirements are continually evolving. Over the next decade, new emission reduction technologies and ways to measure emissions are also likely to emerge. To remain effective, the SAP must evolve accordingly. To ensure consistency and long-term utility, the recommended measures and actions should be considered within the City's annual budget process, and updated periodically to reflect newly available technology, legal requirements and community priorities.

To monitor successful implementation of the SAP and track its progress toward 2020, the communitywide GHG emissions inventory should be updated approximately every 4 years. During these updates, the community may also evaluate the performance of recommended measures, and investigate new measures that have not been recommended currently due to financial or technical constraints to determine their applicability in the future.

Legislative Advocacy

Some measures evaluated during the SAP development process relate to City support of forthcoming federal, state and regional legislation related to the sustainable strategies included within the plan. The City of Roseville has always proactively supported legislation that is in the best interest of the community. The City's choices in determining which legislation to back are based on the following principles: maintaining local control, protecting local revenues, and supporting sustainable growth.

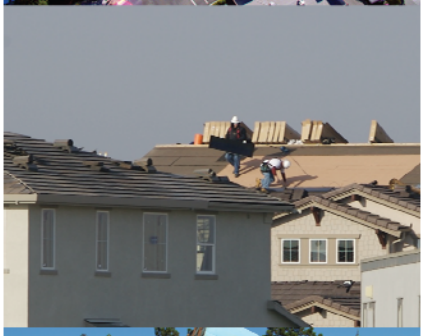
On May 20, 2009, the Roseville City Council adopted a policy to consider state and federal legislative and judicial advocacy priorities, including the following sustainable city priorities:

- Ensure that transportation and land use policies respect local control and assist local governments to integrate new growth.
- Support transit oriented communities utilizing green building design to reduce energy consumption.
- Ensure local governments are not preempted in efforts to decrease emissions.

In the process of recommending measures and actions, the Sustainability Action Plan Committee recommends numerous legislative advocacy measures, including the following:

- Use available revenue from state and federal resources (including gas tax revenues) to promote local alternative transportation programs and facilities.
- Support legislative efforts to increase vehicle fuel economy and efficiency standards.
- Support regional, state or federal efforts to encourage automobile dealers to promote sales of fuel efficient vehicles.
- Support efforts to provide tax credits and incentives for neighborhood electric vehicle use.

Other similar legislative advocacy measures may arise in the future. These and other advocacy items will be prioritized by the City Council on a periodic basis according to the principles described above.



3 SUSTAINABILITY ACTION STRATEGIES

Selection of Sustainability Action Strategies

Based on the City of Roseville's General Plan goals for sustainability and greenhouse gas (GHG) reductions, six sustainability action strategies focus areas have been identified for the Communitywide Sustainability Action Plan (SAP), as shown in Figure 3.1. The City's Green Team (comprised of staff from various departments) spearheaded the process of developing ways to reduce carbon emissions and support sustainability, in collaboration with the Sustainability Action Committee (SAC). Recommended SAP strategies and measures are drawn from the Green Team's work and supported by actions directly influenced by the City and reliant on community participation.

- The recommended SAP measures were developed by: Evaluating existing community conditions and sustainable initiatives already underway;
- Identifying emissions reduction opportunities within the community;
- Reviewing best practices from other jurisdictions and organizations that increase resource efficiency and protect the environment;
- Incorporating state and regional laws, guidelines, and recommendation; and
- Considering ways to attract clean technology businesses in the community to bring social, environmental and economic benefits to the City.

The recommended measures presented in this plan were selected by the Sustainability Action Plan Committee based on the following criteria:

- Would the community support and adopt the measure?
- What are the costs and benefits of implementation to the City and private business sector?
- Is implementation of the measure technically feasible?
- What are the other community benefits (e.g., quality of life, jobs, improved health) beyond reducing emissions?

SUSTAINABILITY ACTION PLAN STRATEGY LAYOUT

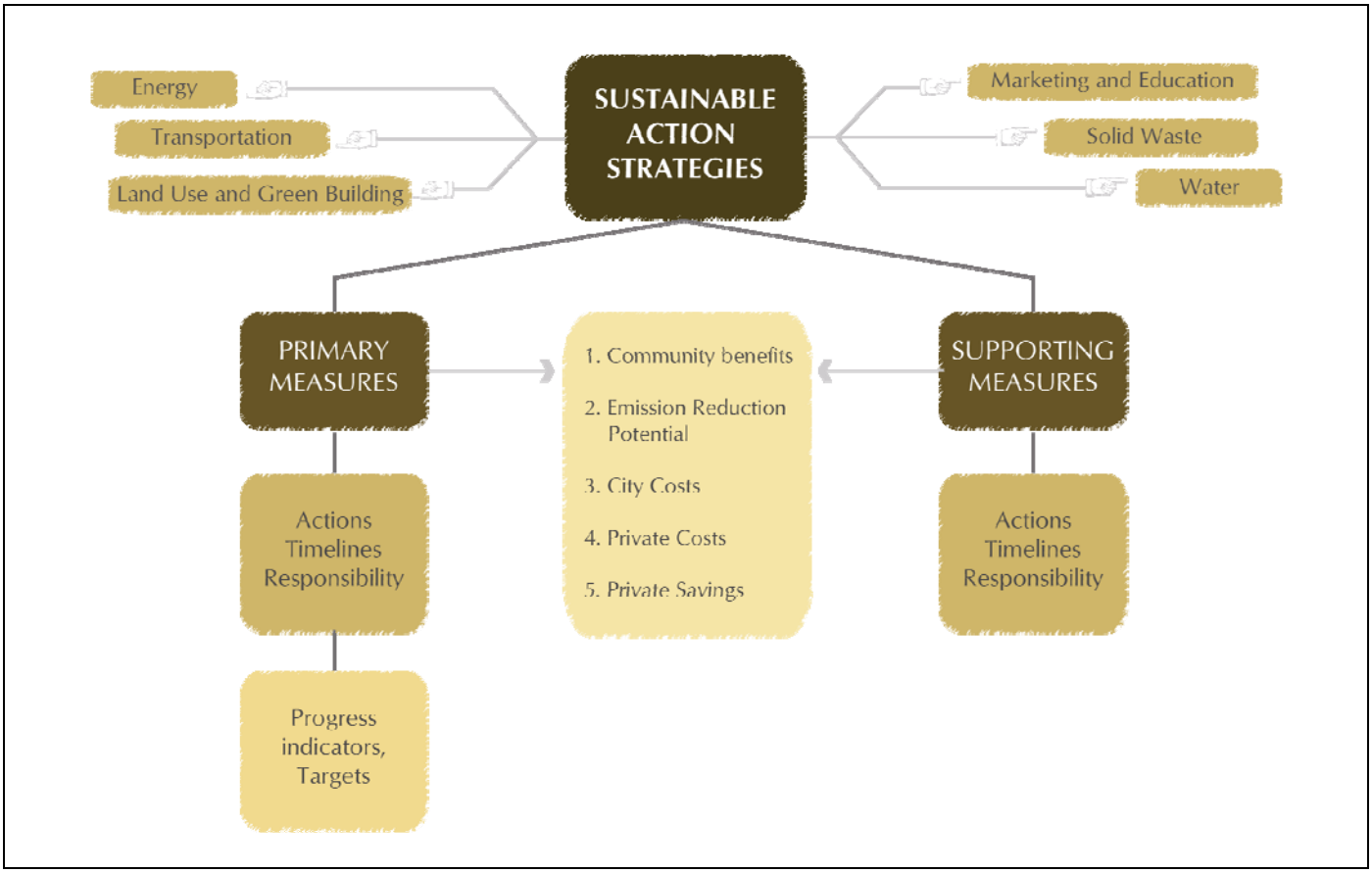


Figure 3-1: ***Sustainability Action Plan Strategy Structure***

Primary and Supporting Measures

Each sustainable action strategy includes two types of measures: *primary* and *supporting*. *Primary* measures generate directly attributable GHG reductions based on current technology, empirical studies and available data. Estimated GHG reduction potential, expressed in metric tons of carbon dioxide equivalent (MT CO_2e) emissions per year, is provided for each *primary* measure. The *primary* measures recommended within this plan outline a path toward meeting the plan reduction target of 6.0 MT CO_2e per service population (SP) by 2020. Collectively, the measures offer a potential reduction of 74,060 MT CO_2e/yr, or 6.0 MT CO_2e/SP/yr by 2020 (equivalent to 9.1% above 2008 emission levels). Combined with the effect of statewide reductions from Assembly Bill (AB) 1493 and the Low Carbon Fuel Standard (LCFS), these measures offer a potential reduction of 192,100 MT CO_2e/yr, or 5.5 MT CO_2e/SP/yr by 2020 (equivalent to 0.7% below 2008 emission levels).

A number of *supporting* measures have also been included in the SAP. These measures are not quantifiable at this time, but they do facilitate and support the reduction potential of the *primary* measures. GHG reduction potential for these *supporting* measures was not estimated due to one or more of three reasons: (a) insufficient data exists to quantify their GHG reduction potential, (b) no reliable quantification methodology is currently available, and/or (c) the GHG reductions are not directly related to the emissions inventory and therefore cannot be counted toward the communitywide 2020 GHG reduction target.

Both primary and supporting measures within each strategy outline short- (within 2013), mid- (within 2017) and long-term (within 2020) actions to support sustainable community development. Each action is marked based on its applicability to either existing development or new development or both types of development in the community. The actions also identify responsible agencies and City Departments. Successful implementation of the action items

will enable the community to meet its reduction target. Specific progress indicators and target dates are identified for primary measures only. Since the primary measures account for GHG reduction potential, these progress indicators will help to monitor performance during the implementation period.

Figure 3-2 summarizes the estimated reduction potential of the recommended *primary* measures across the six strategies.

Figure 3-2: ***Summary of Greenhouse Gas Reduction Potential by Sustainable Action Strategy***

Summary of GHG Reduction Potential by Sustainable Action Strategy
(without assuming statewide reductions from implementation of AB 1493 and LCFS)

	**TRANSPORTATION: 5 primary measures related to:** - rideshare and carpooling - transit expansion - bike-pedestrian enhancements - alternative fuel infrastructure - intelligent transportation systems	49,130 (MT CO_2e/year)	66% (Percent of Total)
	**LAND USE AND GREEN BUILDING: 1 primary measure related to:** - urban forestry All other measures support transportation measures related to alternative transportation modes.	1,580 (MT CO_2e/year)	2% (Percent of Total)
	**ENERGY: 3 primary measures related to:** - existing residential building retrofits - existing commercial building retrofits - new residential building energy efficiency - new commercial building energy efficiency	19,460 (MT CO_2e/year)	26% (Percent of Total)
	**SOLID WASTE: 1 primary measure related to:** - food waste to energy biomass project	1,090 (MT CO_2e/year)	1% (Percent of Total)
	**WATER: 1 primary measure related to:** - 20% per capita reduction in water use	3,520 (MT CO_2e/year)	5% (Percent of Total)
	**MARKETING AND EDUCATION:** No primary measure, but all the measures support performance of all other SAP measures.	- NA -	- NA -

Community Benefits

Beyond reducing GHG emissions, the recommended SAP measures also provide other important community benefits that support sustainable lifestyles and practices. These benefits represent an improvement in the quality of life within the community beyond the intent of the particular strategy. Some of the added benefits of the recommended measures described in this plan include:

- Supporting regional smart growth principles
- Improving air quality within the community
- Restoring habitat
- Reducing urban heat island effects
- Improving public spaces
- Improving public health
- Creating connected, walkable neighborhoods
- Creating local jobs

- Increasing energy independence
- Enhancing community awareness and education
- Saving money

Improved water quality and habitat restoration

Enhanced public spaces with pedestrian-oriented infrastructure

Community involvement and social interaction

Emission Reduction Potential

The reduction potential of each of *primary* measure is noted in the bottom-left corner of the individual measure description. A reduction potential table identifies the total anticipated emission reductions for GHG, PM_{10} and NO_x respectively. GHG emissions are reported in MT CO_2e per year. PM_{10} and NO_x emissions are reported as tons per year.

Cost and Savings Analysis

Economics were a key consideration in determining the feasibility of recommended SAP measures. Cost to the City, as well as costs and savings to the residents or property owners were assessed as part of the analysis for each emission reduction measure. These costs and savings were categorized into *very low*, *low*, *medium*, and *high* ranges, as identified in Table 3-1. Please refer to Appendix C for detailed summary of methods and assumptions employed in the economic analysis.

TABLE 3-1
Costs/ Savings Analysis

City Costs	Very Low: Less than $10,000 Low: $10,001 - $50,000 Medium: $50,001 - $100,000 High: Greater than $100,000
Private Costs and Private Savings	Very Low: $0-$100 Low: $101-$250 Medium: $251-$500 High: Greater than $500

The City is not the only entity bearing financial responsibility for implementing SAP measures. There will also be a private cost borne by residents and businesses for some measures. In recognition of this, a costs and savings analysis was performed for each recommended measure, which evaluates City costs, as well as potential costs and savings to residents or property owners. Measures vary in the distribution of costs; some measures require only funding from the City or other public entities, whereas others require contributions from residents and businesses. In most cases where there are investments required by residents or business owners, there will also be long-term savings that will allow recuperation of initial investments, as well as other benefits such as improved air quality, enhanced public spaces (e.g., streetscapes, open spaces, rights-of-way) and savings on utility bills. There are also measures that do not assume private investment, but generate savings for the resident or business owner due to improved overall efficiency in the community.

A range of sources were used to estimate costs and savings, many of which concern a particular precedent program or policy that is used as a basis for the SAP measure. These are generally derived from federal, state, and local government documents. In some instances, academic and research publications were used to provide case studies and data as well.

The costs and savings ranges shown in Table 3-1 were derived based on the City of Roseville Capital Improvement Plan (~$34.8 million) and the FY 2011 City Budget (Direct Operating Expenditures [~$293.3 million]), as well as other precedents set by comparable California cities. These ranges were developed and approved by the City prior to being used in the economic analysis. As there is some uncertainty in any economic estimation of a SAP policy, many costs and savings are represented as a range or an order-of-magnitude estimate.

City Costs

For the City, the economic implications of implementing the SAP measures primarily concern capital costs, program implementation costs, and employee costs, expressed as total costs for the implementation period of the SAP through 2020. While some measures require funding of capital costs or program costs, other measures may necessitate that the City allocate current staff time. The analysis only estimates costs which are additional to the investments, activities, and staff already budgeted by the City. For example, if a measure requires the City to implement a program that

already exists and is funded; that measure would have no additional cost. A key consideration for analyzing the City costs assumes that dedicated full-time equivalent (FTE) staff would be required to implement all the SAP measures effectively. For example, the City cost key assumption for the various strategy areas are shown as below, where 1 FTE requires ~$200,000 per year including salary, overhead and benefits:

- Transportation strategy – 1 FTE staff
- Land Use and Green Building – 0.75 to 1 FTE staff
- Energy Efficiency and Renewable Energy – 0.5 to 1 FTE staff
- Solid Waste Reduction – 1FTE staff
- Water Resources and Efficiency – 0.10 to 0.25 FTE staff

City Savings

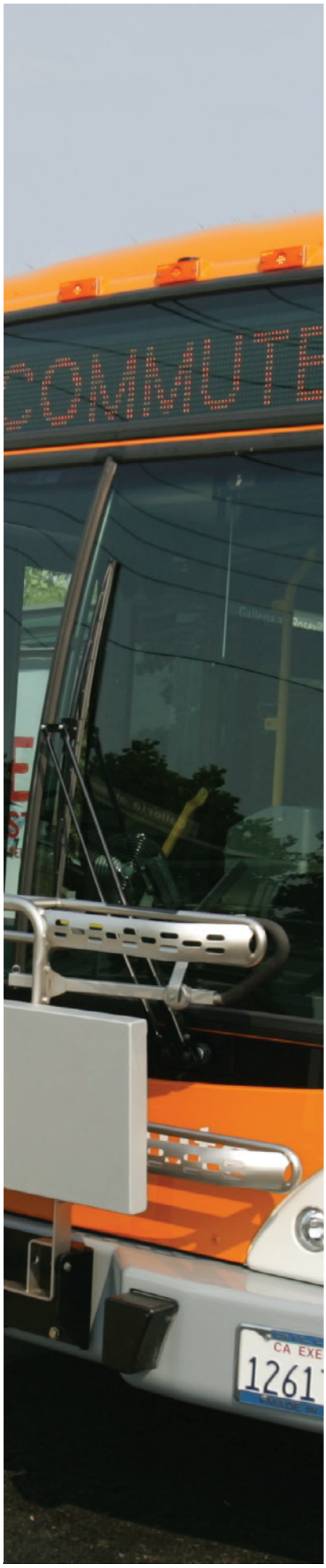
Some of the SAP measures would generate savings for the City. However, this was not analyzed due to the uncertainty of revenue generation methods, as well as the speculative nature of the effect of those SAP measures on the property base. When measures generate a demonstrable increase in property values due to increased building efficiency through retrofits (e.g., energy or water efficiency retrofits), the City would benefit from corresponding increases in property tax revenue. Other measures such as those related to land use and transportation and improving public spaces in and around business districts could also have positive financial outcomes for the City. Though these savings were not captured in this analysis, they should be considered when implementing relevant measures.

Private Costs

The cost analysis for residents or property owners is discussed in terms of average annual costs. Some costs are mandatory, whereas others are voluntary. In many cases, funding sources and financing mechanisms are available to help offset private costs. To provide a comparable assessment of private costs, the calculations are based on a hypothetical average resident or business. For nearly every measure with private cost implications, corresponding savings would accrue over time, and help to payback some of the initial investments.

Private Savings

Although all measures do not generate private savings, many that address energy or water efficiency generate long-term utility bill reductions. Some transportation measures can also generate savings through decreased use of cars and savings on vehicle fuel and maintenance costs. In order to provide a comparable assessment of private savings, the calculations were based on a hypothetical average resident or business.



TRANSPORTATION

CONTEXT

Transportation-related emissions are the largest source (44%) of Roseville's 2008 communitywide GHG emissions inventory. These emissions are determined largely by the number of annual vehicle miles traveled (VMT) by residents and employees.

Roseville's suburban development pattern and demographics contribute to relatively long vehicle trips between destinations and relatively high numbers of trips between related destinations that create high emissions. Roseville also has numerous employment centers that attract vehicle trips from surrounding cities. Reducing these vehicle emissions requires use of creative ways to reduce the number of, and shorten, these vehicle trips by creating viable alternative modes of transportation (such as transit, biking, walking, carpooling, or a combination of the modes) and by increasing proximity of diverse land uses, thereby reducing the need to drive between them. According to the 2000 U.S. Census, 82% of Roseville residents drove alone to work, about 10% carpooled, 4.2% worked from home, 1.3% used public transit, and less than 3% walked or used another means to get to work.

Technological advancements in vehicle fuel efficiency and reduction of fuel carbon content will also reduce vehicular emissions. Statewide implementation of AB 1493 and the Low Carbon Fuel Standard (LCFS) will reduce future vehicle emissions. According to the California Air Resources Board (ARB), AB 1493 will improve vehicle fuel efficiency by 18% compared to vehicles produced prior to 2009. Implementation of LCFS would also reduce vehicle fuel-related GHG emissions by 10% across the state. However, these improvements alone will not be enough to achieve the reductions required within the transportation sector to achieve the City's 2020 GHG reduction goal.

Existing Transportation Policies and Programs

Roseville's General Plan circulation goals and policies are based on level of service (LOS) performance standards. As travel demand increases in the future due to population and employment growth both within Roseville and regionally, using traditional solutions to maintain roadway LOS standards will become more difficult. Therefore, Roseville is actively pursuing ways to promote alternatives to single-occupant automobile use such as walking, biking, carpooling, and public transit to move people and goods efficiently.

Some notable existing and ongoing transportation policies that directly relate to the SAP are highlighted in Table 3-2, below.

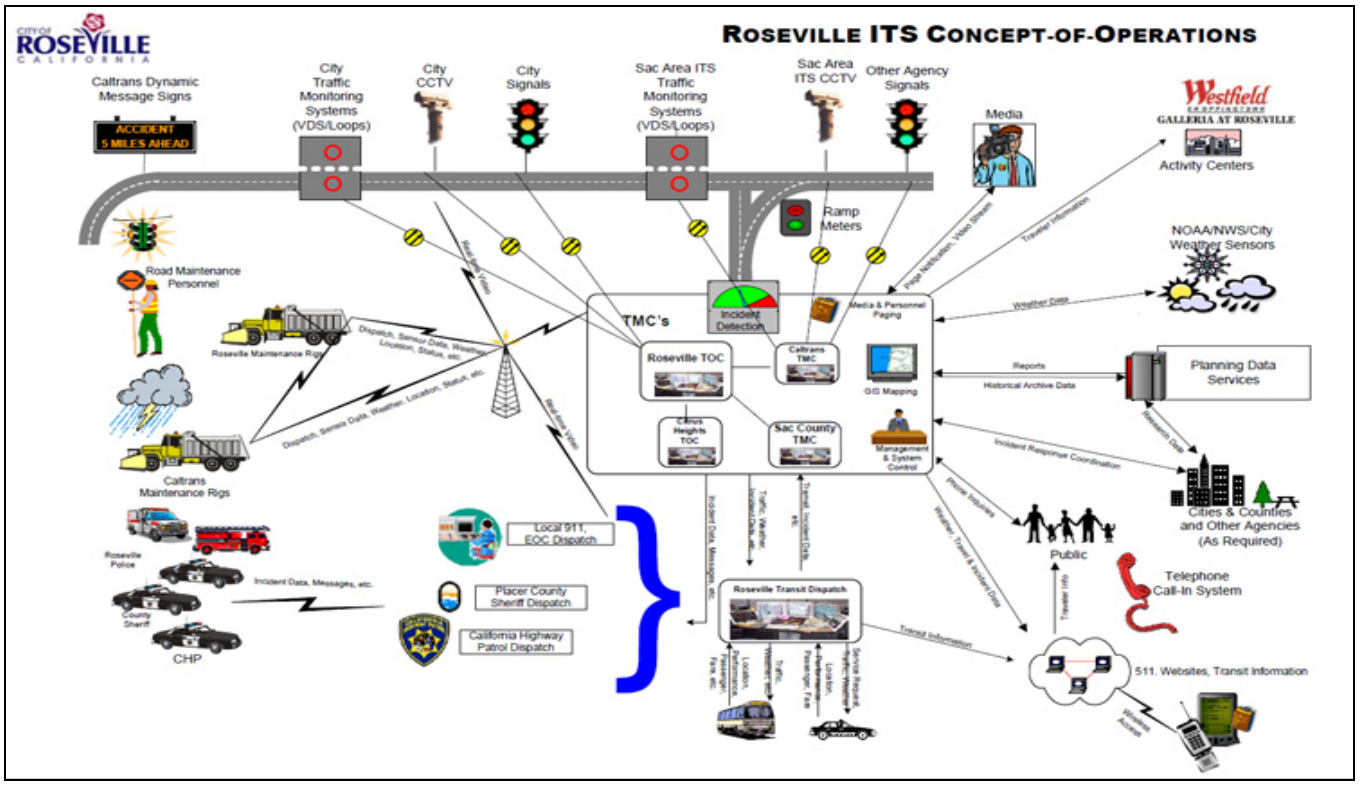
Example of scenario-building during the Sacramento Area Council of Governments' (SACOG's) Blueprint process
Source: SACOG

TABLE 3-2 Existing and Ongoing Transportation Policies		
	Policy Description	**Program Implementation**
A.	Continue to implement the smart-growth principles established in Roseville's Blueprint Policies. Continue to evaluate opportunities to implement a Complete Streets policy where feasible.	General Plan, Community Design Guidelines
B.	Continue to review public parking lot layouts during Design Review to ensure there is no conflict between vehicular and non-vehicular modes.	Design Review
C.	Through the specific plan process, continue to require rideshare-designated parking spaces near bus stops, employment centers and commercial areas (e.g., Roseville Galleria, The Fountains at Roseville).	Specific Plan review.
D.	Continue to implement the Transportation Systems Management Ordinance to require carpool and/or vanpool preferential parking spaces close to the building entry within new or substantially improved major employment sites.	Triennial Survey reporting (2000, 2003, 2006), City website link on Transportation System Management (TSM), park and ride lots
E.	Regularly (i.e., every 4 years) update and implement the Bicycle Master Plan, including construction of capital improvements for bike facilities, especially facilities used for work commutes. Explore funding and staffing options to accelerate bikeway development. Seek community (e.g., Roseville Coalition of Neighborhood Associations [RCONA]) and regional inputs when updating the plan.	Bicycle Master Plan (BMP) first adopted in 1994. State law requires the BMP to be updated every 4 years. The Roseville BMP has been updated three times since 1994, most recently in 2008.
F.	Continue to provide community programs and other incentives for commuter biking.	Roseville Bikefest, free bike locker program, City website links to local bicycle resources, Bike Rally, Share the Road Campaign, May is Bike Month, Bucks for Bikes.
G.	Adopt, regularly update (i.e., every 3 years) and implement a Pedestrian Master Plan that includes a Capital Improvement Program to close sidewalk gaps, identifies other design measures and best practices that improve the pedestrian environment. Seek community (e.g., RCONA) and regional input when updating the plan, and evaluate pedestrian needs using walk scores.	ADA Transition Plan for Public Rights-of-Way, Pedestrian Master Plan and Pedestrian Design Guidelines.
H.	Adopt, regularly update (i.e., every 3 years) and implement an ADA Transition Plan for public rights-of-way.	The ADA Transition Plan for Public Rights-of-Way documents the legal and functional goals and objectives of the City in order to make existing pedestrian facilities within the public right-of-way accessible and usable for persons with disabilities.
I.	Identify ongoing funding to continue the existing Safe Routes to School Pilot Program and expand the program into other Roseville schools.	Walking school bus program (Safe Routes to School).
J.	Promote a program that encourages youth to ride bicycles to school at least 1 day a week. (e.g., “Walking School Bus Day" or "Move It" walk and bike clubs at Coyote Ridge Elementary School.) Long-term goal is moving the program to "Every Day is Bike Day."	Ongoing in Dry Creek area and before 2014 in other areas.
K.	Expand efforts to have Roseville youth participate in a National Bike Month and/or a City-sponsored Bike to School Month.	Ongoing in Dry Creek area and by 2017 in other areas.
L.	Actively pursue funding for adaptive traffic signals (through 2016).	Real-time traveler information tool webpage, Changeable Message Signs, synchronized traffic signals, roadway improvements, traffic study request forms.

The SAP sets forth the following objectives to create effective transportation measures that reduce VMT and associated GHG, NO_x and PM_{10} emissions.

- **Objective T-1:** Support and collaborate with regional agencies and adjacent jurisdictions to provide regional circulation links that improve connectivity and reduce emissions.
- **Objective T-2:** Manage the availability and cost of parking to minimize driving demand, encourage alternatives to driving and reduce emissions.
- **Objective T-3:** Increase carpool and vanpool opportunities to increase the non-single occupancy vehicle mode share (by ~2%).
- **Objective T-4:** Enhance local and regional transit systems to increase transit ridership (~1% mode shift).
- **Objective T-5:** Expand and enhance the bikeway network and support facilities and encourage their use to increase bike ridership (~1% biking and walking combined mode shift).
- **Objective T-6:** Improve the pedestrian environment to increase walking in the community (~1% biking and walking combined mode shift).
- **Objective T-7:** Develop programs to encourage youth to walk or ride bicycles to school and other places within the community.
- **Objective T-8:** Promote use of alternative fuel or high-fuel efficient vehicles to help reduce emissions.
- **Objective T-9:** Enhance efficiency of the City's roadway network to reduce vehicle delays and emissions while maintaining or enhancing the bicycle and pedestrian environment.

Painted and striped bicycle box at a signalized intersection



Intelligent Transportation System Concept of Operations
Source: ITS Master Plan, City of Roseville

TRANSPORTATION

Measure T-1.1	Collaborate with adjacent cities to identify inadequate links in regional connectivity for alternative transportation (e.g., biking and walking) and prioritize filling gaps to maintain continuity through the edge of the city.

Community Benefits

Regional connectivity, Improved public health

The City will coordinate and collaborate with other regional transportation agencies to ensure that regional seamless connectivity is maintained at the edges of the community, particularly in relation to walking, biking and transit. The City will work in partnership with regional agencies to identify gaps and prioritize filling these gaps to improve regional connectivity. Continuous regional bike and pedestrian links will encourage residents and commuters to and from Roseville to use alternative transportation rather than single-occupancy vehicles more frequently. This in turn will reduce emissions related to vehicle use for short daily work or recreation trips.

Timeline	Action		Development		Responsibility
			Existing	New	
Long Term (by 2020)	A.	Support regional efforts to incentivize Carpooling, Vanpooling, Commuter Bus, and Rail Service.	*	*	City Council; City Manager

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
Supporting measure	*NA*	*NA*

City Costs	***Private Costs***	***Private Savings***
Medium-High	*NA*	*Medium-High*

Cost/ Savings Assumptions

City costs - Additional staff time for coordination and collaboration with neighboring cities

Measure T-2.1	Periodically review the Zoning Ordinance and Community Design Guidelines parking standards to reduce minimum required parking ratios, establish maximum allowable parking requirements, prohibit new development from providing more parking than required by code, enhance the pedestrian experience and incorporate other appropriate and feasible measures to reduce parking supply.

Community Benefits

Reduced urban heat island effect, Improved public spaces, Increased land area available for development

Parking policies affect community driving habits. In suburban communities, parking is usually oversupplied. For example, commercial centers usually provide parking based on the needs of holiday shoppers. This type of planning underutilizes land capacity, drives up development costs, and discourages walking, biking and transit use. The City will explore ways to manage parking more judiciously, such as establishing maximum parking standards, shared-parking arrangements, preferential carpool parking, conversion of underutilized parking areas to park-and-ride spaces and consolidated parking structures. Another option would be to create park-once opportunities by combining parking areas for adjacent destinations. The City will also focus on adding pedestrian and bike infrastructure (such as shaded sidewalks, seating areas, bike racks) to enhance walking and biking experience.

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Encourage site designs, where appropriate, that facilitate pedestrian use by locating buildings close to sidewalks.		*	Planning & Redevelopment
Mid Term (by 2017)	B.	Conduct a parking management study to identify vacant or least used parking spaces to convert them to other uses such as park-and-ride lot spaces, bicycle and motorcycle parking, and shared parking spaces that increase land capacity to support higher performing uses (e.g., extra tenant space, plaza design).	*		Planning & Redevelopment; Public Works

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
Supporting measure	*NA*	*NA*

City Costs	***Private Costs***	***Private Savings***
Very low	*NA*	*Medium High*

Cost/ Savings Assumptions

City costs – Additional staff time to review and amend development codes.

Private savings – Average cost of developing a surface lot parking space ranges from $2,000 to $5,000 per space. Private savings is associated with reduced parking requirements for building owners and developers.

Measure T-3.1	Develop rideshare infrastructure (e.g., a community rideshare social networking website and neighborhood ride-share stations) to facilitate participation among those traveling from Roseville to other major employment centers.

Community Benefits

Less congestion on City streets, Improved air quality, Social networking

Carpooling and vanpooling allow people to travel together, share transportation costs and use high-occupancy-vehicle (HOV) dedicated lanes on freeways to reduce commute times. Ridesharing also results in fewer emissions than if each passenger drives separately. By expanding the City's rideshare capabilities through dedicated park-and-ride lots, carpool parking spaces, and rideshare match website; the City can encourage residents and employees to reduce their dependence on single-occupant vehicles. Developing rideshare program connecting potential matches within or outside the community based on common origins and destinations can also reduce GHG emissions and household travel costs.

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Develop a program to educate large retail owners about additional Transportation System Management programs (e.g., parking cash-outs, transit subsidies).	*		Public Works
	B.	Encourage businesses to provide incentives for patrons that use alternative transportation (e.g., bikes, walking, and transit).	*		Public Works
	C.	Coordinate with existing and future major employment centers in Roseville to ensure they implement a Transportation System Management program.	*	*	Public Works
Mid Term (by 2017)	D.	Work with existing companies, major retail centers and nearby cities (e.g., Sacramento, Folsom, Rancho Cordova, Citrus Heights) to promote car-share and local car rental opportunities.	*		City Manager; Public Works

	Progress Indicators	Target
1	2% increase in rideshare mode from 2008	By 2020

Reduction Potential

GHGs	*PM_{10}*	*NO_X*
3,640 MT CO_2e/yr	*0.43 tons/year*	*6.14 tons/year*

City Costs	*Private Costs*	*Private Savings*
Low - Medium	*High*	*Low – High*

Cost/ Savings Assumptions

City costs - Establishing a Web site would be a low-cost item. Building park-and-ride lots or other infrastructure could have considerable costs, unless current sites are used.
Private costs – Participating employers costs for providing transit subsidies and parking cash-out premiums to employees.

Private savings – According to the 511 Bay Area Rideshare calculator, average commute costs are approximately $1,700 per year. Ridesharing with an average of two people in the car would reduce this annual expense to approximately $500. Participating employees would benefit from reduced car operation and maintenance costs (e.g., less fuel use, lower insurance rates) by an estimated $50 to $100 per month.

Measure T-4.1 Analyze strategies to increase transit use and pursue funding sources for transit improvements.

Community Benefits

Less congestion on roads, Improved air quality

The City of Roseville manages its own public transit system, transporting nearly 433,000 passenger trips per year. However, Roseville Transit ridership can be further increased through transit improvements such as real-time scheduling information, convenient and comfortable bus stops, and service area expansion.

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Regularly update the Short Range Transit Plan to analyze strategies to increase transit use and funding sources for transit improvements.	*	*	Public Works
	B.	Continue to provide public transit service including local transit, dial-a-ride and new "timed stop" locations to reduce wait times. Expand service along major corridors as funding allows.	*	*	Public Works
	C.	Identify opportunities to generate sustained revenue to implement TSM programs.	*	*	Public Works
	D.	Identify popular community destinations and encourage businesses to provide community incentives for using transit during non-peak hours and on weekends (e.g., parks, theaters, shopping malls, groceries, libraries).	*		Public Works
	E.	Regularly evaluate and update bus routes to provide routes that are efficient at transporting passengers including workers to businesses and other high use locations.	*		Public Works
	F.	Investigate the effectiveness off providing free or subsidized transit passes for special bus promotions for new development areas.		*	Public Works
	G.	Improve bus flow by removing on-street parking spaces, by timing signals, and providing priority to buses where significant delay occurs regularly.	*		Public Works
Mid Term (by 2017)	H.	Evaluate the feasibility of providing real-time information regarding bus arrival times and transfer times for other regional transit agencies at transfer stations.	*	*	Public Works
	I.	Display real-time information regarding the amount of GHG saved by transit use per person and in total based on number of passengers on board.	*	*	Public Works

	Progress Indicators	Target
1	0.5% increase in transit mode from 2008.	By 2015
2	1% increase in transit mode from 2008.	By 2020

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
5,510 MT CO_2e/ yr	*0.65 tons/ yr*	*9.30 tons/ yr*

City Costs	***Private Costs***	***Private Savings***
High	*High*	*NA*

Cost/ Savings Assumptions

City costs - Additional staff time for managing public transit gap study, consultant fee approximately $5,000 per study and costs of buying and operating buses for expanding transit service.

Measure T-4.2	Work with regional transit and rail providers to increase the number of rides to and from Roseville to Downtown Sacramento, Rancho Cordova and the Bay Area. Explore the feasibility of light rail extension and/or bus rapid transit.

Community Benefits

Less congestion on roads, Improved air quality

Besides the Roseville Transit services, other regional transit service is also available in the community, such as the Capitol Corridor train, Sacramento Regional Transit and E-Tran. Increasing ridership on both local and regional transit systems can reduce single-occupant vehicle emissions.

Timeline	Action		Development		Responsibility
			Existing	New	
Mid Term (by 2017)	A.	Expand the number of rides and shuttles to and from regional employment centers (e.g., Downtown Sacramento) and within the community as funding allows. Work with Regional Transit to explore feasibility of a new Express Bus and light and heavy rail connections to Downtown Sacramento and the Bay Area.	*		Public Works
	B.	Work with Regional Transit, E-Tran, Roseville Transit, AMTRAK and other transit agencies to develop a regional pass system.	*	*	Public Works

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
Included in Measure T-4.1	*Included in Measure T-4.1*	*Included in Measure T-4.1*
City Costs	***Private Costs***	***Private Savings***
Medium – High	*NA*	*Very low*

Cost/ Savings Assumptions

City costs – Increased operations and maintenance costs to expand transit service (e.g., additional buses or trains on relevant routes, staff expense, fuel costs).

Private savings – Associated with ease of using a regional transit pass.

Measure T-5.1 Maximize bicycle use through high-quality design, enhanced infrastructure, and enforcing bike travel rights.

Community Benefits

Improved public spaces, Improved public health

Walking and biking are the healthiest forms of transportation, and cause no related emissions or air pollution. The physical activity involved in walking and biking also improves community health. As a recent winner of the Bicycle Friendly Community award, Roseville offers over 83 miles of on-street bike lanes and 27 miles of off-street bike paths, bike lockers and parking throughout the community.

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Consider adopting a best practices manual for bicycle design that improves the bicycling environment.	*		Public Works
	B.	Consider amending the Municipal Code (Chapter 19 Zoning; Chapter 11.33, TSM Ordinance) to require new or substantially improved commercial and office centers to provide Class 1 bike parking, showers, locker rooms and other bike amenities for employees.		*	Planning & Redevelopment; Public Works
	C.	Consider amending the Municipal Code (Chapter 19, Zoning Ordinance) to require new or substantially improved multi-family housing to provide bike lockers or storage racks close to each unit.		*	Planning & Redevelopment; Public Works
	D.	Work with landscape contractors to identify and implement feasible alternatives to parking in bike lanes. When feasible alternatives are not available, identify procedures for parking in the bike lane that minimize safety concerns for bicyclists.	*	*	Public Works
Mid Term (by 2017)	E.	Where appropriate, include bicycle boxes and bicycle priority signals at intersections of bicycle routes and major streets.	*	*	Public Works
	F.	Consider establishing a network of bicycle rental stations close to major employment centers to encourage short trips on bikes.	*		Public Works

Progress Indicators		Target
1	0.5% increase in bike and pedestrian mode share from 2008.	By 2015
2	1% increase in bike and pedestrian mode share from 2008.	By 2020

Reduction Potential

GHGs	*PM_{10}*	*NO_X*
5,510 MT CO_2e/ yr	*0.65 tons/ yr*	*9.30 tons/ yr*
City Costs	***Private Costs***	***Private Savings***
High	*Low-Medium*	*NA*

Cost/ Savings Assumptions

City costs - Additional staff time for zoning code update, costs of redesign and additional infrastructure and retrofitting of key intersections.
Private costs – Additional builder/ developer costs for providing bike amenities. Bike rack costs are assumed at $315 per 4-bike rack ($265 per rack and $50 for installation [Source: Nelson Nygaard Consulting Associates]).

Measure T-5.2	Promote bicycle use through focused community outreach and education programs.

Community Benefits

Improved public spaces, Improved public health

The City of Roseville is committed to promote biking as an alternative method of transportation. The Bicycle Master Plan provides a framework for increasing biking opportunities in the community. Annual community festivals (such as Roseville Bikefest, Share the Road Campaign) to promote biking is also popular in Roseville and serve as a primary form of bike education. The City will explore other viable options for continuing community outreach and education about bike safety, such as collaborating with the Police Department, promoting green delivery methods for businesses.

Timeline	Action		Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Promote biking by integrating bike racks and lockers as art forms throughout the City.	*	*	Public Works
	B.	Promote green delivery methods by encouraging businesses to use agencies that provide walking/biking delivery options at no-to-low cost.	*	*	
	C.	Coordinate with on-line automated route planning map service providers (including Google and SACOG), adjacent jurisdictions and the local community, including RCONA, to ensure that these systems provide accurate and efficient bicycle route recommendations and encourage people who live and/or work in Roseville to make use of on-line automated route planning services for route planning for bicycle trips.	*	*	Public Works
Mid Term (by 2017)	E.	Work with the Police Department to conduct bicycle and pedestrian specific training for officers.	*		Police; Public Works
	F.	Work with the Police Department to create bicycle and pedestrian specific education program for the public.	*	*	Police; Public Works
	G.	Where speed or other traffic issues are identified on bicycle routes, work with the Police Department to conducted targeted education and/or enforcement efforts as appropriate.	*	*	Police; Public Works

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
Included in Measure T-5.1	*Included in Measure T-5.1*	*Included in Measure T-5.1*
City Costs	***Private Costs***	***Private Savings***
Very low	*NA*	*NA*

Cost/ Savings Assumptions

City costs - Additional staff time for coordination and collaboration with regional transportation agencies.

TRANSPORTATION

Measure T-6.1 Maximize pedestrian travel through high-quality design, enhanced infrastructure, and enforcing pedestrian travel rights.

Community Benefits
Regional connectivity, Improved public health

Walking is a challenging in most parts of the community due to distance between destinations, wide roadway intersections and the community's perspective of driver convenience. However, walking is relatively popular in the higher density, mixed-use Downtown core. The City is committed to increasing communitywide walking and biking and will guide bike and pedestrian infrastructure enhancements through implementation of the Bicycle Master Plan (last updated in 2008) and the Americans with Disabilities Act (ADA) Transition Plan for Public Rights-of-Way, including a pedestrian master plan and design guidelines (last updated in 2009).

Timeline	Action		Development		Responsibility
			Existing	New	
Short Term (by 2013)	B.	Where there is a gap between attractive uses due to the presence of an undeveloped site, investigate alternatives to install temporary asphalt concrete (AC) sidewalks to close the gap.		*	Public Works
	C.	Implement the CDG to encourage new development projects to enhance walking by providing shaded walkways and improving accessibility to daily destinations (e.g., neighborhood parks, restaurants, groceries) and transit stops.	*		Planning & Redevelopment
	E.	Where appropriate, consider modified street designs within new development that enhance the pedestrian environment.		*	Public Works; Planning
	F.	Evaluate the need for new mid-block pedestrian crosswalks where there are high volumes of pedestrians and a long distance between intersections.	*		Public Works

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
Included in Measure T-5.1	*Included in Measure T-5.1*	*Included in Measure T-5.1*
City Costs	***Private Costs***	***Private Savings***
Medium - High	*Medium*	*High*

Cost/ Savings Assumptions

City costs - Additional staff time and pedestrian infrastructure improvement costs.

Private costs – Additional builder/developer costs to provide pedestrian infrastructure.

Measure T-7.1 Coordinate with SACOG's Community Design and Caltrans' Safe Routes to School programs to identify grants to increase alternative transportation networks that serve the community center, libraries, schools, recreational areas and other public gathering spaces.

Community Benefits

Healthy children

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Work with schools and future colleges to provide incentives for use or drop-off of non single-occupancy vehicles (e.g., parking or drop-off charges to create funds to support alternative travel modes).	*	*	Public Works, Local School Districts
	B.	Develop a program to track bicycle miles traveled by school children to promote walking and bicycling and discourage motor vehicle travel (bicycle trip mileage could be subtracted from motor vehicle miles traveled) and provide incentives and rewards for participation.	*		Public Works, Local School Districts
	C.	Work with local bicycle retailers to offer discounts for bikes and equipment for youth involved in promoting transportation bicycling.	*		Public Works, Local School Districts
	D.	Work with schools to develop a scholarship program awarded to high school students with a proven track record of promoting alternative transportation.	*		Public Works, Local School Districts
	E.	Sponsor a bike repair day or similar program for volunteers to help make minor bicycle repairs.	*		Public Works
	F.	Advise residents and workers that the City is encouraging youth (and others) to use bicycles for transportation and that increased traffic enforcement will be used as a tool to support and encourage bicycle use on City streets.	*		Public Works
	G.	Coordinate with all existing and new schools to include pedestrian, bike, and public transit streetscape improvements.	*	*	Public Works, Local School Districts
Mid Term (by 2017)	H.	Develop a School-Commute Bicycle Ambassador program that would promote parents/adults riding on trails and common school routes during school commute hours to provide more "eyes on the trail" and support for kids that might have bike mechanical issues.	*	*	Public Works, Local School Districts
	I.	Increase student incentives to ride transit year-round.	*		Public Works

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
Included in Measure T-5.1	*Included in Measure T-5.1*	*Included in Measure T-5.1*
City Costs	***Private Costs***	***Private Savings***
Very low	*Low*	*NA*

Cost/ Savings Assumptions

City costs - Additional staff time to administer programs (likely to be grant funded).
Private costs – Service and repair costs to bicycle retailers.

TRANSPORTATION

Measure T-8.1 Develop a program to promote purchase and use of low-carbon emitting vehicles.

Community Benefits

Reduced energy demand,
New local green jobs

California is fast progressing toward a low carbon fuel economy. In a suburban context, where driving is necessary to move between various destinations, replacing older and bigger cars with more fuel-efficient cars and alternative fuel vehicles (e.g., electric, plug-in hybrid, compressed natural gas) can create significant reductions from tailpipe emissions. While statewide implementation of AB 1493 and the LCFS will lower vehicle emissions, the City will proactively look for opportunities to promote alternative fuel use by creating its own alternative-fuel infrastructure, encouraging sales of low- to zero- emission vehicles, and public education.

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Promote demonstration projects that use electric and hybrid-electric transportation technologies and biofuels, hydrogen, and other clean transportation fuels at the Roseville Utility Exploration Center.	*		Electric ; Public Works
	B.	Provide incentives for new multi-family residential, commercial and office projects to install secured electric and hybrid car charging stations.	*	*	Planning & Redevelopment Public Works
	C.	Promote the establishment of priority parking and charging stations for NEVs.	*	*	Public Works
	D.	Create incentives to purchase low-carbon vehicles such as electric vehicles and plug-in hybrids.	*		City Manager; Electric
Mid Term (by 2017)	E.	Educate the public about the use of NEVs in accordance with State Law	*	*	Public Works

	Progress Indicators	Target
1	Replacement of 2,500 vehicles with electric vehicles.	By 2020
2	Replacement of 6,400 vehicles with small vehicles.	By 2020
3	Replacement of 7,500 vehicles with hybrid vehicles.	By 2020

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
31,050 MT CO_2e/ yr	*NA*	*52.40 tons/ yr*

City Costs	***Private Costs***	***Private Savings***
Very low	*Very low*	*NA*

Cost/ Savings Assumptions

City costs - Additional staff time for coordination and construction of new infrastructure.
Private costs – Costs to building owners and developers to reconfigure parking.

Measure T-9.1 Continue to build and expand the ITS system to synchronize traffic signals, allow easy traffic flow movement and reduce emissions caused by vehicle idling, while maintaining or enhancing the bicycle and pedestrian environment.

Community Benefits

Less congestion on roads

Building an effective intelligent transportation system (ITS) can reduce transportation-related emissions. The City is actively pursuing ways to implement ITS measures that maintain adequate levels of service on roadways. Roseville is synchronizing the timing of traffic signals to improve traffic flows and reduce idling times. Reducing frequent "stop-and-go" traffic situations can reduce emissions caused by vehicle idling. Synchronized traffic signals can be made more effective by installing ITS equipment that enables the City to divert and re-route vehicles during peak hours to reduce traffic congestion. Another effective traffic management tool is changeable message signs that can direct traffic to alternate routes during peak hours or accidents to reduce travel delays. Changeable message signs may also be used at popular destinations such as shopping malls (e.g., Roseville Galleria, The Fountains at Roseville) and community events (Downtown Tuesday Nights, BikeFest) to direct vehicles to available parking spots, reducing emissions from unnecessary driving through parking aisles to find a convenient parking spot.

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Consider GHG reductions when prioritizing CIP projects.	*		Public Works
	B.	Implement real-time resident reporting of traffic problems with aggressive web/phone software.	*		Public Works
	C.	Expand outreach for traffic management programs such as real-time traveler information, and changeable message signs to increase effective participation.	*		Public Works
	D.	Optimize traffic signal timing Citywide including synchronizing signals where appropriate to reduce idling of vehicles.	*	*	Public Works
	E.	Where appropriate and consistent with City policy, new or modified roadways and intersections should provide traffic calming and traffic flow improvement measures (including all appropriate traffic calming measures).	*	*	Public Works
Progress Indicators					**Target**
1		Implementation of ITS improvements identified in the CIP.			By 2016

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
3,420 MT CO_2e/ yr	*NA*	*5.77 tons/ yr*
City Costs	***Private Costs***	***Private Savings***
High	*NA*	*NA*

Cost/ Savings Assumptions

City costs – Approximately $10million net capital cost (2008-2009), $16million net capital cost (2010-2012), $6million net capital cost (2013-2015). (Source: City of Roseville Greenhouse Gas Emissions Reduction Plan Analysis)

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LAND USE AND GREEN BUILDING

CONTEXT

The City of Roseville, like much of the South Placer/Sacramento region, has, and continues to experience, significant growth. As a result, the community has the ongoing challenge of accommodating and providing for growth, while attempting to balance the need for sustainable practices, such as creating balanced land use patterns, promoting integrated and connected land uses to accommodate alternative modes of transportation, and conserving resources, both tangible and intangible.

Because mobile sources comprise the majority (44%) of the community's pollutants, it is essential to address the effect of community land use patterns on transportation-related emissions. Suburban land use patterns are a significant contributor to high emissions in the transportation sector. The main reason for this is the fact that segregated uses result in the need for residents to travel by automobile for most trips.

Where people choose to live, work and shop dictates how they choose to travel for short trips. Where people live close to transit stops and/or neighborhood-serving commercial centers, they have better access to alternative methods of travel other than private vehicles, such as riding a bus, biking or walking. In suburban communities like Roseville, most intra-city travel occurs along four- and six-lane arterials with distances between destinations that exceed comfortable walking or biking distance. Few areas in the City have land use densities and mixes that support high-frequency transit service. Most residents choose to complete daily tasks by

private vehicle, greatly increasing the challenge of reducing vehicle miles traveled (VMT) and associated emissions through land use strategies.

In order for the community to achieve its emission reduction target, it must focus infill development in areas that encourage green building and design technologies, support alternative travel modes, enhance and expand neighborhood commercial centers, and improve the community's jobs-to-housing ratio. This pattern of growth will also become increasingly important as the City attempts to comply with regional VMT reduction targets set forth by the Sacramento Area Council of Governments (SACOG) in response to SB 375 that will:

- Use the regional transportation planning process to help achieve AB 32 goals.
- Use CEQA streamlining as an incentive to encourage transit-oriented residential projects that help achieve AB 32 goals.
- Coordinate the regional housing needs allocation process with the regional transportation planning process, providing monetary incentives for sustainable development.

Green Building practices can play an important role in reducing pollutant emissions. They are the paradigm under which any structure, whether its residential, commercial or industrial, can be designed, constructed, renovated or operated to minimize its impact on the environment, and utilize resources efficiently.

EXISTING LAND USE AND GREEN BUILDING POLICIES AND PROGRAMS

The City of Roseville General Plan Land Use Element identifies underlying principles that form the foundation for the land use-related goals and policies. These principles are based on input from the community, through forums such as surveys, task forces, and committees. Some of these primary directing principles directly relate to the concept of sustainability, and include:

- Create a balanced land use pattern with an appropriate mix of uses to accommodate resident employment, service and social needs within the community.
- Promote a land use pattern that provides a high level of open space and recreational amenities and is sensitive to the natural environment.
- Create a land use mix and pattern which accommodates and promotes alternative transportation modes for ease of access and improved air quality.

Some notable existing and ongoing land use and green building policies that directly relate to the SAP are highlighted in Table 3-3, below.

TABLE 3-3 Existing and Ongoing Land Use and Green Building Policies		
	Policy Description	**Program Implementation**
A.	Continue to implement Roseville's Blueprint Implementation Strategies that focus development within infill/redevelopment areas to promote high-quality higher density/intensity of development and support alternative transportation modes such as transit.	Office of Economic Development small business workshops, Incentives and Downtown Economic Assistance Program (IDEA), Downtown Roseville Investors Packet, Redevelopment façade improvement rebate program. General Plan policies in Land Use Element, Open Space and Conservation Element
B.	Continue to support mixed-use developments, including examining re-use of underperforming retail corridors.	General Plan policies in Land Use Element, Blueprint strategy, community design guidelines, specific plans and Municipal Code.
C.	Continue to evaluate designs of existing and planned neighborhood commercial areas and implement the City's Community design Guidelines that increase local and regional bike and pedestrian connections and accessibility to these areas from surrounding residential neighborhoods.	Community Design Guidelines adopted in 2008.
D.	Continue to promote site designs for new buildings to maximize solar access to promote passive solar energy design, natural ventilation, effective use of daylight, and on-site solar generation. Review City codes to amend as needed to encourage solar access.	Community Design Guidelines adopted in 2008.
E.	Identify opportunities to create more integrated communities in which the services used by residents are located in close proximity to the residential units.	General Plan policies in Land Use Element, Blueprint strategy, community design guidelines, specific plans and Municipal Code.
F.	Explore opportunities for infill development in targeted, underused portions of older low-density residential areas by encouraging various alternative designs, including co-housing options and accessory dwelling units.	Office of Economic Development small business workshops, Incentives and Downtown Economic Assistance Program (IDEA), Downtown Roseville Investors Packet, Redevelopment façade improvement rebate program. General Plan policies in Land Use Element, Open Space and Conservation Element
G.	Investigate opportunities for funding city projects or incentivize private developers to re-envision existing properties (if not already done) to take advantage of stimulus funding through Recovery Zone Facility Bonds and/or Recovery Zone Economic Development Bonds.	Office of Economic Development small business workshops, Incentives and Downtown Economic Assistance Program (IDEA), Downtown Roseville Investors Packet, Redevelopment façade improvement rebate program. General Plan policies in Land Use Element, Open Space and Conservation Element

The following SAP objectives are intended to further reduce GHG emissions, and criteria air pollutants caused directly and indirectly by land use and transportation choices. These proposed measures are designed to meet these objectives:

- **Objective L-1:** Carefully plan and analyze existing and future development to accommodate efficient use of land and protect the environment.
- **Objective L-2:** Promote high-quality design within the public realm to maximize pedestrian and bicycle use.
- **Objective L-3:** Build greener infrastructure and promote development of a healthy community.
- **Objective L-4:** Promote green building design in the community.

Of the four proposed measures in the Land Use and Green Building strategy, L-3.1 is a primary measure with corresponding GHG emission reduction potential. The other three measures support the efficacy of the measures proposed within the Transportation strategy regarding use of alternative modes of transportation (such as walking, biking and transit) and encouraging shorter trip distances.

LAND USE AND GREEN BUILDING MEASURES & ACTIONS

Measure LU-1.1	Promote infill, mixed-use and transit oriented development within the City's infill urban area. Adjust development standards to maximize opportunities for such projects and explore funding options to incentivize them.

Community Benefits

High quality design and construction

The City of Roseville's General Plan policies promote land use patterns that are more efficient, preserve open space and support sustainable land and transportation practices. These policies are implemented in the City's Municipal Code, Growth Management Visioning Report, and specific plans adopted for individual development areas.

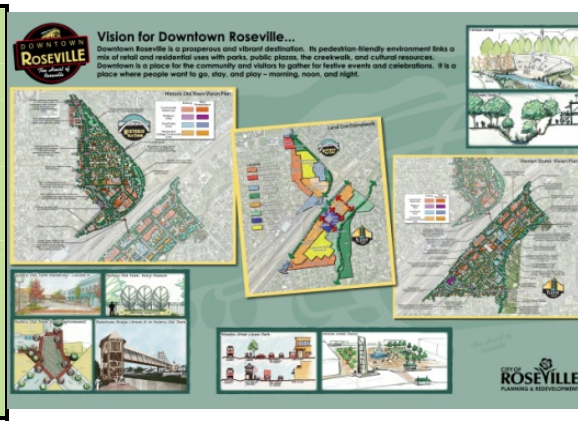
Timeline	Action		Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Establish a procedure/process for review and update of the Sustainability Plan. Seek funds to support staff time necessary to coordinate implementation of the City's municipal *Greenhouse Gas Emissions Reduction Plan Analysis* and Communitywide *Sustainability Action Plan.*		*	City Manager

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
Supports transportation measures	*NA*	*NA*
City Costs	***Private Costs***	***Private Savings***
High	*NA*	*NA*

Cost/ Savings Assumptions

City costs – Additional staff time for Zoning Code revisions. Consultant fees for sustainability audit estimated at $30,000.



LAND USE AND GREEN BUILDING MEASURES & ACTIONS

Measure LU-2.1 Create a public amenity street retrofit program for local arterials, collectors and residential streets to include street-side parking, bicycle lanes, setback sidewalks, shaded seating areas and planting strips to enhance bike and pedestrian infrastructure within the infill area of the City.

Community Benefits

Reduced vehicle miles traveled

General Plan policy promotes land use patterns that enable pedestrian- and bike-friendly neighborhood design and encourages focused growth in infill areas. Studies throughout the Sacramento region show that high-quality dense neighborhoods with diverse uses within one-quarter mile or approximately 10-minute walking distance encourage healthy lifestyles by making walking and biking more readily accessible. Enhancing the quality and diversity of uses in infill areas while creating a pedestrian and bike infrastructure will help decrease transportation-related GHG emissions and improve residents' quality of life. The City will continue to facilitate pedestrian-bike improvements in infill areas by establishing guidelines that prioritize focused growth in these areas, developing small business incentive programs, and encourage pedestrian-bike friendly design such as shaded seating areas, connected sidewalks and secure bike storage and parking areas.

Timeline	Action		Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Continue to evaluate land use and market conditions to identify sites within infill areas that could support walkable and/or bikeable neighborhood-scale commercial centers (e.g. groceries, medical centers).	*		Planning & Redevelopment/ Public Works

Reduction Potential

GHGs	***PM_{10}***	***NO_x***
Supports transportation measures	*NA*	*NA*
City Costs	***Private Costs***	***Private Savings***
High	*NA*	*NA*

Cost/ Savings Assumptions

City costs – Cost of infrastructure development is variable and depends on the level of improvement. Cost estimates for bike infrastructure: Class I Bike Path – $1 million–$2 million per mile (including asphalt path on graded right of way with drainage and new sub-base, minor and major crossings); Class II Bike Lanes – $60,000–$500,000 per mile (depending on signing and striping to minor road widening); Class III Bike Routes – $20,000–$40,000 per mile (depending on signing and striping to minor road widening). Source: Roseville Bikeway Master Plan 2008, Table 7.

LAND USE AND GREEN BUILDING MEASURES & ACTIONS

Measure LU-3.1	Partner with non-profit organizations (e.g., Roseville Urban Forest Foundation) to expand urban forestry (e.g., cost-effective solar-friendly street trees and trees on private and public lots) and green infrastructure (e.g. open space, wetlands) to sequester carbon, reduce building energy consumption and mitigate the heat island effect.

Community Benefits

Reduced urban heat island effect

Roseville's green infrastructure consists of an interconnected network of open spaces and natural areas (e.g., greenways, wetlands, parks, forest preserves, and native plant vegetation) that naturally cleans stormwater runoff, reduces flood risk, and improves water quality. These benefits are just a sample of the many services offered by healthy, functioning ecosystems integrated within the fabric of a sustainable community. The community recognizes the multiple benefits that green infrastructure provides and supports enhancement of these valuable resources. Expanding the urban forest, restoring riparian forests, and creating community gardens will help Roseville improve the quality of life for residents, protect the climate and reduce air pollution.

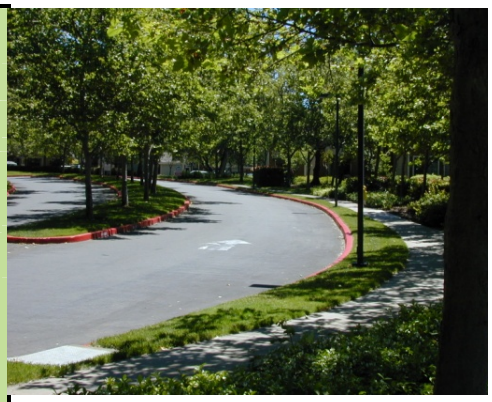
Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Review the City's list of climate-appropriate trees to maximize shade and carbon sequestration (e.g., using SMUD's Tree Benefit Estimator) and high-albedo (above a Solar Reflectance Index of 29) paving materials for all non-permeable surfaces to support easy access by residential and business owners. [Does not apply to street surfaces.]	*	*	Planning & Redevelopment; Parks and Recreation; Electric
	B.	Develop a Community Tree Program with a goal to help qualifying neighborhoods increase their tree canopy cover to 40% or higher.	*	*	Planning & Redevelopment; Parks and Recreation; Electric
	C.	Maintain the City's high standard for acquiring and protecting urban green and open space to promote functional forest ecosystems with high potential to capture and store CO_2.	*		Planning & Redevelopment; Parks and Recreation
	D.	Encourage the development of vegetated green roofs by providing outreach and guidelines consistent with the building code.		*	Public Works; Environmental Utilities; Electric
Progress Indicators					**Target**
1		1,000 new shade trees planted within publicly-owned land and right-of-ways.			By 2020
2		6,000 new trees planted on private property throughout the community.			

Reduction Potential

GHGs	***PM_{10}***	***NO_x***
1,580 MT CO_2e/ yr	*NA*	*NA*
City Costs	***Private Costs***	***Private Savings***
Medium – High	*NA*	*NA*

Cost/ Savings Assumptions

City costs – Additional staff time to develop a cost-effective list of trees. Cost of planting trees varies between $100 and $500 per tree, depending on the quantity of trees, soil preparation needs, and siting. Cost of planting trees, constructing wetlands, or installing bioretention facilities varies depending on extent of strategy.



LAND USE AND GREEN BUILDING MEASURES & ACTIONS

Measure LU-4.1 Facilitate green building design and construction standards in the community to reduce emissions.

Community Benefits

Create local jobs,
Reduced operating costs of buildings

Projected growth will result in ongoing construction related emissions. Using locally-sourced building materials can reduce emissions associated with transporting building materials into the community. The choice of building materials can also reduce emissions based on the manner in which the material has been extracted, harvested or processed.

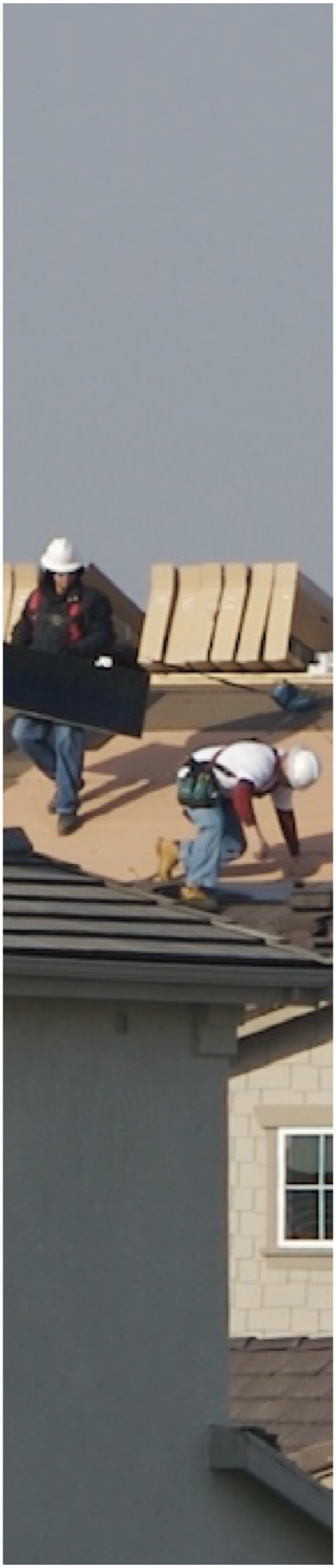
Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Create a Roseville-specific list of green building techniques, materials, contractors and businesses to assist residents and businesses to access appropriate resources while remodeling and for new construction.		*	Community Development; Roseville Electric; Chamber of Commerce; Building Department; Permit Center
	B.	Provide incentives (e.g., rebates, tax credits, expedited permit processing) for new projects with high energy efficiency and smaller environmental footprints and for green retrofits of existing commercial or residential properties in order to reduce overall community energy use.	*		Community Development; Roseville Electric, Placer County APCD
	C.	Track and recognize renovations that use green building standards. Establish a mechanism to evaluate new technologies when proposed within new projects.	*		Community Development; Public Works; Chamber of Commerce
	D.	Identify commercial or residential stationary emission sources and provide incentives for filtration or modification.		*	Placer County APCD
	E.	Encourage use of recycled materials for at least 10% of construction materials within all new projects or substantial renovations of residential and commercial buildings. Encourage construction waste diversion.		*	Community Development
	F.	Promote use of locally available construction materials sourced within a 500-mile radius.		*	Community Development, Environmental Utilities

Reduction Potential

GHG	***PM_{10}***	***NO_x***
Supporting measure	*NA*	*NA*
City Costs	***Private Costs***	***Private Savings***
Medium to High	*NA*	*NA*

Cost/ Savings Assumptions

City costs – Cost assumptions are based on ongoing programs that would require continued implementation and administration



ENERGY

Context

Roseville's GHG baseline inventory shows that energy (electricity and natural gas) for heating, cooling, lighting, machinery, and appliances is the largest source of communitywide emissions. Residential energy use comprises 22% and commercial energy use comprises 29% of total community GHG emissions.

The City of Roseville operates its own electric utility (Roseville Electric). Roseville Electric constructs, operates, and maintains the City's electricity distribution system. Since 2001, Roseville Electric has dedicated 2.85% of its sales revenue to promote energy efficiency, build renewable resources, and provide programs to assist low-income customers. Via the resulting energy reductions, these programs also address GHG reduction objectives, as mandated by State and federal law. Roseville Electric has been actively promoting energy efficiency and conservation through the utilization of several important methodologies, as shown below.

Conservation Based Electric Rates

Over 80% of all Roseville Electric customers presently receive electric service via a conservation based electric tariff. These tariffs send cost/pricing signals to the customer during summer peak months and peak times of the day. Roseville Electric residential customers operate in a "tiered" tariff, where the cost for electricity increases as the volume increases. Large commercial and industrial customers operate in a time-of-use (TOU) tariff where cost varies according to season and the time of day the energy is used.

Energy Efficiency Programs

Roseville Electric provides over 3,000 customer rebates per year via proven energy efficiency programs. These programs support new air conditioning units, advanced lighting systems, energy controls, Energy Star refrigerators and customized efficiency projects within all customer classes.

Demand Reduction
Roseville Electric operates a residential air conditioning cycling program. Participating customers allow Roseville Electric to cycle their air conditioning compressors off/on for a limited period on very hot days.

Audits
Roseville Electric provides "on-line" energy efficiency audits for its customers. These audits provide the customer with a roadmap for energy efficiency and lower monthly bills

Conservation and Energy Efficiency Expertise
Roseville Electric provides extensive "on-line" access the energy conservation tips and information. Customers can research questions and equipment, and see examples of successful energy efficiency. Additionally, Roseville Electric representatives are available by telephone to discuss problems and guide customers to lower monthly bills.

Education
Roseville Electric and Roseville Environmental Utilities designed, built and operate the Roseville Utility Exploration Center (UEC). The UEC promotes conservation via displays and school field trip opportunities. Approximately 38,000 visitors and over 1,000 students on field trips visit the UEC each year.

Community Outreach
Roseville Electric co-sponsors and/or participates in Earth Day and other community outreach events. Staff at these events discusses utility conservation and energy efficiency programs with the public.

In September 2006, the Roseville City Council took a major step toward charting a course for a greener and more sustainable City by adopting the *National Action Plan for Energy Efficiency*, setting forth guiding principles for GHG reduction goals, and joining the California Climate Action Registry.

Renewable Energy
State mandated goals for the Renewable Portfolio Standard (RPS) require State mandated goals for electric utilities for the Renewable Portfolio Standard (RPS) require 20% of Roseville Electric's power portfolio to consist of renewable power resources by 2017. The future state law is likely to require a percentage of renewable power in RE's portfolio. Roseville Electric is already using renewable energy to meet a portion of the community's electricity needs from various Northern California Power Agency projects such as hydroelectric, geothermal, and landfill gas projects. Roseville Electric has a number of ongoing programs and incentives that enable the City to meet the community's projected electricity demand and requirements for reduced carbon intensity within energy.

Roseville Electric manages two energy efficiency programs for new construction homes – Preferred Homes and BEST Homes.

Preferred Homes provides rebates to builders who construct energy efficient homes. The annual goal is 1,000 new homes per year. The BEST Homes program takes an additional step by adding electricity- producing solar electric panels, ENERGY STAR appliances and shade trees to the Preferred Homes requirements; with the a goal that 20% of all new homes in Roseville would meet these standards.

Over the next 25 years, the resulting reduction in future emissions from these programs would will be equivalent to planting 22,000,000 trees over the next 25 years.

According to the City's General Plan:
The average Roseville home enrolled in Roseville Electric's Green Roseville program can prevent about 7,700 pounds of carbon dioxide and other pollutants from entering the atmosphere each year.

Existing Energy Policies and Programs

Roseville's General Plan goals and policies related to energy are based on a dual need to minimize the community's dependence on non-renewable energy sources and to increase energy independence through various renewable energy programs. As the community grows, energy demands will also grow. Therefore, to ensure that the City can continue to provide an adequate and reliable supply of energy, Roseville Electric is committed to promote energy efficiency through a combination of public education and incentives.

TABLE 3-4
Existing and Ongoing Energy Policies

	Policy Description	Program Implementation
A.	Continue to provide a suite of energy-saving programs, resources, education, incentives, rebates and financing options to assist property owners and tenants to comply with local energy standards.	Review Energy audit, workshops and programming at Roseville Utility Exploration Center, Earth Day events, tips on City website for energy efficiency in residential (including low-income residents) and businesses, rebates for bigger energy efficiency projects (such as Energy Star appliances and air conditioners), small business lighting retrofit program, Energy Insider newsletter, traffic signal-head retrofits to LEDs.
B.	Where appropriate, utilize the available electric and natural gas utility energy efficiency and solar generation rebates, education and resources.	Green Roseville program (waives climate mitigation fees for customers who participate at the 100% level), Green Fund, Renewable Portfolio (using landfill methane gas to produce electricity), workshops and programming at Roseville Utility Exploration Center (e.g., All Things Solar Day), tips on City website.
C.	Roseville Electric to continue coordination and collaboration with SMUD, PG&E and other electric utilities to develop and maintain energy efficiency and renewable energy programs that provide outreach, financial incentives and other technical assistance to home and business owners.	Programming at Roseville Utility Exploration Center, Earth Day events, tips on City website for energy efficiency in residential (including low-income residents) and businesses, rebates for bigger energy efficiency projects (such as Energy Star appliances and air conditioners), small business lighting retrofit program, Green Fund, Renewable Portfolio.


Upgrading energy efficiency of existing homes in Roseville can significantly reduce communitywide energy consumption.

The Sustainability Action Plan sets forth the following objective to create effective energy measures that reduce non-renewable energy demand and associated emissions.

- **Objective E-1:** Minimize non-renewable energy consumption and maximize renewable energy consumption.

ENERGY

Measure E-1.1 By 2020, the City will strive to reduce overall household kWh and therm use by 20% from baseline year 2008 for existing homes through various education and incentive programs, technology innovation, and conservation.

Community Benefits

Reduced energy bills,
Increased home equity,
Create local green jobs,
Increased energy independence

Improving the energy efficiency of Roseville's existing housing stock will considerably reduce emissions, while also decreasing home energy bills. Roseville Electric will establish programs to educate homeowners about energy efficiency upgrades, facilitate home energy audits and efficiency upgrades, and provide financial incentives for home improvements.

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	If available, promote Placer County mPower or other AB 811 financing programs.	*		City Manager; Electric; PG&E
	B.	Promote in-home conservation strategies as outlined by utilities, California *Flex Your Power*, and other industry sources.	*		Electric; PG&E
Mid Term (by 2017)	C.	Guarantee processing dates for existing residential improvement projects meeting Green Point Rated, ENERGY STAR, LEED, Roseville Electric's energy efficiency program, or similar green building benchmarks.	*		Electric
	D.	Encourage switching to solar thermal hot water systems from conventional hot water systems.	*		Electric; PGE
	E.	Provide on-line audits and other energy reporting services.	*		Electric; PG&E
	F.	Utilize Home Energy Rating Service- (HERS) rated, or similar professionals for home energy efficiency assessment.	*		Electric
Long Term (by 2020)	G.	Where appropriate, bundle home energy efficiency projects into "whole-house" projects, completing a group of energy efficiency measures, prioritizing the project measures to maximize the quantity of energy saved.	*		Electric; PG&E

Progress Indicators		Target
1	10% reduction in overall household kWh and therm use from 2008 energy consumption.	By 2015
2	20% reduction in overall household kWh and therm use from 2008 energy consumption.	By 2020

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
5,190 $MTCO_2e$/ yr	*NA*	*NA*
City Costs	***Private Costs***	***Private Savings***
Low – Medium	*High*	*Medium*

Cost/ Savings Assumptions

City costs - Costs will vary based on the type of the program and how much it can build on current programs or leverage regional initiatives.

Private costs - Costs will vary based on the size, age, and condition of the building. The home or building owner could leverage additional rebates and financing options to offset some costs.

Private savings - Savings will vary based on the size, age, and condition of the home. The home or building owner could leverage additional rebates and financing to offset some costs.

Measure E-1.2

(a) Qualifying existing commercial buildings should strive to achieve ENERGY STAR performance criteria. This rating denotes that the building's estimated energy use is intended to be in the top 25% compared to similar buildings throughout the nation.

(b) For building types not qualifying for ENERGY STAR, the design should strive for a 15% reduction in the overall energy budget over California Title 24 performance standards.

Community Benefits

Reduced energy bills,
Increased rental space equity,
Create local green jobs,
Increased energy independence

The City will coordinate and collaborate with existing commercial property owners to identify if they would qualify for the U.S. Environmental Protection Agency's (EPA's) ENERGY STAR program. Improvements to commercial building energy efficiency will help Roseville businesses reduce long-term energy costs and provide communitywide emission reductions. Roseville Electric will oversee a comprehensive commercial energy conservation program providing education, outreach, and financial incentives. The City hopes these educational programs and financial incentives will encourage many businesses to invest in efficiency improvements.

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Where appropriate, promote installation of energy efficiency and solar electric generation systems using available financing and other programs	*		City Manager; Electric
Mid Term (by 2017)	B.	Guarantee permit processing dates for existing commercial improvement projects meeting Green Point Rated, ENERGY STAR, LEED, Roseville Electric's energy efficiency program, or similar green building benchmarks.	*		City Manager; Electric, Planning and Redevelopment
	C.	Encourage switching to solar thermal hot water systems from conventional hot water systems.	*		Electric; PG&E
	D.	Encourage commercial building owners to use EPA's Portfolio Manager for energy tracking. Provide on-line audits to tracking energy savings.	*		Electric; PG&E
	E.	Encourage commercial building owners to use benchmarking against other "like" buildings and businesses as a way to foster competitive energy conservation practices.	*		Electric; PG&E
Progress Indicators					**Target**
1		15% reduction in overall commercial energy use from 2008 energy consumption.			By 2020

Reduction Potential

GHGs	***PM_{10}***	***NO_x***
10,400MT CO_2e/ yr	*NA*	*NA*
City Costs	***Private Costs***	***Private Savings***
Low – Medium	*Medium*	*High*

Cost/ Savings Assumptions

City costs - Costs will vary based on the type of the program and how much it can build on current programs or leverage regional initiatives.

Private costs - Costs will vary based on the size, age, and condition of the commercial property. The building owner could leverage additional rebates and financing options to offset some costs.

Private savings - Savings will vary based on the size, age, and condition of the building. The building owner could leverage additional rebates and financing to offset some costs.

ENERGY

Measure E-1.3	The City of Roseville should provide cost effective incentives for new homes in Roseville to exceed Title 24 standards.

Community Benefits

Reduced energy bills,
Increased home equity,
Create local green jobs,
Increased energy independence

Anticipated residential and non-residential construction in new growth areas provide ample opportunity to ensure high levels of energy efficiency through use of advanced technology, materials and design. The City of Roseville Electric anticipates that, new technologies and superior energy systems along with cost effective incentives for new homes will enable homebuilders to exceed requirements of the California Green Building Code's 2008 Title 24 requirements.

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Where appropriate and consistent with the owner's or designer's market intent, builders should utilize passive solar design, energy efficient materials and technologies, solar electric generation and green building techniques and materials.		*	Electric; PG&E
	B.	Guarantee permit processing dates for new residential construction meeting ENERGY STAR, Green Point Rated, LEED, Roseville Electric's energy efficiency program, or similar green building benchmarks.		*	CDD; Public Works; Electric
Mid Term (by 2017)	C.	Encourage use of thermal hot water systems rather than conventional hot water systems in new homes.		*	PG&E

Progress Indicators		Target
1	15% reduction in overall electricity use from 2008 electricity consumption.	By 2020
2	15% reduction in overall natural gas use from 2008 natural gas consumption.	By 2020

Reduction Potential

GHGs	*PM_{10}*	*NO_X*
3,150 MT CO_2e/ yr	*NA*	*NA*

City Costs	*Private Costs*	*Private Savings*
Very low to Low	*High*	*High*

Cost/ Savings Assumptions

City costs - Additional staff time for coordination and collaboration with regional transportation agencies.

Private costs – Depends on the size of the home .National average for incremental cost of meeting a 15% reduction in energy consumption is $2 to $4 per building square foot.

Private savings – Depends on the size of the home. This measure assumes a decrease in consumer energy costs of approximately 20%.

ENERGY

Measure E-1.4

(a) Qualifying new commercial construction should strive to achieve ENERGY STAR performance criteria. This denotes that the building's estimated energy use is intended to be in the top 25% compared to similar buildings throughout the nation. Once the building is built and operating for at least one year, it may qualify to receive an ENERGY STAR plaque.

(b) For new commercial construction projects not qualifying for ENERGY STAR, building designs should strive for a 15% reduction in the overall energy budget over California Title 24 performance standards.

Community Benefits

Reduced energy bills,
Increased rental space equity,
Create local green jobs,
Increased energy independence

Roseville Electric will provide education and incentives to encourage new technologies and superior energy systems to be integrated within new building designs and construction. The City anticipates that, these programs and incentives will enable qualifying commercial properties to achieve the ENERGY STAR rating, while non-qualifying properties should strive to achieve 15% below 2008 Title 24 requirements).

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Where appropriate and consistent with the owner's or designer's market intent, builders should strive to utilize passive solar design, energy efficient materials and technologies, solar electric generation and green building techniques and materials.		*	Electric
	B.	Guarantee processing dates for new commercial construction projects meeting ENERGY STAR, Green Point Rated, LEED, Roseville Electric's energy efficiency program, or similar green building benchmarks.		*	Planning & Redevelopment; Electric
Mid Term (by 2017)	C.	Encourage switching to solar thermal hot water systems from conventional hot water systems.		*	PG&E

Progress Indicators		Target
1	15% reduction in overall electricity use from 2008 electricity consumption.	By 2020
2	15% reduction in overall natural gas use from 2008 natural gas consumption.	By 2020

Reduction Potential

GHG	*PM_{10}*	*NO_x*
Included in Measure E-1.3	*NA*	*NA*
City Costs	***Private Costs***	***Private Savings***
Very low	*High*	*High*

Cost/ Savings Assumptions

City costs - Additional staff time for monitoring and enforcement of $10,000-$20,000. Estimated cost of producing guidance and educational material on how to meet code of approximately $25,000.

Private costs - The cost to developers will vary considerably depending on the type of energy efficiency measures employed in the design.

Private savings - Assumed consumer energy costs decrease by 15% due to more stringent building codes.

ENERGY

Measure E-1.5	Continue to explore innovative ways to promote energy efficiency and renewable energy use in the community.

Community Benefits

Create local green jobs

Roseville Electric is continually exploring new and innovative ways to promote energy efficiency and renewable energy programs in the community. A number of ongoing programs provide public education about various ways to reduce energy use and increase use of renewable energy sources. Based on best-available practices, Roseville Electric will continue to introduce innovative ways to minimize non-renewable energy demand and maximize renewable energy use.

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Roseville Electric should provide links to existing online Department of Energy, State of California, and other industry web sites with solar mapping capabilities to help customers identify the solar energy potential of their property and to estimate the potential environmental benefits and monetary savings that would result from installing solar energy panels on their property.	*	*	Electric
	B.	Encourage Roseville residents and businesses to purchase retail certified green energy renewable energy credits to offset their carbon footprint.	*	*	Electric
Mid Term (by 2017)	C.	Identify and encourage potential sites for solar parking lots and solar bus stop canopies.	*	*	Alternative Transportation; Electric
	D.	Encourage energy performance ratings and consumption disclosures for all homes.	*	*	Electric; PG&E

Reduction Potential

GHGs	***PM_{10}***	***NO_x***
Supporting measure	*NA*	*NA*
City Costs	***Private Costs***	***Private Savings***
Very low- Low	*Medium*	*Low*

Cost/ Savings Assumptions

City costs - Additional staff time to assess and enact recommendations.

Private costs - Financing incentives and technical assistance provided to home and business owners.

Private savings - Cost savings with decreased energy use.

SOLID WASTE REDUCTION

CONTEXT

Waste-related GHG emissions result from the types of products we use within our daily lives and how we dispose of them, as well as from pre-consumer commercial and industrial processes. In Roseville, only 1.1% of GHG emissions are associated with solid waste generation and disposal in landfills. The City of Roseville is part of the Western Placer Waste Management Authority in joint partnership with Placer County, the City of Lincoln, and the City of Rocklin. Roseville's landfill inventory includes the Western Regional Landfill site, along with five other inactive solid waste facilities and various individual recycling and salvage businesses.

Since the City of Roseville operates and manages the community's solid waste collection service, the City must comply with State-adopted minimum standards, goals and procedures and develop an integrated Waste Management Plan. Historically, Roseville has aggressively managed various waste reduction, recycling and composting programs, and is well below State-mandated per capita waste generation targets for residential and non residential uses. The City estimates that under a 2020 build-out business-as-usual scenario, the community will generate approximately 153,177 tons of solid waste per year (comprised of 41% residential and 59% non-residential waste sources).

Existing Waste Policies and Programs

Waste disposal creates emissions when organic waste (e.g., food scraps, yard clippings, paper, and wood) is buried in landfills and anaerobic digestion takes place, emitting methane, a potent GHG, as a by-product of the digestive process. Additionally, extracting and processing raw materials for consumer products, distributing them to consumers and disposing of them creates a large portion of global GHG emissions.

Roseville's General Plan solid waste-related goals and policies are based on growth management principles to ensure adequate landfill capacity. As the community grows into future Specific Plan areas, the City recognizes the prime importance of meeting State targets and reducing waste generation. The City's existing 290-acre landfill has sufficient capacity to accept additional waste until 2025. Given the lengthy approval process required by State law for new landfill sites, the City needs to maintain at least eight to 10 years of reserve capacity. Some of the existing programs related to solid waste reduction and diversion is highlighted in table 3-5 below.

The City's solid waste management programs are guided by the following state mandates:

Assembly Bill (AB) 939 requires that the City divert a minimum of 50% of total waste generated to reuse and recycling.

Senate Bill (SB) 1016 establishes a per capita disposal target based on total service population (population + employment) and disposal rates as reported by disposal facilities.

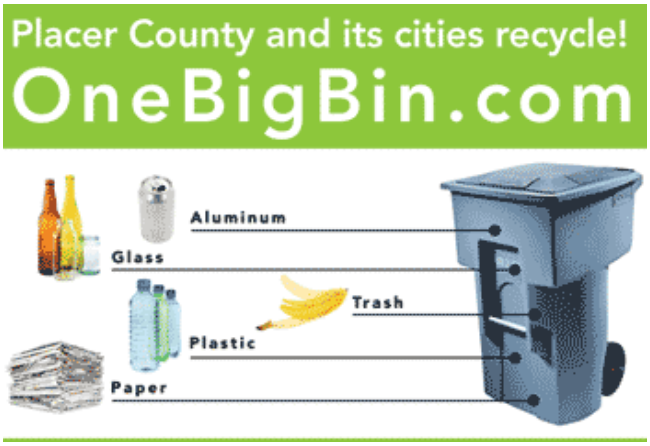
TABLE 3-5
Existing and Ongoing Waste Policies

	Policy Description	Program Implementation
A.	Encourage businesses and residents to purchase new and reused goods with minimal packaging that are durable, repairable and reusable (e.g., resources and information).	Source reduction campaign, source reduction classes, workshops and programming at Roseville Utility Exploration Center, Earth Day events.
B.	Continue implementing a tiered rating/ billing system to reward businesses with lower waste generation. Additional materials should be added for recycling opportunities if a market exists, and if feasible to collect on an as-needed basis.	Source reduction campaign, source reduction classes, workshops and programming at Roseville Utility Exploration Center, Earth Day events, Green Waste Program, Free Compost Bin Program, Materials Recovery Facility.
C.	Conduct waste reduction events at the Roseville Utility Exploration Center (RUEC) and other City-sponsored events to provide information and resources regarding a cradle-to-cradle (i.e., closed loop) concept.	Source reduction campaign, source reduction classes, workshops and programming at Roseville Utility Exploration Center, Earth Day events, Materials recovery facility, expanded polystyrene recycling program, electronic and household hazardous waste door-to-door program, household battery recycling program, glass, newspaper, aluminum, cardboard recycling drop-off locations, Placer Recycles Day. Non-profit organizations ReCreate and ReStore (Habitat for Humanity), methane capture from Dry Creek Wastewater Treatment Plant, reusable shopping bags for sale at Roseville Utility Exploration Center. Office recycling program to start in April 2010, food waste to energy biomass project needs federal funding for implementation by 2013.
D.	Conduct waste-reduction consultations with major waste generators (e.g., businesses and multi-family residential properties) and recommend strategies to reduce waste and increase recycling, thereby reducing business costs.	Materials recovery facility, expanded polystyrene recycling program, electronic and household hazardous waste door-to-door program, household battery recycling program, glass, newspaper, aluminum, cardboard recycling drop-off locations.

The SAP sets forth the following objectives to create an effective solid waste management plan, to reduce source generation, and to divert waste from landfills to achieve emission reductions:

- **Objective WR-1:** Promote waste source reduction programs.
- **Objective WR-2:** Increase recycling and composting programs to divert waste from landfills.

By reducing community's waste stream these objectives also help to lengthen the life of regional landfill areas.



WASTE REDUCTION

Measure WR-1.1	Create a comprehensive source reduction analysis and plan for the community to promote efforts to assist residents, businesses and schools to decrease their per capita waste generation.

Community Benefits

Improved air quality

The City of Roseville implements various source reduction programs to reduce the community's projected waste stream and to eliminate disposal of household hazardous materials. The Environmental Utilities Department has prepared a Source Reduction and Recycling Plan, a Household Hazardous Plan, and a Non-Disposal Facilities Plan, all of which have been approved by the California Integrated Waste Management Board. Successful ongoing implementation of these plans has enabled the Roseville community to consistently exceed State per capita waste targets set by CalRecycle.

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Prepare a source reduction analysis and plan for the community.	*	*	City Council; Environmental Utilities
	B.	Develop a junk-mail prevention outreach program that helps residents to voluntarily opt out of receiving junk mail.	*	*	Environmental Utilities
	C.	Look for opportunities to encourage residents to reduce use of plastic water bottles (e.g., resources and information).	*	*	Environmental Utilities

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
Supporting measure	*NA*	*NA*
City Costs	***Private Costs***	***Private Savings***
Medium	*NA*	*NA*

Cost/ Savings Assumptions

City costs – Additional staff expenses to set target; Source reduction plan cost estimated at $25,000–$50,000; Outreach campaign estimated at $25,000. Source reduction analysis could be completed before December 31, 2012, recommended measures from the analysis would be phased in based upon logistical and financial constraints.

WASTE REDUCTION

Measure WR-1.2	Develop a consistent funding source for implementing solid waste reduction programs to achieve the greatest operating and natural resource efficiency and benefit the Roseville community.

Community Benefits

Improved air quality

The City of Roseville will identify a consistent funding source to ensure implementation of source reduction programs to reduce the community's projected waste stream and lengthen the lifetime capacity of community's landfill areas. Recent studies have shown that using tiered billing structures motivate customers to save on bills by reducing their household disposal rate.

Timeline	Action		Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Develop a consistent funding source for implementing solid waste reduction programs.	*	*	City Council; Environmental Utilities

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
Supporting measure	*NA*	*NA*
City Costs	***Private Costs***	***Private Savings***
Very low	*Very low*	*Low*

Cost/ Savings Assumptions

City costs – Additional staff time to administer fee, offset by fee revenue. Fee needs to be performance-based and have built-in accountability.

Private costs – Utility fee amount to be determined, but assumed to be < $100/year.

Private savings – Recurring savings through reduced waste generation.

WASTE REDUCTION

Measure WR-2.1 Maximize reuse, recycling and composting programs.

Community Benefits

Improved air quality,
Provide alternative sources of energy,
Improved water quality

The City of Roseville collects all types of waste in a single bin instead of providing separate waste and recycling bins. To meet State targets, this collected waste is then taken to the City's Materials Recovery Facility (MRF), where the waste is separated into groups for recycling, reuse, and disposal in landfills.

The City of Roseville continually explores innovative ways to divert solid waste from landfills. One such program is Roseville's food waste-to-energy biomass project. Contingent upon receipt of grant funding, the City hopes to build a biomass receiving and processing station to accept and process restaurant fats and food waste. This facility would be capable of generating about 2 million kWh of renewable energy. Currently the fats, oils, and grease from restaurants in the community are deposited in the sewer system, where they can cause overflows and blockage. This program would also help to meet federal and State water quality requirements. Additionally, an estimated 3600 tons of food waste could be diverted from the landfill annually.

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Implement a food waste-to-energy biomass project focused on restaurant food waste and grease collection.	*	*	City Council; Environmental Utilities
	B.	Promote businesses such as ReCreate and ReStore to create a viable market for reused articles. [Existing and ongoing]	*		Environmental Utilities
	C.	Promote a viable commercial office paper recycling program, reduced rates as incentive.	*	*	Environmental Utilities
Mid Term (by 2017)	D.	Develop a move-in box/packing peanut reuse program.	*	*	Environmental Utilities
	E.	Develop a community-wide CFL recycling program.	*	*	Environmental Utilities

	Progress Indicators	Target
1	Completion of Phase 1 food fats-to-energy project, generating 1million kWh of renewable energy (methane).	By 2015
2	Completion of Phase 2 food fats to energy project generating another 1million kWh of renewable energy (methane). 3,600 tons of food waste diverted.	By 2020

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
1,090 MT CO_2e/ yr	*NA*	*NA*
City Costs	***Private Costs***	***Private Savings***
Medium – High	*NA*	*Low*

Cost/ Savings Assumptions

City costs – Construction of the biomass receiving and processing station is contingent upon grant funding. Additional staff time will be required to apply for and administer grants.

Private savings – Savings would be gained if a residence or business could reduce waste disposal to the point of not requiring an additional waste container.

WATER

CONTEXT

Water-related greenhouse gas (GHG) emissions are mainly caused by energy required to pump, transport, heat, cool and treat water and wastewater. Emissions from water and wastewater make up about 4.1% of the baseline communitywide GHG inventory.

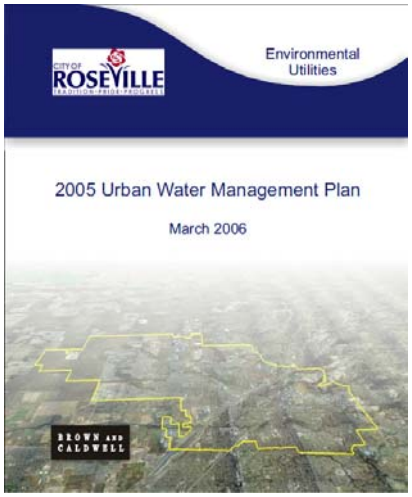
Potable water is a limited resource, and reducing demand is a necessity to ensure that the City can continue to provide adequate water service as the community grows. In 2008, most of Roseville's water use (75%) was from residents of single-family homes, 9% from multi-family units, and 16% from commercial and industrial users. The City estimates that, during the summer months, over half of the water is used outdoors. Thus, water conservation programs must target both indoor and outdoor water use to achieve meaningful demand reduction.

Most of Roseville's water comes from Folsom Lake, and the City also maintains supplemental water supplies through a combination of groundwater wells, reservoirs, and interagency connections. The availability of water supplies changes with growth, climate conditions (e.g., drought years), and legislative requirements. As Roseville manages and operates its own water and wastewater system, water conservation strategies offer a double benefit of reducing energy demand and managing the City's operating and maintenance costs. San Juan Water District (SJWD) and Placer County Water Agency (PCWA) also provide water to certain portions of the city.

The City currently has two wastewater treatment plants – Dry Creek and Pleasant Grove. Recycled water produced at these wastewater plants is used in City parks, medians and golf courses.

As a utility provider, the City of Roseville must comply with continually changing federal, state and regional requirements affecting water and wastewater systems. Some of the guiding laws are:

- **Senate Bill (SB) 7** requires a 20% per capita water use reduction by 2020. Non-compliance would make Roseville ineligible for state grant or loan funding and could lead to re-negotiation of water rights.
- **Urban Water Management Planning Act** requires Roseville to prepare a 25-year plan for efficient use of available water supplies.
- **AB 1881** requires adoption of the Department of Water Resources (DWR) model landscape ordinance or a similar locally specific ordinance to establish water budgets and preferred plant types for landscaping.
- **SB 407** establishes requirements for residential and commercial real property built and available for use on or before January 1, 1994, to replace plumbing fixtures that are not water conserving.
- **National Pollutant Discharge Elimination System** sets standards for discharge of treated wastewater.
- **Green Building Code** effective January 1, 2011, will require 20% reduction of indoor use.



The City updates its Urban Water Management Plan every 5 years. The next update, scheduled for June 2011, will include strategies to meet SB 7 per capita water use reduction requirements.

Existing Water Conservation and Efficiency Policies and Programs

The Public Facilities Element in the City of Roseville General Plan includes goals and policies regarding the management and operations of the community's water and wastewater system. In conjunction with policies in the Air Quality and Climate Change Element, these goals and policies commit Roseville to implement resource efficiency and sustainable programs that conserve natural resources and reduce emissions.


The City provides free water-wise house calls to help establish efficient water irrigation schedules.

Based on the General Plan, water systems may be divided into three broad categories: potable water, wastewater and stormwater. Some notable existing and ongoing water efficiency and conservation policies that directly relate to the SAP are highlighted in Table 3-6, below.

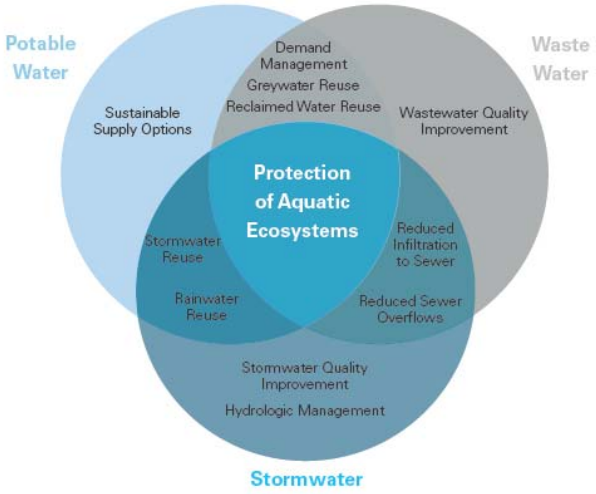


TABLE 3-6 Existing and Ongoing Water Conservation and Efficiency Policies		
Policy Description		**Program Implementation**
A.	Continue implementation of the residential water meter retrofit program. [Completion scheduled for December 2011.]	Water-wise house calls
B.	Continue use of water shortage charge and excess water use charge in rate structure in times of water shortage.	Current Billing Structure
C.	Continue to install dedicated irrigation meters in all new and retrofitted commercial construction.	Landscape water use reviews for commercial properties
D.	Continue to create and refine water budgets for existing landscapes with dedicated irrigation meters.	Cash for grass program; Irrigation efficiency rebate, water budget on-site reviews
E.	Continue recycled water irrigation programs and expand programs where feasible.	*Purple Pipes Keep Roseville Green* Recycled Water Awareness Campaign
F.	Continue to work with City departments to reduce overall water use in City parks, Lighting and Landscape Districts, and facilities.	Water Budget on-site reviews
G.	Continue to offer customers free comprehensive water reviews of their homes, businesses and landscapes to identify inefficiencies.	Water-wise house calls (since 2001); Re-View Water Audits (since 2001)
H.	Continue to develop a demonstration area that features water efficient design and technologies at the Utility Exploration Center.	Ideascape
I.	Continue to incorporate water conservation programs into Roseville school curriculum.	Living-wise resource program, UEC
J.	Continue to attend various community outreach events and speaking engagements touting the conservation message.	Water awareness day, Earth Day, Neighborhood Presentations
k.	Continue to offer rebate and incentive programs to eligible customers to encourage efficient water use.	Washing machine rebates, cash for grass, irrigation efficiency rebates, pool cover rebates, low flow toilet rebates

Replacing old water fixtures with new high-efficient models can generate valuable water conservation benefits.

The following SAP objectives are intended to further reduce GHG emissions, and criteria air pollutants caused directly and indirectly by water use. These proposed measures are designed to meet these objectives:

- **Objective WC-1:** Reduce potable water demand in buildings and landscapes through conservation and alternative sources of water.
- **Objective WC-2:** Implement low impact design techniques to reuse stormwater and minimize pollution of natural water systems.

WATER

Measure WC-1.1 Develop an SB 7 implementation plan to achieve an across the board 20% reduction (gallons per capita per day [GPCD]) in water demand by 2020.

Community Benefits

Reduced energy demand
Reduced water consumption

Based on State legislative requirements (e.g., SB 7, AB 1881, and SB 407), Roseville has been very aggressive in implementing water conservation programs, providing rebates and financial incentives, and organizing public events to raise conservation awareness. The City promotes replacement of old water fixtures, appliances and irrigation systems with newer water-efficient models. The City also continues to explore alternative water sources both for indoor and outdoor use, such as recycled water, and rainwater.

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Evaluate the current four-tier residential rate structure and establish a structure that further encourages water savings in residential use and implement in FY 2011/2012	*	*	City Council; Environmental Utilities
	B.	Encourage model lease provisions that would encourage commercial landlords and tenants to share the liabilities and benefits of water-saving measures.	*	*	Environmental Utilities
	C.	Establish a conservation rate structure (based on water budget billing) for commercial landscapes based on the water budget submitted with original landscape plans or a water budget based on actual planting material and irrigation design.	*	*	City Council; Environmental Utilities;
	D.	Continue to implement a community outreach program in partnership with the water districts to educate residents and business owners regarding how to reduce water bills by implementing various water-sensitive urban design strategies and water needs.	*	*	Environmental Utilities
	E.	Continue to promote the availability of water-efficient products and fixtures at local stores.	*		Environmental Utilities
	F.	Continue to promote the availability of water-efficient and climate-appropriate plants at local nurseries and stores.	*		Environmental Utilities
	G.	Continue to co-market Placer County's mPOWER program to fund large-scale residential and commercial efficiency retrofits.	*	*	Environmental Utilities

Progress Indicators		Target
1	10% per capita water use reduction.	By 2015
2	20% per capita water use reduction	By 2020

Reduction Potential *(in tandem with current programs in Table 3-X)*

GHGs	***PM_{10}***	***NO_X***
3,520 MT CO_2e/ yr	*NA*	*NA*

Costs	***Private Costs***	***Private Savings***
High	*Low to Medium*	*Very Low to Low*

Cost/ Savings Assumptions

City costs – Additional staff time to administer programs.

Private costs and savings – Depend on the fee structure for the water utility. There are no quantifiable savings for water conservation for homes, buildings, or landscapes that are based on a flat rate structure, as the fees are determined by the size of the building or lot. For those homes, buildings, or landscapes that are tied to a metered rate structure, there would be approximately $2.50/month savings for a 20% reduction in water consumption for an average home that consumes 1,900 cu. ft. per month.

WATER

Measure WC-1.2	Develop a consistent funding source to implement water savings programs that achieve the greatest efficiency gain.

Community Benefits

Reduced water demand,
Reduced energy demand

Recent studies regarding utility bills and connections to human habits have consistently shown that water utility customers often use their bills to check for unusual consumption and/or to evaluate the effect of conservation measures. While the City has been proactive in providing financial incentives to be more resource efficient, recommended SAP measures also propose to identify consistent funding sources for such conservation programs, such as tiered-billing rates and utility bill surcharges. These may also further reduce water demand by encouraging property owners to reduce consumption.

Timeline	Action		Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Develop a dedicated and consistent funding source for water conservation incentive programs.	*	*	City Council; Environmental Utilities

Reduction Potential

GHGs	***PM_{10}***	***NO_x***
Included in Measure WC-1.1	*NA*	*NA*

City Costs	***Private Costs***	***Private Savings***
Medium to High	*Very low*	*Low to Medium*

Cost/ Savings Assumptions

City costs – Additional staff time to administer fee, offset by fee revenue. Fee needs to be performance-based and have built-in accountability.

Private costs – Payment of utility fee, amount to be determined, but assumed to be less than $100/year.

Private savings – Recurring savings through reduced water consumption.

WATER

Measure WC-2.1 Work within the established guidelines of the Stormwater Quality Design Manual to maximize implementation of low impact development techniques in the community.

Community Benefits

Habitat restoration, Improved public spaces

Pollution of local natural water systems due to sediments and pollutants in urban runoff is of high concern to the community. The City has developed a stormwater management program in compliance with federal and state requirements. This program includes educating the public regarding stormwater pollution prevention techniques and reducing stormwater runoff from construction sites.

Low impact design techniques allow for innovative stormwater management practices that mimic natural conditions by minimizing runoff from the site and maximizing infiltration and groundwater recharge. By encouraging low impact design techniques in the community, the City will ensure that high water quality is maintained in local creeks and habitat areas.

Timeline		Action	Development		Responsibility
			Existing	New	
Short Term (by 2013)	A.	Identify parks with creeks running through them to implement low impact development programs to enhance water quality, achieve flood control benefits and provide public education. [City demonstration project]	*		Public Works; Park and Recreation; Environmental Utilities
	B.	Provide guidance to homeowners that wish to build rain gardens.	*		Environmental Utilities
Mid Term (by 2017)	C.	The City shall investigate providing incentives to encourage existing residential owners to reroute rainwater from rain gutters into landscapes for infiltration.	*	*	Public Works; Environmental Utilities

Reduction Potential

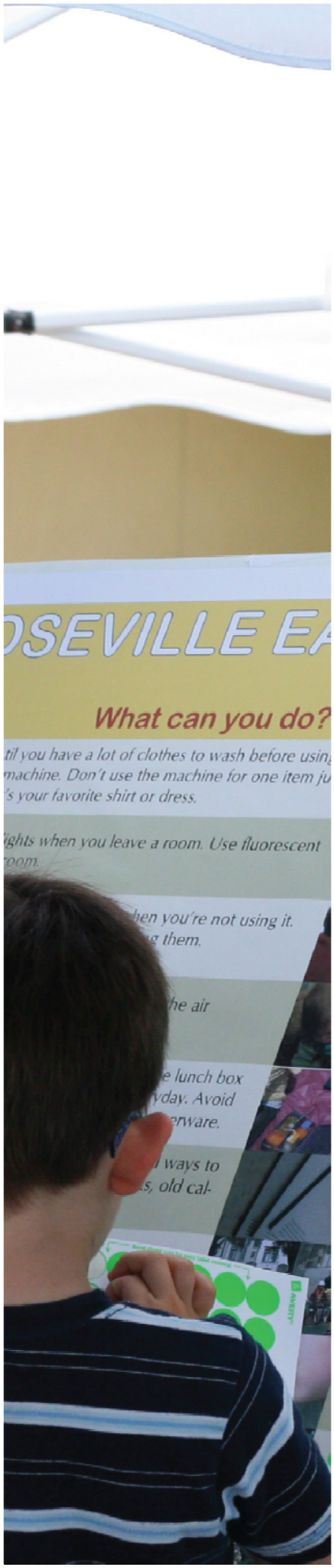
GHGs	***PM_{10}***	***NO_x***
Supporting measure	*NA*	*NA*

City Costs	***Private Costs***	***Private Savings***
Medium to High	*Low to Medium*	*NA*

Cost/ Savings Assumptions

City costs – Additional staff time to administer programs.

Private Costs – depends on soil conditions, type of best management practices (BMP) implemented and the density and types of plants used



MARKETING AND EDUCATION

CONTEXT

Roseville has a long history of successful public outreach. The City recognizes public empowerment is necessary to ensure there is community investment in actions that rely on community participation. Marketing and public education efforts are integral to public empowerment. The right message and access to the best available information helps individuals make informed choices.

The City uses various public outreach methods to involve community members in decisions (e.g., websites, newsletters, surveys, public events, workshops, government access television and social media sites. During the development of the Sustainable Action Plan (SAP), the City Council appointed a 38-member Sustainable Action Committee (SAC) to participate in developing recommend measures and actions for the plan.

The three recommended SAP measures related to marketing and education do not directly account for emission reductions; however, they are central to the successful implementation of the plan.

Most measures and actions recommended throughout the plan rely on voluntary community participation. Therefore, it is critical a robust marketing and education program be put in place early in the implementation period to ensure community awareness and voluntary participation in the measures.

Sustainable Marketing and Education Focus

Objective M-1: Promote awareness and support of the City of Roseville's Sustainability Action Plan by educating the public on issues, encouraging engagement in proposed outlined actions, and targeting marketing efforts for participation by residents, businesses and visitors to meet the emission reduction goals outlined by the SAP.

New state and federal laws and regulations have been enacted or being considered to guide jurisdictions and communities in the reduction of greenhouse gas (GHG) and air pollutant emissions. The City is committed to raising awareness and providing solutions for reducing emissions in support of the community's health and sustainability. For measures and actions related to Objective M-1, refer to:

M-1.1: Develop and implement a community-based social marketing and education/outreach plan to communicate to all community members the measures adopted in the Sustainability Action Plan. The strategy should identify and prioritize various marketing and outreach methods, including but not limited to websites, government/public access television, online newsletters, events, social media, programs/workshops and brochures/fliers. The marketing and outreach strategy should be developed within the first year of plan adoption, and should involve City personnel and community members interested in ongoing involvement.

M-1.2: Promote sustainable lifestyles among residents, businesses and visitors.

.

MARKETING AND EDUCATION

Measure M-1.1 Develop and implement a community based social marketing and outreach/education plan to implement measures adopted in the Sustainability Action Plan. The strategy should identify and prioritize various marketing and outreach methods, including but not limited to websites, government/public access television, online newsletters, events, social media, programs/workshops and brochures/fliers. The marketing and outreach strategy should be developed within the first year of plan adoption, and should involve City personnel and community members interested in ongoing involvement.

Community Benefits

Community involvement, Interaction and networking

Timeline		Action	Applicability		Potential Partners
			Existing	New	
Short Term (by 2013)	A.	Continue to find creative ways of to involving involve residents, businesses and students in sustainability discussions, programs and education. [Existing and ongoing]	*		City Manager, City Council, Chamber of Commerce
	B.	Continue to educate community members regarding water budgets for existing landscapes with dedicated irrigation meters.	*		Environmental Utilities
	C.	Prepare and promote the City's local workforce and students for local and regional green jobs that offer stable employment, career growth and living wages.	*	*	Economic Development, Chamber of Commerce
	D.	Develop a Sustainable Business Outreach program to promote sustainable businesses practices, .	*		Economic Development, Chamber of Commerce
	E.	Coordinate Encourage with Roseville schools, colleges and universities to facilitate programs that include research-based curricula and promote innovative techniques and solutions that address sustainability issues	*	*	City Manager, BECOME

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
Included within all other SAP measures	*NA*	*NA*

City Costs	***Private Costs***	***Private Savings***
Medium - High	*NA*	*Medium - High*

Cost/ Savings Assumptions

City costs - For Actions A – D and F, additional staff time. For Action E, cost of developing a Sustainability Business Outreach program could vary greatly depending on the level of service provided and the number of businesses that make use of the technical assessments and networking opportunities.

Private savings - Participating businesses, through technical assessments and implementing cost-saving strategies to reduce energy use, vehicle miles traveled (VMT), or waste, will generate variable recurring savings that will impact their bottom line.

MARKETING AND EDUCATION

Measure M-1.2 Promote sustainable lifestyles among residents, businesses and visitors.

Community Benefits

Community involvement, Interaction and networking

Timeline		Action	Applicability		Potential Partners
			Existing	New	
Short Term (by 2013)	A.	Provide tools and resources for citizens, businesses, organizations, and visitors to measure and reduce their carbon footprint.	*		RUEC
	B.	Encourage Roseville schools, colleges and universities to use show-and-tell displays for energy, water and waste reduction practices they have implemented in various locations to promote sustainable practices among students.	*	*	City Manager; RUEC, BECOME
	C.	Partner with hotels, motels, and other visitor destinations to provide information regarding public transit, bicycle and pedestrian facilities and promote other sustainable practices, such water conservation practices (changing linens and bedding only when requested by guests, use of dual/low-flush toilets etc), temperature default settings intended to provide a reasonable comfort zone yet save energy, use of recycled paper products and other materials, and reduced use of individually packaged personal care products (soaps, shampoos, conditioners, etc.)	*		Environmental Utilities, Public Works/Transportation, Placer Tourism Board; Chamber of Commerce
	D.	Encourage local restaurants and caterers to find ways to integrate locally-grown food in their menu (also making a viable business case for community gardens and community-supported agriculture) and continue to promote locally grown food.	*		Chamber of Commerce; Placer County Agricultral Comissioner; Placer Grown
	E.	Encourage expansion of green building displays and demonstration projects at the Roseville Utility Exploration Center (RUEC) and future outdoor projects and use them to showcase innovative green building materials and practices.	*		RUEC
Mid Term (by 2017)	F.	Promote deconstruction and reuse of building materials through written outreach materials such as a brochure on residential remodeling, and through direct consultations with builders.	*	*	Chamber of Commerce; BIA, Planning Department, Contractor's Association;
	G.	Coordinate with local artists and art schools to encourage and fund art projects that heighten awareness of sustainability.	*		Roseville ARTS
	H.	In collaboration with community partners and neighborhood associations, launch a *Green Neighborhood Challenge* and *Green Star Household* program to recognize neighborhoods and families making the most positive changes.	*		RUEC; RCONA
	I.	Consider developing and adopting a *Buy Local* outreach program that would give purchasing preference to local businesses.	*	*	Chamber of Commerce

Reduction Potential

GHGs	***PM_{10}***	***NO_X***
Included within all other SAP measures	*NA*	*NA*

City Costs	***Private Costs***	***Private Savings***
Medium to High	*NA*	*NA*

Cost/ Savings Assumptions

City costs - Additional staff time for collaboration and coordination.

MARKETING AND EDUCATION

Resource Information

This portion provides an overview of an approach to be used when developing the community-based social marketing plan for the SAP.

City Website

Roseville will use its website – and various department pages – to communicate to the community the plan objectives and programs, services, and events aimed at meeting those goals. The website may contain news stories, web banner ads, press releases and videos to get those messages to the various audiences. The City is encouraged to create a page dedicated to promoting sustainability through its programs and services – a one-stop shop for information.

Newsletters

Roseville has several different types of newsletters sent to the community, including those that are electronic newsletters and the utilities newsletters which are sent to electric, water, sewer, garbage and wastewater customer in their monthly utility bills. These newsletters reach all demographics in our community including Roseville business owners. These newsletters will feature stories on the importance in living in a sustainable fashion, and provide information on the programs, services and resources available to various demographic groups to meet the plan objectives.

Bill Messages

Roseville's utilities has messages printed on monthly electric, water, sewer, garbage and wastewater bills that direct customers to programs, services and resources aimed at using conserving power and water to protect our natural resources.

Program Guides

The Roseville Utility Exploration Center offers a variety of workshops, events and programs that encourage sustainable lifestyles. The Center's staff creates a workshop and program guide available on line and in hard copy explaining the scheduled courses and workshops. The programs are open to residents and non residents.

Events

The Roseville Utility Exploration Center hosts annual events, including but not limited to Earth Day, Solar Day and Water Awareness Day. These events are held to educate residents about sustainable living while offering programs and services to protect our natural resources by reducing energy and water use.

Direct Mail

Roseville Electric and Environmental Utilities may use direct mail to its customers to encourage participation in programs and services that reduce power and water use, thereby promoting sustainable lifestyles.

Fliers, Brochures, Maps

Roseville Electric, Environmental Utilities Department and Public Works' Transportation Division created fliers, brochures and maps for all demographic groups in Roseville. These hard copy pieces promote energy efficiency programs, water efficiency programs, green workshops, waste reduction services and tips, programs to preserve local creeks and streams, public transportation, and bike and pedestrian paths. These programs and services all work toward the goal of reducing our community's impact on the environment and this plan's objective to reduce greenhouse gas emissions through sustainable living practices.

Government Access Television

Through is programming, Roseville City staff will use its government access channel to promote city programs and services that encourage sustainable lifestyles.

Social Media

The City may use approved social media tactics to communicate plan objectives in an attempt to change community members' behavior.

Community-based Social Marketing

Roseville will use a comprehensive Community-based Social Marketing (CBSM) approach to guide implementation of the recommended SAP measures. CBSM focuses on local education and outreach strategies developed with community input to identify barriers and benefits to public action, methods that will effectively alter individual and group behavior to achieve local goals, and an ongoing public process by which strategies are periodically evaluated for their effectiveness across all segments of the community. A CBSM strategy will ensure that public outreach and programs are designed in a manner capable of effectively changing people's behavior. In order to change behavior, it is important to understand two basic assumptions:

What may prevent community members from engaging in the desired sustainable behavior?

What leads individuals within the community to engage in behavior that collectively is sustainable?

Marketing and outreach programs should be developed accordingly. A CBSM program tailors social marketing strategies for each sustainability objective based upon the identified barriers to implementation. To create an effective CBSM strategy, it is important to sort through the competing theories of barriers to implementation and discover the actual barriers that inhibit individuals from engaging in the desired activity. Prior to implementing the strategies proposed in the SAP, it is important to collect information that will properly inform the CBSM program

Ten Steps toward Successful Community-based Social Marketing

1. Establish specific targeted goals for each objective within the SAP.
2. Establish a timeframe for implementation of a CBSM pilot program.
3. Research barriers to successful implementation of the desired sustainability behavior change.
4. Identify and match behavior change tools to the identified barriers for desired outcome.
5. Develop a pilot CBSM program with strategies that use behavior change tools targeted at the identified barriers within the Roseville community. This program may include several of the information and incentive tools already identified in the SAP.
6. Identify a targeted sample audience to pilot the CBSM program. It is important to implement within a small portion of the community to know that a strategy will work before implementing on a large scale.
7. Implement a CBSM pilot program.
8. Evaluate the program and refine, if necessary
9. Implement the program on a community-wide basis.
10. Evaluate the program on a regular basis.

Identifying Barriers through Primary and Secondary Research

If any form of sustainable behavior is to be widely adopted by the Roseville community, then barriers to engaging in the activity must first be identified. Since the barriers that prevent individuals from engaging in sustainable behavior are activity specific, the CBSM program needs to develop strategies only after a particular activity's barrier has been identified.

Roseville's SAP includes many different types of sustainable activities, each of which will have different barriers (e.g., alternative transportation, renewable energy, water conservation). Identifying barriers for each Roseville SAP objective can be done through a combination of primary and secondary research. Many professional and community organizations have access to national or possibly local research which could be useful to better understanding barriers to implementation.

In addition to national and local organizations, numerous CBSM case studies exist for each of the identified objectives (transportation, land use, water, energy, and waste) within the SAP. A review of these case studies would assist in identifying barriers and developing successful CBSM tools. A sample of recommended case studies and secondary research sources for each SAP strategy is provided at the end of this section.

Secondary research assists in identifying issues to be explored further with Roseville residents through primary research (i.e., focus groups, public meetings, phone/mail/electronic surveys). Primary research is critical to determining the specific barriers for successful implementation of the SAP.

Focus groups provide valuable in-depth information about what issues residents see as important and also how they speak about the topic. Focus groups will help enrich the understanding of the SAP action, which will help with understanding more in-depth the barriers to implementation and framing key messaging, as well as ensuring that a more comprehensive survey will be well-constructed and that questions contained in the survey will be readily understood by the respondents. However, results from focus groups cannot be extrapolated to represent the broader population. A survey that provides multivariate statistics allows for determination of the factors that distinguish householders who engage in a particular activity from those who don't, and also enables analysis of the relative importance of these factors. Knowing which factors are most important in distinguishing individuals who have adopted a sustainable behavior from those who have not is an essential first step in developing a CBSM strategy.

Community-Based Social Marketing Tools

Commitment Techniques

Obtaining commitments (preferably written and public) by community members is a powerful way of increasing public participation rates in sustainable behavior. For community-wide programs such as Roseville's SAP, using existing volunteer groups to procure commitments from Roseville residents (e.g., neighborhood associations, community organizations, athletic clubs, business groups) and/or commit to engaging in the sustainable behavior. It is important that commitments should be sought only for behaviors which people express interest in doing.

Examples

Alternative Transportation - Ask Roseville Schools Parent Teacher Organizations to publicly commit to using alternative means of transportation to get to school for 3- of the 5-days a week for an entire school year. Engage the athletic teams to participate in a ride your bike to school program for an entire year.

Water Conservation – Ask homeowners to make a commitment to raise the height of their lawnmower, thereby reducing evaporation and the need for lawn watering.

Prompts

Prompts are visual or auditory aids which remind us to carry out an activity that we might otherwise forget. Prompts can be used to encourage repetitive behaviors that promote sustainability. They should be self-explanatory, explicit, noticeable and be delivered as close in space and time as possible to targeted behavior.

Examples

Waste Reduction – Use shelf talkers at the point of sale to promote source reduction.

Energy Conservation – Use signs to encourage drivers to turn off their engines while parked in locations where drivers frequently wait (e.g., schools, train stations, stores).

Norms

Publicizing high participation rates of a specific sustainable behavior and modeling that behavior creates opportunities for others to participate. Norms need to be internalized by people. That is, people need to view the behavior which the norm prescribes as the way they *should* behave. The adoption of new behaviors, such as recycling and composting, frequently occurs as a result of friends, family members or colleagues introducing us to them. This process is referred to as social diffusion. Social diffusion is one CBSM tool that is used infrequently and yet with remarkably long-term results.

Examples

Water Conservation – Communicate the percentage of people who comply with the City's request to restrict summer water use.

Waste Reduction – Affix a decal to the recycling container indicating that the household buys recycled products.

Alternative Transportation – Publicize Roseville residents who have made commitments to reduce the number of trips made in cars.

Communication

Promoting sustainable behavior and developing key messaging that resonates with the Roseville community are critical in a successful CBSM program. Have the message delivered by individuals or organizations who are credible with the intended audience. Also, frame the message to indicate what the individual is losing by not acting, rather than what he or she is saving by acting. Provide feedback at both the individual and community levels about the effects of sustainable behavior.

Examples

Energy Conservation – Send mailers to households that indicate the extent to which they had been able to reduce energy use over the same month during the previous year.

Transportation – Provide daily tips on reducing gasoline usage.

Incentives

- Incentives have been highlighted extensively throughout the SAP. Key considerations regarding incentives include:
- Incentives can be effective when motivation to engage in sustainable behavior is low.

- Closely pair the incentive and the behavior, e.g., receiving a discount on your grocery bill when you use reusable bags.
- Use incentives to reward positive behavior.
- Incentives need to be visible.
- Be cautious about removing incentives.

Convenience

If the sustainable behavior is inconvenient, unpleasant, costly or time consuming than it can be impossible to expect a large number of people to adopt it. Identifying ways to remove external barriers can be done by researching and presenting examples in other, similar communities where the public regularly practices the desired behavior. Also, making the activity that you wish to discourage less convenient and more expensive can increase motivation for the behavior you want to encourage.

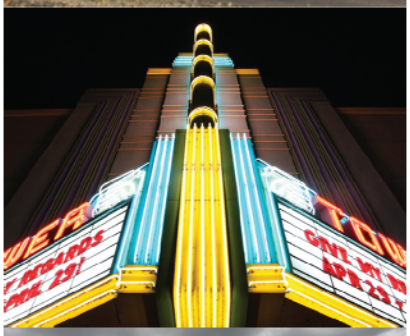
Examples

Water Conservation – Have home auditors install water saving devices during home visits to make them more convenient and provide useful information on easy-to-implement and cost-effective water conservation practices.

Energy Conservation – If it is perceived to be too expensive to upgrade insulation or install energy-efficient windows, allow renovations to be paid through savings in energy use.

Community-based Social Marketing Case Studies

Transportation	Land Use	Water Resources	Energy	Solid Waste
Case Study: *Sustainable Modes of Transportation in Boulder Colorado*, Contact Bob Whitson, Senior Transportation Planner at WhitsonB@ci.boulder.co.us	**Case Study:** *Connecting Transportation and Land Use Systems Initiative/Identifying and Evaluating Regionally Significant Walkable Urban Places* http://www.reconnectingamerica.org/public/display_asset/ctlus_pdf	**Case Study:** *Encouraging Dog Owners to Pick-up Dog Droppings in Chicago, Illinois* Jason, L. A., Zolik, E. S., & Matese, F. J. (1979). *Prompting dog owners to pick up dog droppings.* American Journal of Community Psychology, 7, 3, 339-351.	**Case Study:** *Reducing Energy Consumption in Iowa City* www.toolsofchange.com/English/CaseStudies/default.asp?ID=8	**Case Study:** *Consumer research survey regarding recycled-content products in King County, Washington* www.toolsofchange.com/English/CaseStudies/default.asp?ID=8
Local Resources: City of Roseville Alternative Transportation http://www.roseville.ca.us/transportation/default.asp Biking Roseville Sacramento Area Bicycle Advocates http://www.sacbike.org Friends of Light Rail http://www.friendsoflightrail.org Sacramento Regional Transit www.sacrt.org ULI Sacramento District Council TOD Advisory Council www.ulisacramento.org National Center for Safe Routes to School www.saferoutesinfo.org Safe Routes to School National Partnership http://www.saferoutespartnership.org	**Local Resources:** City of Roseville Community Development; Planning and Redevelopment http://www.roseville.ca.us/planning/default.asp American Planning Association www.planning.org Building Industry Association www.northstatebia.org Urban Land Institute www.ulisacramento.org Reconnecting America www.reconnectingamerica.org Making Cities Livable www.livablecities.org	**Local Resources:** City of Roseville Environmental Utilities http://www.roseville.ca.us/eu/default.asp Placer County Water Agency www.pcwa.net Association of California Water Agencies www.acwa.com Water Education Foundation www.watereducation.org	**Local Resources:** Roseville Electric http://www.roseville.ca.us/electric PG&E www.PGE.com SMUD www.smud.org Alliance to Save Energy www.ase.org American Council for Energy Efficient Economy www.aceee.org Association of Home Appliance Manufacturers www.aham.org Energy and Environmental Building Association www.eeba.org US DOE Energy Efficiency and Renewable Energy www.eere.energy.gov California Institute for Energy Efficiency www.ciee.ucop.edu Consortium for Energy Efficiency www.cec1.org	**Local Resources:** City of Roseville Solid Waste Division http://www.roseville.ca.us/eu/solid_waste_utility/default.asp Western Placer Waste Management Authority www.wpwna.com California Department of Resources Recycling and Recovery www.calrecycle.ca.gov



4 CONCLUSION

Roseville is a growing community in a growing region that anticipates both infill and greenfield development. Over the next decade, the community anticipates adding both residents and jobs in new specific plan areas, such as Sierra Vista and Creekview. Considering the existing suburban community form and projected growth trends, the City recognizes the high potential for communitywide emissions increases due to human activities such as driving, construction, energy and water use, and solid waste disposal.

SUMMARY

The City of Roseville *Communitywide Sustainability Action Plan* (SAP) recommends 11 *primary* measures that allow Roseville to meet its communitywide greenhouse gas (GHG) emission reduction target for 2020. The SAP includes other supporting measures that achieve emission reductions, but could not be quantified, due either to a lack of substantial evidence or limitations inherent in quantifying the effect of less tangible programs and policies. The City recognizes that reductions will also occur based on statewide implementation of Assembly Bill (AB) 1493 (Pavley), Low Carbon Fuel Standards (LCFS) and Renewable Portfolio Standards (RPS). The combined effect of these regulations and measures recommended in the SAP are capable of achieving the communitywide efficiency-based reduction target of 6.0 metric tons of carbon dioxide equivalent emissions (MT CO_2e) per service population per year by 2020. In addition to reducing GHG emissions in the community, the measures described in this plan also improve overall quality of life by promoting smart growth and mobility principles that better connect the community, reduce air pollution, increase energy independence, reduce non-renewable energy and potable water consumption, reduce waste generation and increase diversion from landfills, and encourage healthy lifestyles.

The SAP implements Roseville's *General Plan 2025* by identifying ways to reduce communitywide emissions. The recommended measures will be implemented in tandem with the municipal measures identified in the *City of Roseville Greenhouse Gas Emissions Reduction Plan Analysis* to achieve emission reductions that address both communitywide and municipal sources. These measures were developed considering input from the Sustainability Action

Committee and City staff. Other opportunities for communitywide participation and input were provided, such as Earth Day events, and City website updates.

The estimated level of GHG reduction from the recommended SAP measures can only be realized if the identified progress indicators and targets are achieved throughout the course of implementing the SAP. As a whole, the measures were designed and benchmarked to specific standards that would enable the community to achieve its GHG reduction target of 6.0 MT CO_2e per service population per year by 2020. As proposed, the SAP meets this target even if statewide reductions from AB 1493 and LCFS are not assumed in the calculations.

Implementation

For the SAP to successfully guide Roseville toward meeting its emissions reduction target, the City must play a prominent role in implementing the SAP programs and policies. The SAP therefore includes a recommendation to seek funds to coordinate implementation of the communitywide and municipal emission reduction plans.

The City recognizes that empowering the public to participate in and ensure success of the measures and actions is important to ensure that there is community investment in actions that rely on community participation. The SAP outlines a community-based social marketing strategy to support these efforts.

To monitor successful implementation of the SAP and track its progress toward 2020, the communitywide GHG emissions inventory should be updated approximately every 4 years. During these updates, the community may also evaluate the performance of recommended measures, and investigate new measures that have not been recommended currently due to financial or technical constraints to determine their applicability in the future.

ACRONYMS

AB	Assembly Bill
ADA	Americans with Disabilities Act
ARB	California Air Resources Board
BAAQMD	Bay Area Air Quality Management District
BRT	Bus Rapid Transit
CBSM	Community-based social marketing
CEC	California Energy Commission
CEQA	California Environmental Quality Act
EPA	U.S. Environmental Protection Agency
EO	Executive Order
GBC	California Green Building Code
GHG	Greenhouse gas
GWP	Global Warming Potential
HOV	High-occupancy-vehicle
ICLEI	International Council of Local Environmental Initiatives, renamed to "ICLEI – Local Governments for Sustainability"
ITS	Intelligent Transportation System
LCFS	Low Carbon Fuel Standard
LED	Light-emitting diode
LID	Low impact development
LOS	Level of Service
MPG	Miles per gallon
MPO	Metropolitan Planning Organizations
MRF	Material Recovery Facility
MT CO_2e	Metric tons of carbon dioxide equivalent emissions
NO_X	Oxides of nitrogen
PG&E	Pacific Gas and Electric
PM_{10}	Particulate matter with an aerodynamic diameter of 10 micrometers or less
RT	Roseville Transit
RPS	Renewable Portfolio Standard
SAC	Sustainability Action Committee
SACOG	Sacramento Area Council of Governments
SAP	Communitywide Sustainability Action Plan
SB	Senate Bill
SP	Service Population
TSM	Transportation system management
VMT	Vehicles miles traveled

COMMONLY USED TERMINOLOGY

GREENHOUSE EFFECT

The greenhouse effect is a natural process. Without naturally occurring GHGs in the atmosphere – such as water vapor, carbon dioxide, nitrous oxide and methane, our planet's surface temperature would be essentially uninhabitable. However, increased concentrations of GHGs in the atmosphere can also cause global warming and climate change consequences by magnifying the greenhouse effect, trapping excessive solar heat.

CLIMATE CHANGE

Climate change is defined as alterations to regional climatic events such as rainfall patterns, evaporation and cloud formation.

WHAT IS A TON OF CARBON?

A ton of carbon is equivalent to:

- Travel 5,000 miles in an airplane, (e.g., a roundtrip between Roseville and New York).
- Drive 2,500 miles in a medium-sized car, (e.g., driving one-way from Roseville to New York.)
- Cut down and burn a tree that was about one foot in diameter and 40 feet tall

Adapted from Nature Conservancy, Carbon Footprint Calculator

WHAT IS A METRIC TON OF CARBON DIOXIDE EQUIVALENT?

Carbon Dioxide Equivalency is a conversion method used to express the global warming potential (GWP) of multiple GHGs using a consistent unit of measurement, metric tons of carbon dioxide equivalent (MT CO_2e). The measurement is expressed in terms of the amount of carbon dioxide (CO_2) that would have the same GWP as the mixture. For example, methane is twenty-five times more potent than carbon dioxide, giving it a GWP of 25.

APPENDIX A:

SUSTAINABLE ACTION PLAN EMISSIONS INVENTORY AND PROJECTIONS METHOD AND ASSUMPTIONS

This appendix summarizes the methods and assumptions used to calculate the emission inventory and projections for greenhouse gas (GHG) and air pollutants emissions for the Sustainable Action Plan (SAP).

Communitywide Greenhouse Gas Inventory

The purpose of a greenhouse gas (GHG) emissions inventory is to identify sources and levels of GHG emissions to enable policy makers to implement cost-effective GHG-reduction strategies, in policy areas over which they have operational or discretionary control.

AECOM has developed a GHG emissions inventory (inventory) for community-wide and GHG emission sources for the 2008 base year in the City of Roseville. This inventory will be used to establish an emissions baseline for the Communitywide Sustainability Action Plan (SAP).

A "sector" is a distinct subset of a market, society, industry, or economy, whose components share similar characteristics. With respect to GHG inventories, sectors can be thought of as public or private, with associated subsectors, although the Intergovernmental Panel on Climate Change (IPCC) defines sectors that cut across the public and private sectors: such as energy, industrial processes and waste. For purposes of the communitywide GHG inventory, the public and private sectors are separated, and further broken down into categories of energy (residential/commercial/industrial), transportation (on-road mobile sources), waste, and water (technically a subset of the energy sector).

The inventory was compiled for the following emission sectors: residential and non-residential (i.e., commercial and industrial) electricity and natural gas use (i.e., energy use); transportation; solid waste; water use; and wastewater treatment. The City previously completed a GHG emissions inventory for government-related (i.e., municipal) operations for operational year 2005 in 2008. Government-related GHG emission sources, which include government buildings, vehicle fleets, solid waste, streetlights, and other government-owned/operated facilities, can be considered a subset of the community-wide emissions inventory.

AECOM also prepared a communitywide GHG emission projection for 2020 under a business-as-usual scenario (i.e., a scenario without the GHG reduction measures that will become part of the SAP). In some cases, GHG reductions are anticipated to occur (despite a growing population) due to programs and regulations applied at the federal and state levels (e.g., low carbon fuel standards and renewable energy portfolio requirements). Because there is limited knowledge on the level of implementation of federal and state GHG reduction measures at the time of inventory preparation, and in order not to minimize the importance of local government actions in achieving the State's GHG reduction goals as outlined in Assembly Bill 32, quantitative reductions attributable to federal and state actions are not accounted for in the 2020 projections.

There is currently no agency-adopted or recommended protocol for preparing community-wide GHG emissions inventories. The field of practice and available tools and methods continue to evolve in absence of standardized guidance. This affords the City considerable flexibility in establishing a defensible approach to estimating GHG emissions that reflects local conditions and priorities.

A summary of the baseline (2008) community-wide GHG emissions, 2020 projection, and calculation methodologies employed are discussed below.

Overview

The inventory includes community-wide GHG emissions associated with energy use (i.e., electricity and natural gas) for residential and non-residential land uses, mobile-source emissions associated with on-road vehicles, solid waste disposal, wastewater treatment, and water consumption. The inventory also includes municipal emissions as a subset of the total community-wide emissions.

Analysis

Emission Factors

An emission factor is a representative constant that relates the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant (EPA 2010). Although there is currently no adopted protocol for preparing community-wide GHG emission inventories, several reputable sources of information can be used to gather emissions information.

Sources of GHG emission factors used in preparing the communitywide inventory include:

- California Air Resources Board (ARB): On-Road Mobile-Source Emission Factor Model (EMFAC2007), Version 2.3.
- The California Climate Action Registry (CCAR): General Reporting Protocol, Version 3.1, 2009.
- California Energy Commission (CEC): California Energy - Water Relationship Staff Report (CEC-700-2005-011-SF)
- Intergovernmental Panel on Climate Change: IPCC Guidelines for National Greenhouse Gas Inventories, 2006.
- Roseville Electric Annual 2007 Entity Emissions.
- U.S. Environmental Protection Agency (EPA): Waste Reduction Model (WARM), 2009.

These emission factors likely represent GHG emissions from activities occurring in Roseville. Transportation data from the Sacramento Area Council of Governments (SACOG), based on the SACSIM travel model, was also used in conjunction with EMFAC2007 to develop on-road mobile-source GHG emissions.

Demographic Data

GHG emissions inventory projections for certain sectors were calculated using anticipated development levels and resulting population as described within the City of Roseville General Plan Housing Element for 2008 and 2015. Growth rates from the U.S. Department of Energy-Energy Information Administration were also used (DOE 2010).

Consumption Data

The inventory was prepared using consumption and generation data from the following sources:

- Pacific Gas and Electric (PG&E) for residential and non-residential natural gas consumption data.
- Roseville Electric for residential and non-residential electricity consumption data and projections.
- California Integrated Waste Management Board (CIWMB) for waste generation and characterization data.
- South Placer Regional Wastewater and Recycled Water Systems data.
- Water consumption data from the City of Roseville.

Each of these sources is directly applicable to the communitywide inventory.

Methodology

Communitywide 2008 GHG emissions were calculated using a "bottom-up" approach, which involves multiplication of an emission factor for a given process by a consumption rate for that process. This approach ensures the highest level of control over the quality of the data used to generate the emissions inventory.

Table A-1 and Exhibit A-1 summarize the magnitude and relative contribution of baseline and projected emissions for each sector.

TABLE A-1
Roseville 2008 and 2020 Communitywide GHG Emissions

Community Sector	2008 Inventory Emissions		2020 Inventory Emissions	
	MT CO_2e	Percent	MT CO_2e	Percent
Residential Energy Use[1]	156,267	13%	185,639	13%
Commercial/Industrial Energy Use[1]	292,730	24%	309,935	22%
Residential Natural Gas Use	102,996	9%	110,412	8%
Commercial/Industrial Natural Gas Use	53,827	4%	54,021	4%
On-road Mobile-sources[2]	530,088	44%	633,494	46%
Solid Waste	13,110	1%	18,521	1%
Wastewater Treatment	39,068	3%	54,116	4%
Water Use	14,298	1%	19,805	1%
Total	**1,202,383**	**100%**	**1,385,943**	**100%**
Per Capita (MT/Person)[3]	**11**		**9**	
Roseville Railyard[4]	**25,927**		**-**	

Notes: CO_2e = carbon dioxide equivalent; MT= metric tons.

[1] Electricity estimates are for 2009 and 2019, based on data from Roseville Electric.

[2] 2008 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM Traffic Model.

[3] Based on 2008 and 2020 populations of 109,154 and 151,199; the 2020 population was linearly extrapolated from the 2015 General Plan population of 133,680.

[4] Railyard emissions include only those generated in the portions of the railyard lying in Placer County. Emissions associated with pass-through trips are not included.

Source: Data compiled by AECOM 2010.

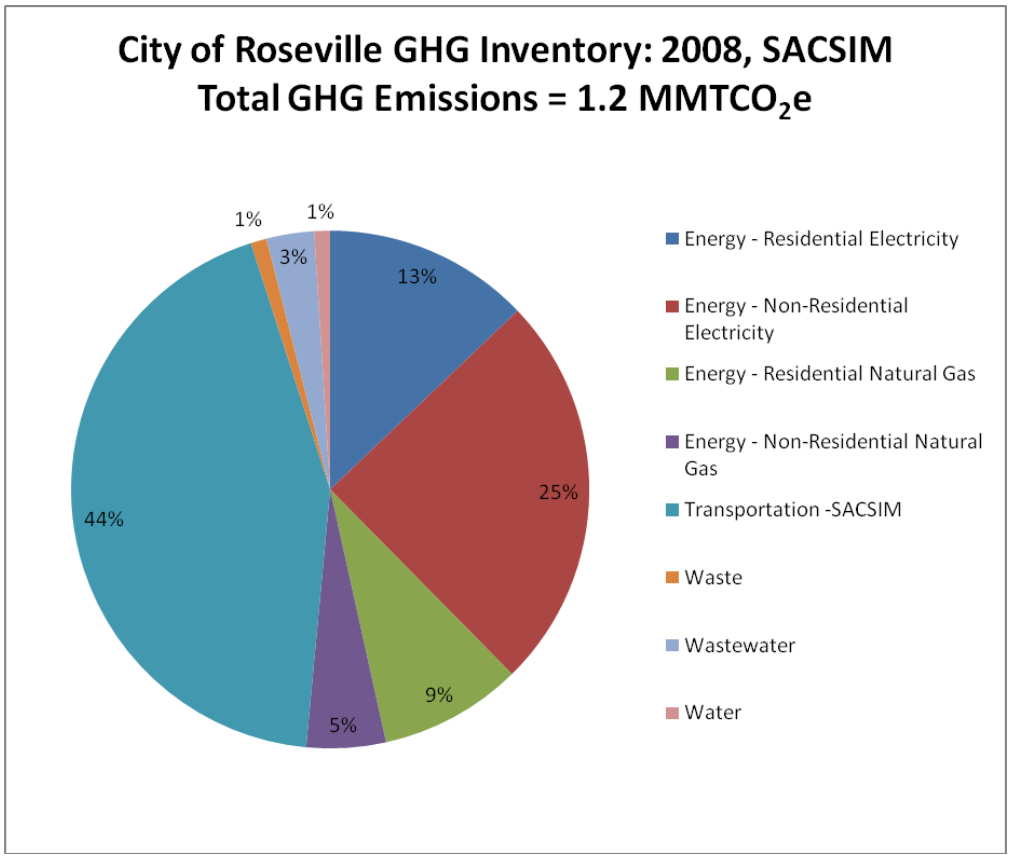


Exhibit A-1: ***Roseville Communitywide GHG Inventory by Sector: 2008 and 2020***

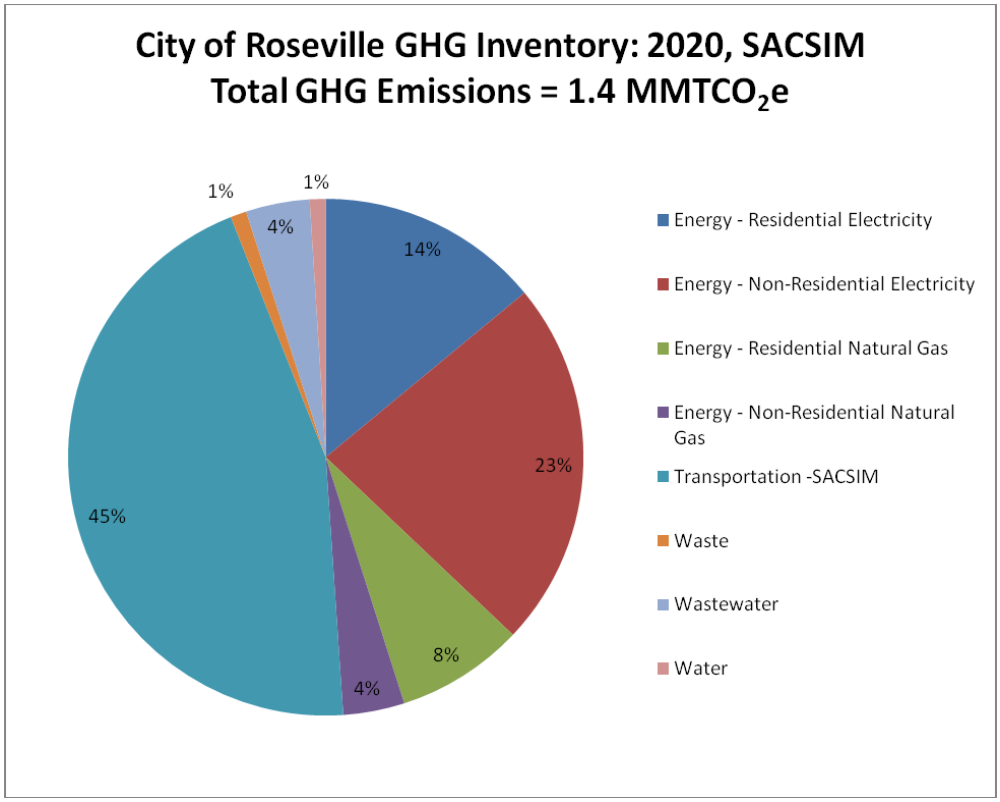


Exhibit A-2: ***Roseville Communitywide GHG Inventory by Sector: 2008 and 2020 (Continued)***

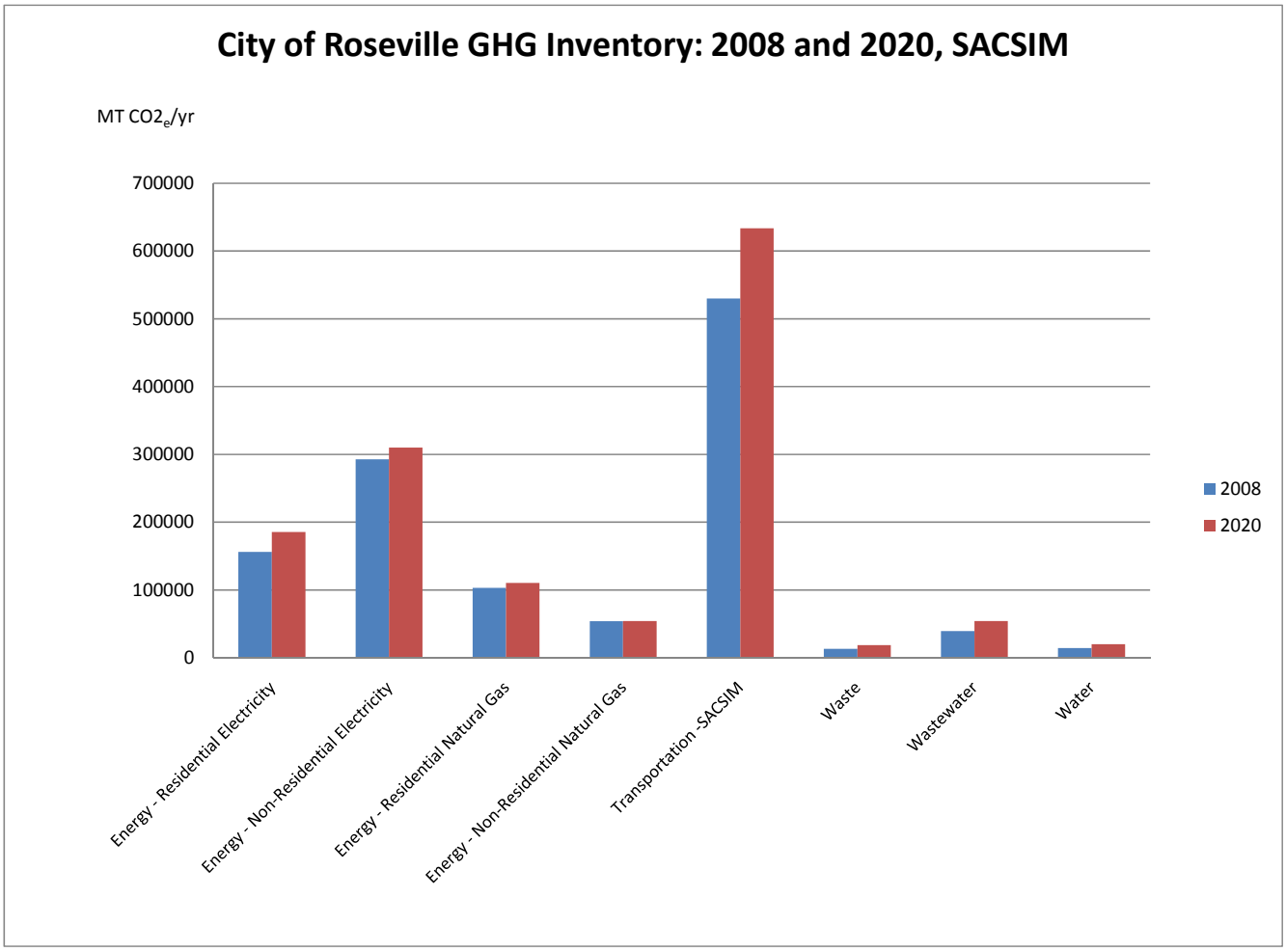


Exhibit A-3: ***City of Roseville GHG Inventory: 2008 and 2020, SACSIM***

Each GHG emissions sector is discussed in the following sections.

Residential and Non-Residential Energy

Electricity use data for residential and non-residential land uses were obtained from Roseville Electric; residential consumption was reported separately from commercial consumption, and industrial consumption was combined with commercial consumption. All electricity consumption within the City of Roseville, including electricity consumption by Roseville Electric not related to generation, was included in the calculation of electricity-related GHG emissions. Electricity generation for the purposes of sales outside the City, or sales to other utilities were not included to avoid double-counting, as those sales would be included as electricity consumption in other GHG inventories outside the City.

Residential and non-residential electricity-related GHG emissions and projections were calculated using bottom-up calculation methods with Roseville Electric CO2 emission factors. Electricity demand from Roseville Electric's 2009 Long-Term Forecast was used in conjunction with Roseville Electric emission factors to estimate future GHG emissions associated with electricity use.

Natural gas use data were obtained from PG&E. PG&E's natural gas consumption data were combined with CCAR emission factors to estimate current GHG emissions. Future projections were based on natural gas consumption growth rates from U.S. Department of Energy's Energy Information Administration (EIA 2010, Pacific Region).

Mobile Sources

On-road mobile-source GHG emissions and projections were calculated using a bottom-up method based on vehicle miles traveled (VMT) data obtained from SACOG and Fehr and Peers. VMT data from the SACSIM travel model was available for years 2005 and 2035. AECOM interpolated the VMT data linearly to derive VMT for the

inventory base year (2008) and for the projection year (2020). Numbers of trips for 2008 and 2020 were estimated based on an average trip length of 11 miles. Interpolated VMT data were combined with EMFAC2007 running CO_2 emission factors to calculate on-road mobile-source CO_2 emissions using California-based emission factors and vehicle-fleet distributions for Placer County for analysis years 2008 and 2020. Starting CO_2 emissions were calculated using average starting emission factors from EMFAC2007 and numbers of trips in 2008 and 2020. N_2O and CH_4 running emissions were calculated using interpolated VMT combined with fleet-averaged emission factors from CCAR. Starting and running emissions were summed to obtain total on-road mobile source GHG emissions.

Trips that did not begin or end in Roseville were accounted for by apportioning 50 percent of VMT (and associated emissions) to Roseville for internal-to-external and external-to-internal trips. VMT, (and associated emissions) resulting from internal-to-internal trips were allocated 100 percent to Roseville. Pass-through trips that neither begin nor end in Roseville were not counted in the analysis. This methodology is consistent with Regional Target Advisory Committee (RTAC) recommendations in response to SB 375.

Solid Waste

GHG emissions and projections from solid waste disposal were calculated using a bottom-up method relying on City waste generation data, CIWMB waste characterization data, and emission factors contained in EPA's WARM model.

Wastewater Emissions

Domestic wastewater treatment emissions were calculated using City and South Placer Regional Wastewater and Recycled Water Systems influent quality and treatment process data. GHG emissions were calculated using IPCC methodology for centralized, aerobic wastewater treatment plants. Projections were calculated using population data from the City's General Plan Housing Element as an indicator of growth in wastewater-related GHG emissions.

Water Consumption Emissions

GHG emissions associated with water use (i.e., conveyance and distribution) were calculated using a bottom-up method based on City water supply data, CEC electricity demand factors, and CCAR emission factors. Projections were calculated using population data from the City's General Plan Housing Element as an indicator of growth in water use-related GHG emissions. The City's Urban Water Management Plan (UWMP) was written in 2005, and 2008 projected demand was based on growth and consumption projections made in 2004. Projected demand from the UWMP in 2008 did not match water consumption in that year; therefore, water consumption data were obtained from the City, which reflect actual use in 2008.

Discussion

Total communitywide GHG emissions are anticipated to grow by approximately 16% between 2008 and 2020 under a business-as-usual scenario, due largely to projected growth. The largest sources of GHG emissions for the 2008 baseline and 2020 projection years are the following, in descending order:

- on-road mobile sources (~44%)
- non-residential electricity consumption (~24%)
- residential electricity consumption (~13%)
- residential natural gas consumption (~8%)

Most of the remaining sources are similar in magnitude (~4% each of the total GHG emissions in 2008 and 2020):

- non-residential natural gas consumption
- wastewater treatment

The smallest sources of GHG gas emissions considered in the current analysis are solid waste and water consumption which compose approximately 1% each of the total GHG emissions in 2008 and 2020.

Government-related (municipal) GHG emission sources, which include government buildings, vehicle fleets, solid waste, streetlights, and other government-owned/operated facilities, can be considered a subset of the community-wide emissions inventory. As shown in Exhibit 3, Roseville's current municipal emissions make up approximately 2% of the communitywide emissions profile.

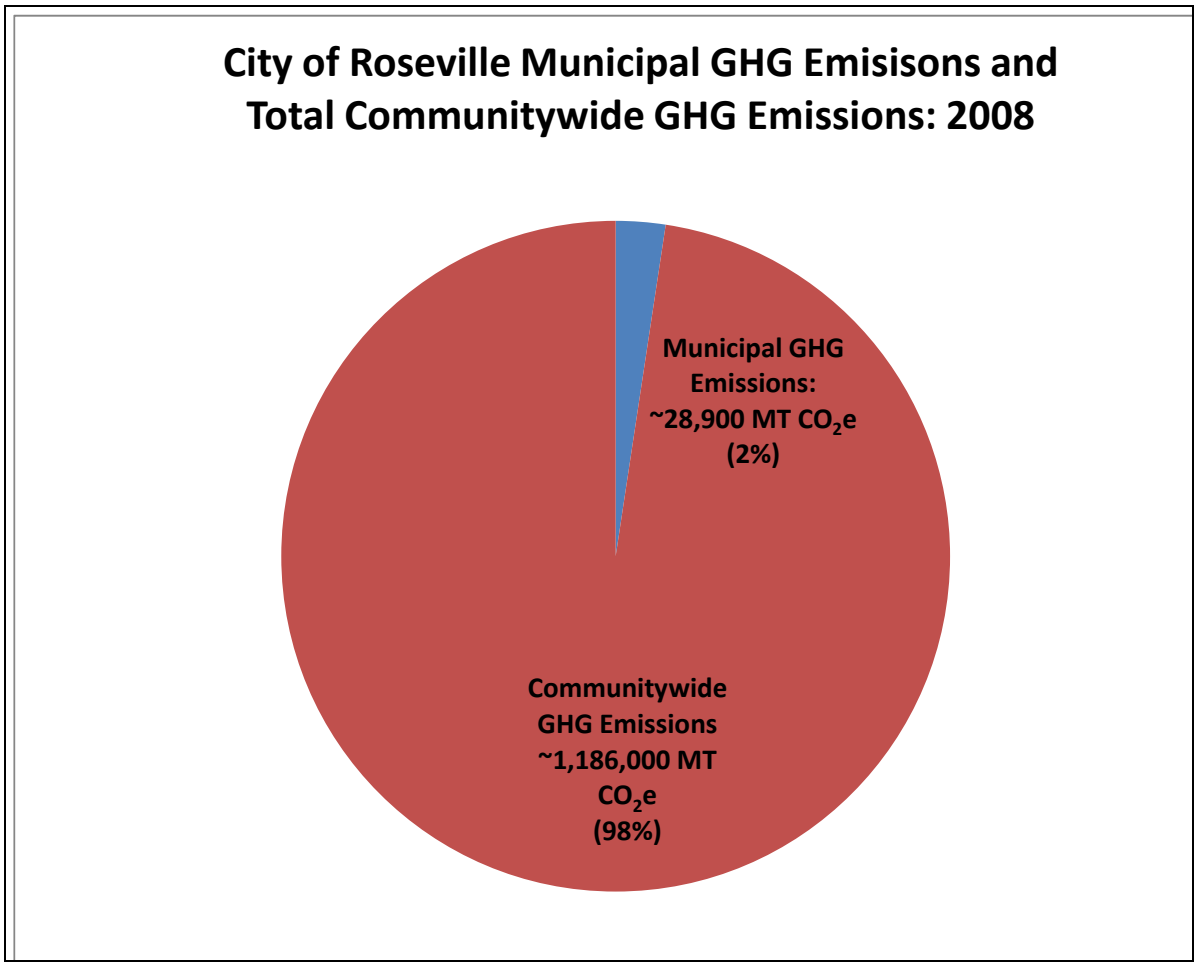


Exhibit A-4: ***City of Roseville Municipal GHG Emissions and Total Communitywide GHG Emissions: 2008***

The magnitude of GHG emissions increases from 2008 to 2020, due primarily to anticipated future population growth (and related consumption) in Roseville. The relative percentages of emissions in each sector remains relatively insensitive to change during the projection period.

Per capita emissions are predicted to decrease by approximately 18% between 2008 and 2020.

Conclusion

Roseville will likely be able to achieve the largest, most cost-effective emissions reductions from on-road mobile-source and electricity conservation-related GHG reduction measures. Developing and implementing sustainability measures to reduce VMT, wasted fuel, and heating/cooling needs should be strong focus areas within the SAP.

TABLE A-2 Roseville 2008 and 2020 Communitywide GHG Emissions				
Community Sector	**2008 Inventory Emissions**		**2020 Inventory Emissions**	
	MT CO_2e	**Percent**	**MT CO_2e**	**Percent**
Residential Electricity Use[1]	156,267	13%	185,639	13%
Non-Residential Electricity Use[1]	292,730	24%	309,935	22%
Residential Natural Gas Use	102,996	9%	110,412	8%
Non-Residential Natural Gas Use	53,827	4%	54,021	4%
On-road Mobile-sources[2]	530,088	44%	633,494	46%
Solid Waste	13,110	1%	18,521	1%
Wastewater Treatment	39,068	3%	54,116	4%
Water Use	14,298	1%	19,805	1%
Total	**1,202,383**	**100%**	**1,385,943**	**100%**
Per Capita (MT/Person)[3]	**11**		**9**	
Roseville Railyard[4]	**25,927**		**-**	

Notes: CO_2e = carbon dioxide equivalent; MT= metric tons.

[1] Electricity estimates are for 2009 and 2019, based on data from Roseville Electric.

[2] 2008 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM Traffic Model.

[3] Based on 2008 and 2020 populations of 109,154 and 151,199; the 2020 population was linearly extrapolated from the 2015 General Plan population of 133,680.

[4] Railyard emissions include only those generated in the portions of the railyard lying in Placer County. Emissions associated with pass-through trips are not included.

Source: Data compiled by AECOM 2010.

TABLE A-3 Roseville 2008 and 2020 Communitywide GHG Emissions								
Community Sector	**2008 Inventory Emissions**				**2020 Inventory Emissions**			
	EF	**GWP[1]**	**Activity**	**MT CO_2e**	**EF**	**GWP[1]**	**Activity**	**MT CO_2e**
Residential Electricity Use[2]	793.8 (lb CO_2e/MWh)		434,000 (MWh/yr)	156,267	793.8 (lb CO_2e/MWh)		515,574 (MWh/yr)	185,639
Non-Residential Electricity Use[2]	793.8 (lb CO_2e /MWh)		813,000 (MWh/yr)	292,730	793.8 (lb CO_2e /MWh)		860,783 (MWh/yr)	309,935
Residential Natural Gas Use CO_2 Emissions[3]	0.00531 ($MTCO_2e$/therm)		19,407,111 (therms)	102,996	0.00531 ($MTCO_2e$ /therm)		20,804,423 (therms)	110,411
Non-Residential Natural Gas Use CO_2 Emissions[3]	0.00531 ($MTCO_2e$ /therm)		10,142,570 (therms)	53,827	0.00531 ($MTCO_2e$ /therm)		10,179,083 (therms)	54,021
On-road Mobile-sources[4]	See Table 3			530,088	See Table 3			633,494
Solid Waste	See Table 4			13,110	See Table 4			18,521
Wastewater Treatment[5,6] CO_2 Emissions	3.81 [$MTCO_2e$/yr]/[MG-mgBOD/D-L]		36.2 MG/D, 275 mg/L BOD	37,906	3.81 [$MTCO_2e$/yr]/[MG-mgBOD/D-L]		50.1 MG/D 275 mg/L BOD	52,507
N_2O Emissions[5,6,7]	3.21 [$MTCO_2e$/yr]/[MG-mgN/D-L]		36.2 MG/D, 10 mg/L N	1,162	3.21 [$MTCO_2e$/yr]/[MG-mgN/D-L]		50.1 MG/D 10 mg/L N	1,609
Water Use[6,8]								
CO_2 Emissions	0.3285 [$MTCO_2e$/MWh]		10,974 MG/yr, 3.95 MWh/[MG/yr]	14,237	0.3285 [$MTCO_2e$/MWh]		15,200 MG/yr, 3.95 MWh/[MG/yr]	19,721
CH_4 Emissions	1.37E-05 [$MTCH_4$/MWh],	23 MT CO_2e/MT CH_4	10,974 MG/yr, 3.95 MWh/[MG/yr]	13.66	1.37E-05 [$MTCH_4$/MWh],	23 MT CO_2e/MT CH_4	15,200 MG/yr, 3.95 MWh/[MG/yr]	18.92
N_2O Emissions	3.674E-06 [MTN_2O /MWh]	296 MT CO_2e/MT N_2O	10,974 MG/yr, 3.95 MWh/[MG/yr]	47.14	3.674E-06 [MTN_2O /MWh]	296 MT CO_2e/MT N_2O	15,200 MG/yr, 3.95 MWh/[MG/yr]	65.30
Total				**1,202,383**				**1,385,943**
Per Capita (MT/Person)[6]				**11**				**9**
Roseville Railyard[9]				**25,927**				**-**

Notes: EF= emission factor; CO2e = carbon dioxide equivalent; MT= metric tons.

1 GWP values are 100-year warming potentials from IPCC's Third Assessment Report (IPCC 2001).

2 Electricity estimates are for 2009 and 2019, based on data from Roseville Electric. Units: MWh = megawatt hours , 1MT = 2204.623 lbs

3 Gas consumption annual growth rates of 0.6% residential and 0.03% commercial were used to estimate 2020 gas consumption (EIA 2010).

4 Based on SACSIM Traffic Model: see Table 3.

5 Used 10% above ADWF per City of Roseville Guidance. Conversion of BOD to methane and CO2e based on IPCC methodology for centralized aerobic treatment plant. (IPCC 2006). Units: BOD = Biological Oxygen Demand, MG/D = mega gallons/day or million gallons/day, N = effluent nitrogen.

6 Based on 2008 and 2020 populations of 109,154 and 151,199; the 2020 population was linearly extrapolated from the 2015 General Plan population of 133,680.

7 Used 10 mg/L N (stated design target) from South Placer Regional Wastewater and Recycled Water Systems Evaluation Updated Final Report (December, 2009).

8 Used pumping energy demand for Northern California (CEC 2005) and GHG EFs for electricity use (CCAR 2009).

9 Emissions data obtained from Union Pacific Railroad (Estimated Emissions of DPM, NOx, and GHGs for the 2008 Calendar Year from the J.R. Davis Rail Yard). Emission factors are unavailable.

Source: Data compiled by AECOM 2010.

TABLE A-4
Roseville 2008 and 2020 On-Road Mobile Source GHG Emissions

Community Sector	2008 Inventory Emissions				2020 Inventory Emissions			
	EF	GWP[1]	Activity	MT CO_2e	EF	GWP[1]	Activity	MT CO_2e
On-road Mobile-sources[2]				530,088				633,494
CO_2 Emissions (running)	below		below	507,406	below		below	606,602
CO_2 Emissions (starting)	1.238E-04 (MT/trip)		92,875,378 (trips/year)	11,496	1.2204E-04 (MT/trip)		110,903,458 (trips/year)	13,534
N_2O Emissions	3.4E-08 (MT N_2O/mi)	296 MT CO_2e/MT N_2O	1,021,629,160 (mi/yr)	10,328	3.4E-08 (MT N_2O/mi)	296 MT CO_2e/MT N_2O	1,219,938,040 (mi/yr)	12,333
CH_4 Emissions	3.7E-08 (MT CH_4/mi)	23 MT CO_2e/MT CH_4	1,021,629,160 (mi/yr)	859	3.7E-08 (MT CH_4/mi)	23 MT CO_2e/MT CH_4	1,219,938,040 (mi/yr)	1025

Notes: EF= emission factor; CO_2e = carbon dioxide equivalent; MT= metric tons.

[1] GWP values are 100-year warming potentials from IPCC's Third Assessment Report (IPCC 2001).

[2] 2008 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM Traffic Model.

Source: Data compiled by AECOM 2010.

TABLE A-5
On-Road Mobile Source CO_2 Emissions from EMFAC 2007

Speed MPH	EMFAC 2008 CO_2- All Vehicles (g/mi)	SACSIM 2008 Interpolated VMT by Speed (mi/day)	SACSIM 2008 CO_2 (MT/year)	EMFAC 2020 CO_2- All Vehicles (g/mi)	SACSIM 2020 Interpolated VMT by Speed (mi/day)	SACSIM 2020 CO_2 (MT/year)
0	605	210	46	608	197	44
5	1,306	5,456	2,600	1,309	6,578	3,143
10	1,001	12,332	4,507	1,003	19,465	7,126
15	794	75,017	21,750	795	94,728	27,476
20	654	137,509	32,827	653	156,530	37,330
25	567	224,484	46,441	566	287,604	59,401
30	507	508,337	94,126	506	626,209	115,688
35	468	433,617	74,113	467	619,977	105,667
40	445	315,931	51,358	444	344,023	55,747
45	436	200,362	31,910	435	233,191	37,014
50	440	251,062	40,357	439	332,376	53,257
55	458	557,512	93,255	457	556,245	92,784
60	492	64,154	11,525	491	53,090	9,517
65	546	12,999	2,592	546	12,083	2,407
70	557	0	0	557	0	0
		Total	**507,406**			**606,602**

Estimated Placer County Travel Fractions by Vehicle Class EMFAC 2007

		LDA	LDT1	LDT2	MDV	**LDV/MDV**	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH	**HDV/Other**	Total
2008	%VMT	0.396	0.133	0.223	0.118	**0.87**	0.033	0.009	0.014	0.054	0.001	0.001	0.012	0.001	0.004	**0.129**	0.999
	%TRIP	0.38	0.128	0.197	0.098	**0.803**	0.098	0.027	0.041	0.011	0.004	0	0.015	0.001	0	**0.197**	1
	%VEH	0.415	0.143	0.214	0.105	**0.877**	0.025	0.008	0.009	0.012	0.001	0	0.053	0.001	0.013	**0.122**	0.999
2020	%VMT	0.403	0.143	0.215	0.111	**0.872**	0.029	0.009	0.014	0.056	0.001	0.001	0.013	0.001	0.005	**0.129**	1.001
	%TRIP	0.379	0.127	0.195	0.096	**0.797**	0.105	0.028	0.041	0.009	0.003	0	0.015	0.001	0	**0.202**	0.999
	%VEH	0.416	0.142	0.215	0.106	**0.879**	0.025	0.008	0.009	0.01	0.001	0	0.053	0.001	0.013	**0.12**	0.999

TABLE A-6
Output from Pavley/LCFS Post-Processor (2020 Placer County Fleet and City of Roseville VMT)

Vehicle Category	Vehicle Population	Weekday VMT from EMFAC (VMT/day)	Weekday CO2 Emissions from EMFAC (tons/day)	Weekday CO2 Emission Reduction from Pavley I (tons/day)	Weekday CO2 Emissions after adopting Pavley I (tons/day)	% CO2 Emission Reduction from LCFS	Weekday CO2 Emission Reduction from LCFS (tons/day)	Weekday CO2 Emissions after adopting Pavley I & LCFS (tons/day)	Annual CO2 Emissions after adopting Pavley I & LCFS (MMTCO2/year)
LDA	150,993	1,345,424	524.74	111.95	412.79	10.00%	41.28	371.51	0.12
LDT1	51,653	476,644	232.71	48.18	184.53	10.00%	18.45	166.08	0.05

Notes: EF= emission factor; CO_2e = carbon dioxide equivalent; MT= metric tons.
[1] GWP values are 100-year warming potentials from IPCC's Third Assessment Report (IPCC 2001).
[2] 2008 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM Traffic Model.
Source: Data compiled by AECOM 2010.

TABLE A-7
Roseville 2008 and 2020 Solid Waste GHG Emissions

Community Sector	2008 Inventory Emissions			2020 Inventory Emissions		
	EF	Activity	MT CO_2e	EF	Activity	MT CO_2e
Solid Waste CO_2 Emissions	below	108,422 (tons/yr)	13,110	below	153,177 (tons/yr)	18,521

Landfilled Waste CO_2e Emissions from WARM Model

Overall CA Waste Characterization[1]	% by type	tons/yr	EF by Waste[2] $MTCO_2e$/ton	$MTCO_2e$	tons/yr	EF by Waste[2] $MTCO_2e$/ton	$MTCO_2e$
Paper	17.3%	18,757	0.29	5,377	26,500	0.29	7,597
Glass	1.4%	1,518	0.04	61	2,144	0.04	86
Metal	4.6%	4,987	0.04	199	7,046	0.04	282
Electronics	0.5%	542	0.04	22	766	0.04	31
Plastic	9.6%	10,409	0.04	416	14,705	0.04	588
Other Organic	32.4%	35,129	0.15	5,269	49,629	0.15	7,444
Inerts and Other[3]	29.1%	31,551	0.04	1,262	44,575	0.04	1,783
Household Hazardous Waste[3]	0.3%	325	0.04	13	460	0.04	18
Special Waste[3]	3.9%	4,228	0.04	169	5,974	0.04	239
Mixed Residue	0.8%	867	0.37	321	1,225	0.37	453
Total	99.9%	108,314		13,110	153,024		18,521

Notes: EF= emission factor; CO_2e = carbon dioxide equivalent; MT= metric tons.

[1] Commercial, residential and self-hauled waste characterization from CIWMB, 2008 Waste Characterization Study.

[2] EFs from USEPA's WARM model (Version 9.01, 3/09). Note: USEPA does not have emission factors for medical waste, HHW, C&D waste, and special wastes such as bulky items/white goods .

[3] Used PC factor for electronics/HHW/Special Waste, mixed organic factor for other organic, and aggregate for inerts, according to categories and subcategories described in the CIWMB 2008 Waste Characterization Study.

Source: Data compiled by AECOM 2010.

Criteria Air Pollutants Inventory and Projections

The purpose of a criteria pollutant emissions inventory is to identify sources and levels of emissions so that policy makers may implement cost-effective reduction strategies, in areas over which they have operational or discretionary control. Furthermore, criteria pollutants are subject to rules, regulations and emissions limits or performance standards, and an emissions inventory can help planners and policy makers determine whether they are in compliance with local, state, and federal air quality attainment or maintenance plans.

AECOM has developed a NOx and PM10 emissions inventory (inventory) for community-wide emission sources for the 2008 base year in the City of Roseville (City). This inventory will be used to establish an emissions baseline that can be used to examine the effects of the Roseville Communitywide Sustainability Action Plan (SAP) on future emissions of NOx and PM10.

There is currently no agency-adopted or recommended protocol for preparing community-wide NOx and PM10 emissions inventories. The NOx and PM inventory prepared for the City is broken into major and minor categories that follow the format of criteria pollutant inventories developed by the California Air Resources Board (ARB) for counties, air basins, and the state.

The inventory was compiled for the following emission categories:

- stationary sources (Roseville Electric considered separately)
- area sources: residential, commercial and industrial gas combustion; wood stoves and fireplaces; and paved road dust
- mobile sources: on-road and railyard

The major source categories of NOx and PM10 in Roseville are not in perfect alignment with those of Placer County because the unincorporated areas have different criteria pollutant sources than the urban areas. The subset of major sources of NOx and PM10 in Roseville were selected from the more extensive list of source categories for Placer County, and where possible, compared to the emissions reported for Placer County (distributed to the City on the basis of population). Population fraction is not always an accurate predictor for emissions occurring in a larger area, and discrepancies between the bottom-up method (derived from local sources, activities, and emissions factors) and the top-down method (distribution of reported Placer County emissions to Roseville by population fraction) will be discussed in later sections.

Government-related NOx and PM10 emission sources, which include government buildings, vehicle fleets, solid waste, streetlights, and other government-owned/operated facilities, could not be considered separately, and must be recognized as a subset of the community-wide emissions inventory.

AECOM also prepared a community-wide NOx and PM10 emissions projection for 2020 under a business-as-usual scenario (i.e., a scenario without the GHG/NOx/PM reduction measures that will become part of the SAP). In some cases, NOx and PM reductions are anticipated to occur (despite a growing population) due to programs and regulations applied at the federal and state levels (e.g., improved NOx and PM controls for vehicles, low- or zero-emitting vehicle programs, and renewable energy portfolio requirements). Regulated emissions reductions programs were incorporated into the NOx and PM10 modeling for on-road mobile sources[1], but for other sources, such as stationary sources, there is limited knowledge on the level of implementation of improved technologies or federal and state reduction measures at the time of inventory preparation, and quantitative reductions that may occur within categories other than mobile sources are not accounted for in the 2020 projections.

[1] Low Emitting Vehicles and Zero Emitting Vehicle programs and emissions control technology built into EMFAC2007 were included. Any NOx and PM10 emission reductions that might be associated with Pavley (Assembly Bill 1493) and the Low carbon Fuel Standard (LCFS) were not quantifiable at the time this report was written. Additionally, technological accomplishments and associated implementation dates may not occur according to the current schedule.

A summary of the baseline (2008) community-wide NOx and PM10 emissions, 2020 projections, and calculation methodologies employed are discussed below.

Overview

The inventory includes community-wide NOx and PM10 emissions associated with stationary sources, area sources, and mobile sources. The inventory also includes municipal emissions as a subset of the total community-wide emissions.

Analysis

Emissions Data

Some NOx and PM10 emissions data for stationary sources within the City and data for stationary, area, and mobile sources within Placer County were available from the following ARB databases:

- Facility Search Engine (2007 Criteria Pollutants and Toxics)
- 2008 Emissions Inventory by California County[2]

Additionally, NOx and PM10 emissions data were available from Roseville Electric and the Roseville Railyard.

Emission Factors

An emission factor is a representative constant that relates the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant (EPA 2010). Although there is currently no adopted protocol for preparing community-wide NOx and PM emission inventories, several reputable sources of information were used to gather emissions information.

Sources of emission factors used in preparing the communitywide inventory include the following:

- California Air Resources Board (ARB):
    - On-Road Mobile-Source Emission Factor Model (EMFAC2007), Version 2.3.
    - Almanac Emission Projection Data Methodology
- URBEMIS2007 (wood stove and fireplace emissions factors)
- US Environmental Protection Agency (USEPA 2010a, 2010b)
    - AP-42, Compilation of Air Pollutant Emission Factors (natural gas combustion and road dust emissions factors)

These emission factors likely represent NOx and PM10 emissions from activities occurring in Roseville. Transportation data from the Sacramento Area Council of Governments (SACOG), based on the SACSIM travel model, was also used in conjunction with EMFAC2007 to develop on-road mobile-source NOx and PM10 emissions.

Demographic Data

GHG emissions inventory projections for wood stoves/fireplaces were calculated using anticipated development levels and resulting population as described within the City of Roseville General Plan Housing Element for 2008 and 2020. Growth rates from the U.S. Department of Energy-Energy Information Administration were also used for natural gas use projections (DOE 2010).

[2] Placer County emissions data were utilized for a top-down check only.

Consumption Data

The inventory was prepared using consumption data from the following sources:

- Pacific Gas and Electric (PG&E) for residential and non-residential natural gas consumption data for 2008.
- Roseville Electric for residential and non-residential electricity consumption data and projections.

Each of these sources is directly applicable to the communitywide inventory.

Methodology

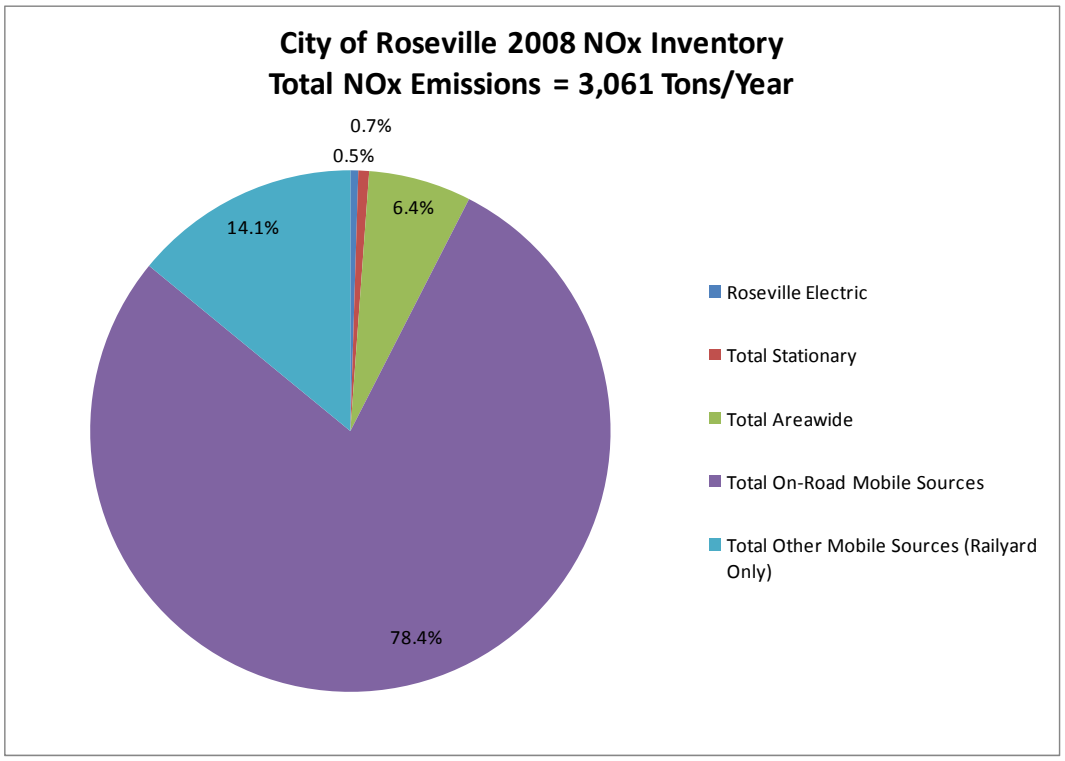
Communitywide 2008 emissions were calculated using a "bottom-up" approach, which involves multiplication of an emission factor for a given process by a consumption rate for that process. This approach ensures the highest level of control over the quality of the data used to generate the emissions inventory.

Table A-8 and Exhibit A-5 summarize the magnitude and relative contribution of baseline and projected emissions for each category. A comparison of the 2008 Roseville NOx and PM inventory (bottom-up approach) and the 2008 Placer County inventory distributed to Roseville on the basis of population (top-down approach) is shown in Table A-9 and Exhibit A-6.

TABLE A-8
Roseville 2008 and 2020 Communitywide NO_x and PM_{10} Emissions (tons/year)

Emissions Category	2008 Inventory Emissions				2020 Inventory Emissions			
	NOx	Percent	PM10	Percent	NOx	Percent	PM10	Percent
Stationary Sources								
Roseville Electric[1]	15.10	0.49	3.44	0.27	16.66	0.96	3.80	0.24
Other Stationary Sources[2]	5.42	0.18	5.96	0.47		0.00		0.00
Total Stationary Sources	20.51	0.67	9.40	0.74	16.66	0.96	3.80	0.24
Areawide Sources								
Residential, Commercial, Industrial Natural Gas Use	160.90	5.26	10.71	0.84	167.60	9.66	11.25	0.72
Wood Stoves/Fireplaces	35.51	1.16	460.15	36.09	49.19	2.83	637.39	40.66
Paved Road Dust		0.00	694.23	54.45		0.00	828.98	53.25
Total Areawide Sources	196.41	6.42	1,165.09	91.38	216.78	12.49	1,477.62	94.25
On-Road Mobile-Sources[3]	2,411.00	78.77	89.41	7.01	1,069.05	61.60	75.24	4.80
Railyard Emissions[2,4]	433.00	14.15	11.10	0.87	433.00	24.95	11.10	0.71
Total	**3,061**	**100.00**	**1,275**	**100.00**	**1,736**	**100.00**	**1,568**	**100.00**

Notes;
[1] Electricity emissions estimates are for 2009 and 2019, based on data from Roseville Electric.
[2] Data were unavailable for future projections.
[3] 2008 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM Traffic Model.
[4] Railyard emissions include only those generated in the portions of the railyard lying in Placer County. Emissions associated with pass-through trips were not included.
Source: Data compiled by AECOM 2010.



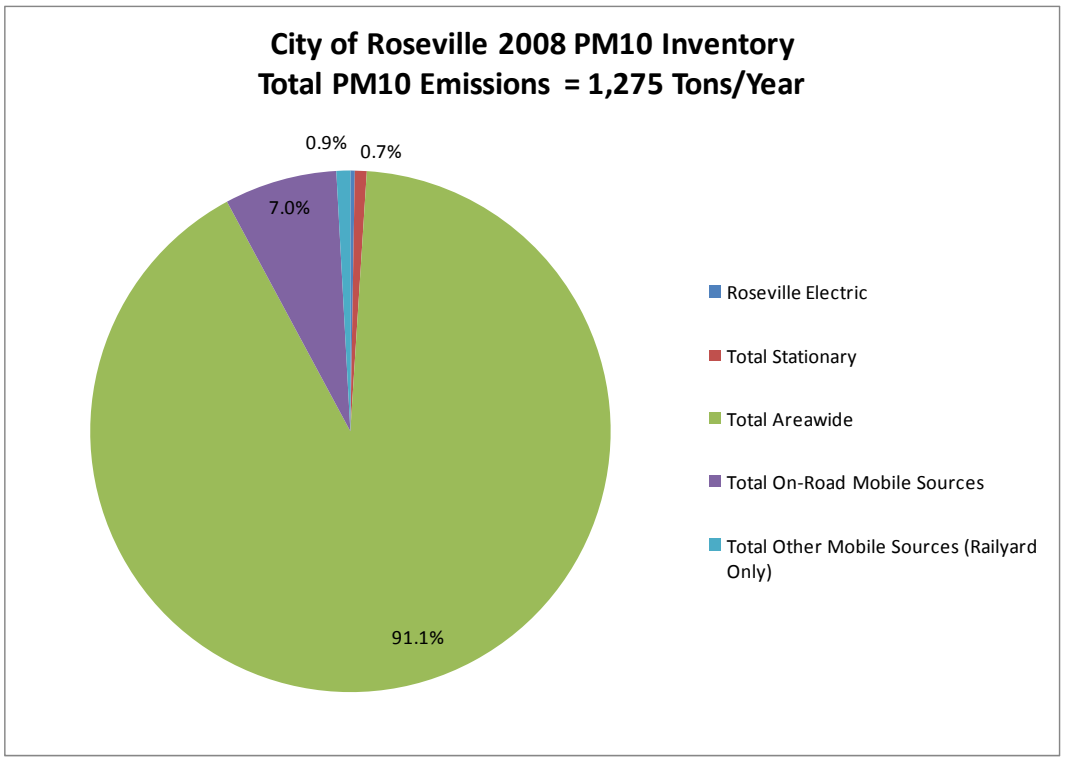
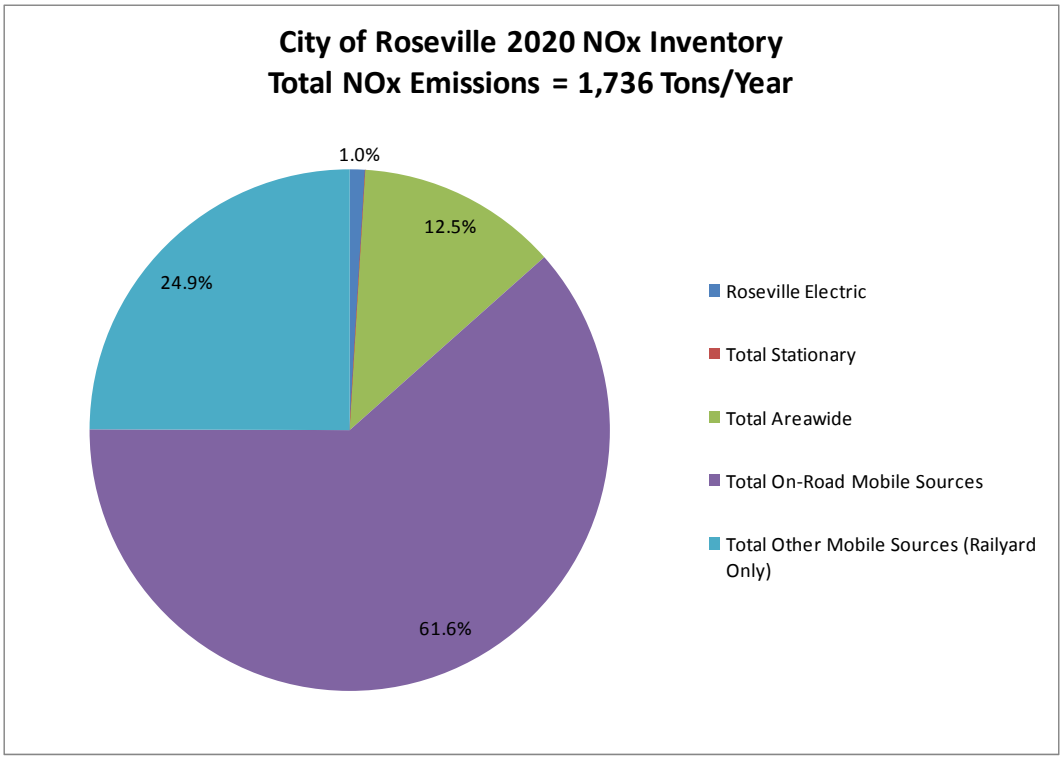


Exhibit A-5: ***Communitywide NO_x and PM_{10} Inventory by Category: 2008 and 2020***



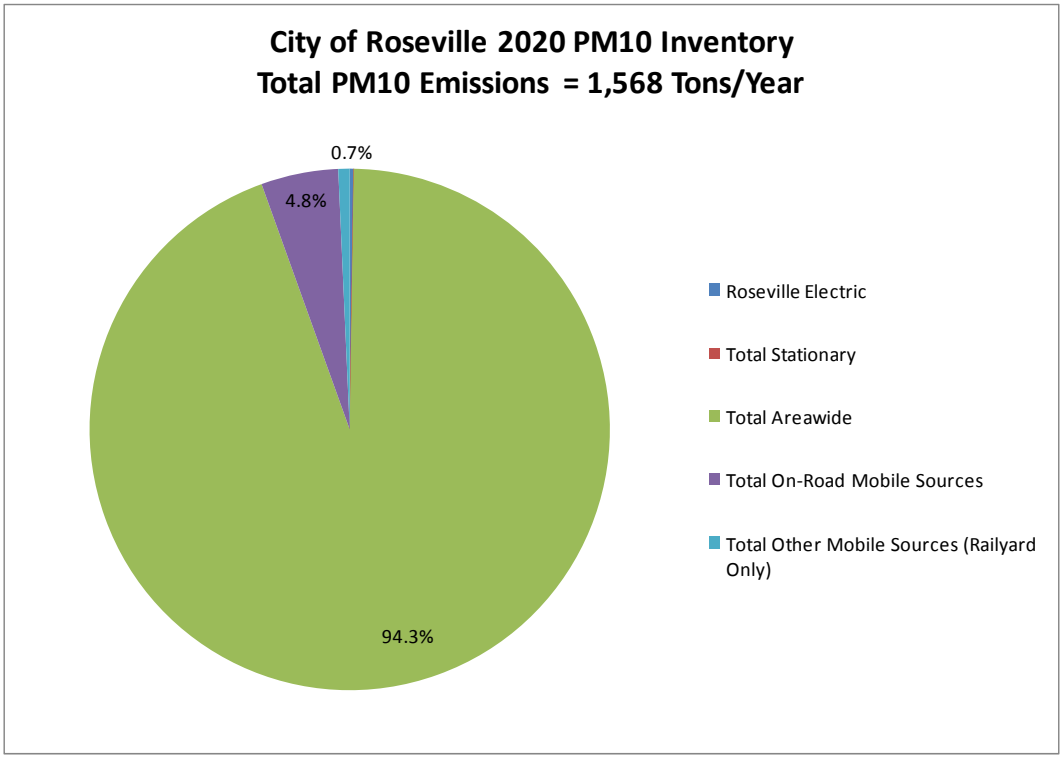


Exhibit A-5, Continued: ***Communitywide NO_x and PM_{10} Inventory by Category: 2008 and 2020***

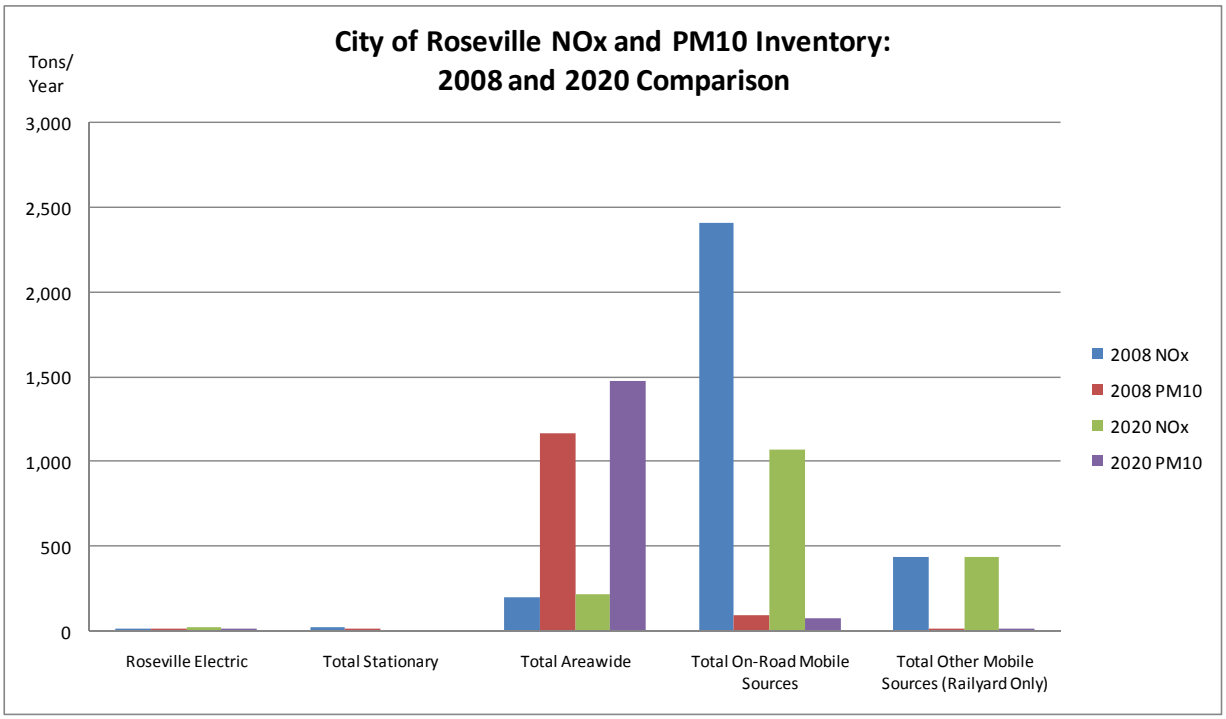


Exhibit A-5, Continued: ***Communitywide NO_x and PM_{10} Inventory by Category: 2008 and 2020***

TABLE A-9
2008 Roseville Bottom-Up and Top-Down Comparison of NOx and PM10 Emissions (tons/year)

Emissions Category	2008 Inventory Emissions			
	Bottom-Up Inventory		Top-Down Inventory	
	NO_x	PM_{10}	NO_x	PM_{10}
Stationary Sources				
Roseville Electric[1]	15.10	3.44	89.16	26.29
Other Stationary Sources[2]	5.42	5.96	5.42	5.96
Total Stationary Sources	20.51	9.40	94.57	32.25
Areawide Sources				
Residential, Commercial, Industrial Natural Gas Use	160.90	10.71	254.90	10.29
Wood Stoves/Fireplaces	35.51	460.15	38.86	433.22
Paved Road Dust		694.23		697.26
Total Areawide Sources	196.41	1,165.09	293.76	1,140.77
On-Road Mobile-Sources[3]	2,411.00	89.41	2,023.20	93.73
Railyard Emissions[2,4]	433.00	11.10	329.20	9.14
Total[5]	**3,061**	**1,275**	**2,741**	**1,276**

Notes: CO_2e = carbon dioxide equivalent; MT= metric tons.

[1] Electricity emissions estimates are for 2009 and 2019, based on data from Roseville Electric.

[2] Only includes stationary sources within the City. Data were unavailable for future projections.

[3] 2008 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM Traffic Model.

[4] Railyard emissions include only those generated in the portions of the railyard lying in Placer County. Emissions associated with pass-through trips are not included.

[5] Total top-down emissions only include categories and sources pertinent to the City. Numerous sources exist in the unincorporated areas of Placer County that do not exist in Roseville. For example, stationary sources in Placer County outside of Roseville were not included in the emissions estimates and area sources such as unpaved road dust, fires, managed burning, etc.,were not included.

Source: Data compiled by AECOM 2010.

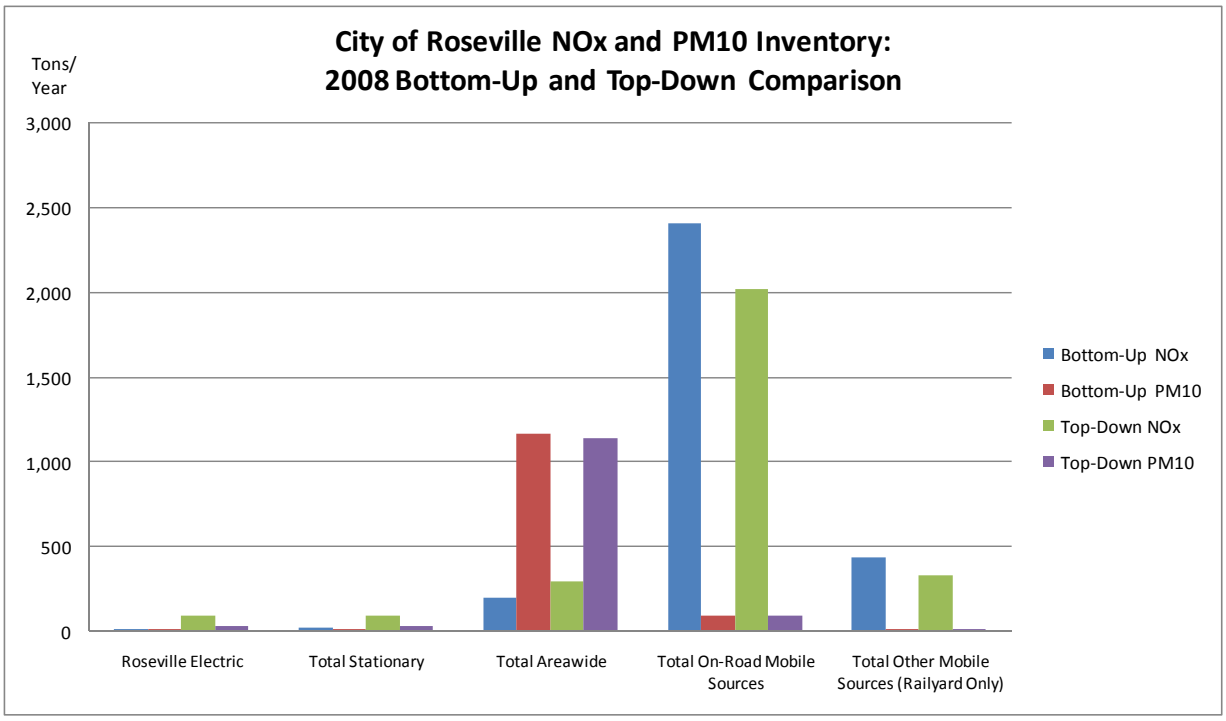


Exhibit A-6: ***Bottom-Up and Top-Down Inventory Comparison: 2008***

Each emissions category is discussed in the following sections.

Stationary Sources

According to the ARB's Facility Search Database, there are three stationary sources in the City; however, the most recent emissions inventory year available is 2007, and some of the data in the database are not current (i.e. Roseville Electric is not in the database). Consumption data from Roseville Electric were available from the City and were used to estimate baseline and future NOx and PM10 projections from electricity generation.

Roseville Stationary Sources

Three small stationary sources were found in the Facility Search Database, accounting for less than 1% of total NOx and PM10 emissions in 2008. Facility-specific data and/or growth projections for commercial and industrial stationary sources were not available to predict emissions in 2020.

Roseville Electric

NOx and PM10 emissions data associated with electricity generation for the year 2008 were obtained from Roseville Electric (see Appendix A). Owned electricity generation data from 2008 and the projected estimate for 2019 were also obtained from Roseville Electric, and were used in conjunction with 2008 emissions data to estimate future NOx and PM10 emissions.

Area Sources

The major area sources of NOx and PM10 emissions in the City result from natural gas use, wood stoves and fireplaces, and paved road dust. Natural gas combustion is the primary source of NOx emissions while wood burning and paved road dust are primarily sources of PM10.

Natural Gas Combustion

PG&E's natural gas consumption data were used with USEPA's AP-42 emission factors to estimate current NO_x and PM_{10} emissions (USEPA 2010b). Future projections were based on natural gas consumption growth rates from the U.S. Department of Energy's Energy Information Administration (EIA 2010, Pacific Region).

Wood Stoves/Fireplaces

An estimate of the number of wood stoves in the City was based on the number of residential dwelling units in Roseville (from the General Plan Land Use Element). Emissions were calculated based on percentages of residences containing wood burning stoves and fireplaces, annual days in use, quantities of fuel (wood) consumed, and NO_x and PM_{10} emissions factors from ARB and URBEMIS2007 (ARB 2010, Rimpo and Associates 2008). Projections were based on future dwelling unit estimates from the General Plan Land Use Element, and assumed a business-as-usual scenario, in the absence of rules or regulations which would ban existing or new wood burning stoves and fireplaces.

Paved Road Dust

PM10 emissions from paved road dust were estimated based on AP-42 methodology (USEPA 2010b). Equation parameters and emissions factors, obtained from AP-42 and URBEMIS2007, were combined with VMT from SACSIM model output to obtain PM10 emissions for the years 2008 and 2020 (see the following section for more details).

Mobile Sources

On-road mobile-source NO_x and PM_{10} emissions and projections were calculated using a bottom-up method based on vehicle miles traveled (VMT) data obtained from Fehr and Peers. VMT data from the SACSIM travel model were available for years 2005 and 2035. AECOM interpolated the VMT data linearly to derive VMT for the inventory base year (2008) and for the projection year (2020). Interpolated VMT data were combined with EMFAC2007 emission factors to calculate on-road mobile-source NO_x and PM_{10} emissions using California-based emission factors and vehicle-fleet distributions for Placer County for analysis years 2008 and 2020.

To maintain consistency with the communitywide greenhouse gas (GHG) emissions inventory prepared for Roseville, trips that did not begin or end in Roseville were accounted for by apportioning 50 percent of VMT (and associated emissions) to Roseville for internal-to-external and external-to-internal trips. VMT (and associated emissions) resulting from internal-to-internal trips were allocated 100 percent to Roseville. Pass-through trips that neither begin nor end in Roseville were not counted in the analysis.

Railyard Emissions

NO_x and PM_{10} emissions from the Roseville Railyard were provided by Union Pacific for the year 2008. Railyard emissions include only those generated in the portions of the railyard lying in Placer County. Emissions associated with pass-through trips were not included. Future emissions data or growth rates were not available for 2020 projections; however, ARB's 2020 projections for railyard switching emissions in Placer County indicate that NO_x emissions may decrease slightly while PM10 emissions remain the same (ARB 2010). For this reason, NOx and PM_{10} emissions from the Roseville Railyard were held constant between the years 2008 and 2020.

DISCUSSION

Comparison of 2008 and 2020 Emissions

Communitywide NO_x emissions are expected to decline by approximately 50% between 2008 and 2020 under a business-as-usual scenario, due largely to improvements in mobile-source engine control, despite the anticipated VMT growth in the City.

PM_{10} emissions are expected to grow by about 20% between 2008 and 2020, mainly due to increases in population and VMT. Increased population will result in larger numbers of residential wood stoves and fireplaces in the absence of future regulations in Placer County, and re-suspended paved road dust will increase as VMT increases.

The largest source of NOx emissions for the 2008 baseline and 2020 projection years is the category comprising on-road mobile sources, which accounts for about 80% of the total NO_x emissions in 2008 and about 60% in 2020. The railyard accounts for about 14% of the NOx emissions in 2008 and about 25% of NO_x emissions in 2020. The remainder of the NO_x emissions in 2008 and 2020 are mostly due to area sources.

Stationary sources could not be estimated for the year 2020 because it is unknown what new sources will be permitted in the City, whether existing sources will still be operational, and what NO_x and PM_{10} emissions might be expected (which depend on source type and strength). Stationary sources account for less than 1% of NO_x and PM_{10} in 2008, and they are presumed to be similar in 2020, outside the unlikely event that some large, commercial or industrial stationary sources are permitted within city limits.

The largest source of PM_{10} emissions for the 2008 baseline and 2020 projection years is the category comprising paved road dust, which accounts for about 54% of the total PM10 emissions in 2008 and 2020. The second largest source of PM_{10} emissions is the category of wood burning stoves and fireplaces, which accounts for 36% of the total PM_{10} emissions in 2008 and 41% in 2020. On-road mobile sources account for most of the remaining PM_{10} emissions in 2008 and 2020.

Bottom-Up and Top-Down Comparison of 2008 Emissions

A comparison of the 2008 Roseville NOx and PM inventory (bottom-up approach) and the 2008 Placer County inventory distributed to Roseville on the basis of population (top-down approach) reveals consistency between all of the stationary, area, and mobile source categories for which data were available. Bottom-up NO_x emissions estimates for the category of Residential, Commercial, Industrial Natural Gas Use were a factor of about 1.6 lower than those estimated using the top-down approach, but this can be explained by the fact that the county-wide inventory had several commercial categories of natural gas use which may or may not be appropriate for Roseville, and distribution of county-wide commercial process gas use to Roseville on the basis of population may not be appropriate.

CONCLUSION

Roseville will likely be able to achieve the largest, most cost-effective NO_x and PM_{10} emission reductions from on-road mobile-source VMT reduction measures, including fewer trips, which will reduce both starting and running emissions of NO_x and PM_{10}. Developing and implementing sustainability measures to reduce VMT is already a strong focus area within the SAP, and will have the co-benefit of reducing NO_x and PM_{10} emissions.

TABLE A-10
Roseville 2008 and 2020 Communitywide NOx and PM10 Emissions (tons/year)

Emissions Category	2008 Inventory Emissions				2020 Inventory Emissions			
	NO_x	Percent	PM_{10}	Percent	NO_x	Percent	PM_{10}	Percent
Stationary Sources								
Roseville Electric[1]	15.10	0.49	3.44	0.27	16.66	0.96	3.80	0.24
Other Stationary Sources[2]	5.42	0.18	5.96	0.47	-	-	-	0.00
Total Stationary Sources	20.51	0.67	9.40	0.74	16.66	0.96	3.80	0.24
Areawide Sources								
Residential, Commercial, Industrial Natural Gas Use	160.90	5.26	10.71	0.84	167.60	9.66	11.25	0.72
Wood Stoves/Fireplaces	35.51	1.16	460.15	36.09	49.19	2.83	637.39	40.66
Paved Road Dust		0.00	694.23	54.45		0.00	828.98	53.25
Total Areawide Sources	196.41	6.42	1,165.09	91.38	216.78	12.49	1,477.62	94.25
On-Road Mobile-Sources[3]	2,411.00	78.77	89.41	7.01	1,069.05	61.60	75.24	4.80
Railyard Emissions[2,4]	433.00	14.15	11.10	0.87	433.00	24.95	11.10	0.71
Total	**3,061**	**100.00**	**1,275**	**100.00**	**1,736**	**100.00**	**1,568**	**100.00**

Notes:
[1] Electricity emissions estimates are for 2009 and 2019, based on data from Roseville Electric.
[2] Data were unavailable for future projections.
[3] 2008 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM Traffic Model.
[4] Railyard emissions include only those generated in the portions of the railyard lying in Placer County. Emissions associated with pass-through trips were not included.
Source: Data compiled by AECOM 2010.

TABLE A-11 Roseville 2008 and 2020 Communitywide NOx Emissions						
Community Sector	**2008 Inventory Emissions**			**2020 Inventory Emissions**		
	EF	**Activity**	**NO_x (tons/year)**	**EF**	**Activity**	**NO_x (tons/year)**
Roseville Electric[1]	-	-	15	-	-	17
Other Stationary Sources[2]	-	-	5	-	-	-
Residential Natural Gas Use	4.61E-06 (tons/therm)	19,406,629 (therms/year)	89	4.61E-06 (tons/therm)	20,803,906 (therms/year)	96
Commercial and Industrial Natural Gas Use	7.65E-06 (tons/therm)	9,347,111 (therms/year)	71	7.65E-06 (tons/therm)	9,380,761 (therms/year)	72
Wood Stoves/Fireplaces	0.0012 (tons/ton wood burned)	29,592 (tons wood burned)	36	0.0012 (tons/ton wood burned)	40,989 (tons wood burned)	49
Paved Road Dust	-	-	-	-	-	-
On-Road Mobile-Sources[3]	See Table A-4	See Table A-4	2,411	See Table A-4	See Table A-4	1,069
Railyard Emissions[2,4]	-	-	433	-	-	433
Total			**3,061**			**1,736**
Per Capita (tons/year/person)[5]			**0.03**			**0.01**

Notes:

[1] Electricity emissions estimates are for 2009 and 2019, based on data from Roseville Electric.

[2] Emission factors were unavailable. Data were unavailable for future projections.

[3] 2008 and 2020 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM Traffic Model.

[4] Railyard emissions include only those generated in the portions of the railyard lying in Placer County. Emissions associated with pass-through trips were not included. Emissions data were obtained from the City of Roseville, and held constant between 2008 and 2020 (2008 emissions obtained from the J.R. Davis Rail Yard).

[5] Based on 2008 and 2020 populations of 109,154 and 151,199; the 2020 population was linearly extrapolated from the 2015 General Plan population of 133,680.

Source: Data compiled by AECOM 2010.

TABLE A-12 Roseville 2008 and 2020 Communitywide PM10 Emissions						
Community Sector	**2008 Inventory Emissions**			**2020 Inventory Emissions**		
	EF	**Activity**	**PM_{10} (tons/year)**	**EF**	**Activity**	**PM_{10} (tons/year)**
Roseville Electric[1]	-	-	3	-	-	4
Other Stationary Sources[2]	-	-	6	-	-	-
Residential Natural Gas Use	3.73E-07 (tons/therm)	19,406,629 (therms/year)	7	3.73E-07 (tons/therm)	20,803,906 (therms/year)	8
Commercial and Industrial Natural Gas Use	3.73E-07 (tons/therm)	9,347,111 (therms/year)	3	3.73E-07 (tons/therm)	9,380,761 (therms/year)	3
Wood Stoves/Fireplaces	0.0156 (tons/ton wood burned)	29,592 (tons wood burned)	460	0.0156 (tons/ton wood burned)	40,989 (tons wood burned)	637
Paved Road Dust	0.00025 (tons/mile)	2,798,984 (miles/year)	694	0.00025 (tons/mile)	3,342,296 (miles/year)	829
On-Road Mobile-Sources[3]	See Table A-4	See Table A-4	89	See Table A-4	See Table A-4	75
Railyard Emissions[2,4]	-	-	11	-	-	11
Total			**1,275**			**1,568**
Per Capita (tons/year/person)5			**0.01**			**0.01**

Notes:

[1] Electricity emissions estimates are for 2009 and 2019, based on data from Roseville Electric.

[2] Emission factors were unavailable. Data were unavailable for future projections.

[3] 2008 and 2020 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM Traffic Model.

[4] Railyard emissions include only those generated in the portions of the railyard lying in Placer County. Emissions data were obtained from the City of Roseville, and held constant between 2008 and 2020 (2008 emissions obtained from the J.R. Davis Rail Yard).

[5] Based on 2008 and 2020 populations of 109,154 and 151,199; the 2020 population was linearly extrapolated from the 2015 General Plan population of 133,680.

Source: Data compiled by AECOM 2010.

TABLE A-13
Roseville 2008 and 2020 On-Road Mobile Source NOx and PM10 Emissions

Community Sector	2008 Inventory Emissions				2020 Inventory Emissions			
	EF	GWP[1]	Activity	NO_x/PM_{10} (tons/year)	EF	GWP[1]	Activity	NO_x //PM_{10} (tons/year)
On-Road Mobile-Sources				2,411/89				1,069/75
NOx Emissions	below		below	2,411	below		below	1,069
PM10 Emissions	below		below	89	below		below	75

On-Road Mobile Source NO_x Emissions from EMFAC 2007

Speed MPH	EMFAC 2008 NOx- All Vehicles (g/mi)	SACSIM 2008 Interpolated VMT by Speed (mi/day)	SACSIM 2008 NOx (tons/year)	EMFAC 2020 NOx- All Vehicles (g/mi)	SACSIM 2020 Interpolated VMT by Speed (mi/day)	SACSIM 2020 NOx (tons/year)
0	7.78	210	1	8.52	197	1
5	3.60	5,456	8	1.11	6,578	3
10	2.63	12,332	13	0.85	19,465	7
15	2.03	75,017	61	0.68	94,728	26
20	1.79	137,509	99	0.58	156,530	37
25	1.70	224,484	154	0.54	287,604	62
30	1.64	508,337	336	0.51	626,209	127
35	1.61	433,617	280	0.48	619,977	120
40	1.59	315,931	203	0.47	344,023	65
45	1.61	200,362	129	0.47	233,191	44
50	1.64	251,062	166	0.47	332,376	63
55	1.70	557,512	382	0.49	556,245	109
60	1.80	64,154	46	0.52	53,090	11
65	1.94	12,999	10	0.57	12,083	3
70	2.09	0	0	0.63	0	0
starts	0.862 (g/trip)[1]	1,511,239 (trips/d)[1]	524	0.426 (g/trip)[1]	2,282,799 (trips/d)[1]	391
		Total	**2,411**			**1,069**

TABLE A-13
Roseville 2008 and 2020 On-Road Mobile Source NOx and PM10 Emissions

On-Road Mobile Source PM_{10} Emissions from EMFAC 2007

Speed MPH	EMFAC 2008 PM10- All Vehicles (g/mi)	SACSIM 2008 Interpolated VMT by Speed (mi/day)	SACSIM 2008 PM10 (tons/year)	EMFAC 2020 PM10- All Vehicles (g/mi)	SACSIM 2020 Interpolated VMT by Speed (mi/day)	SACSIM 2020 PM10 (tons/year)
0	0.143	210	0.012	0.05	197	0.004
5	0.23	5,456	0.555	0.102	6,578	0.331
10	0.156	12,332	0.888	0.069	19,465	0.720
15	0.105	75,017	3.863	0.048	94,728	2.706
20	0.075	137,509	5.422	0.036	156,530	3.716
25	0.062	224,484	7.677	0.029	287,604	6.017
30	0.052	508,337	15.339	0.024	626,209	11.842
35	0.046	433,617	12.038	0.022	619,977	11.225
40	0.042	315,931	8.262	0.021	344,023	6.090
45	0.041	200,362	5.159	0.02	233,191	4.034
50	0.042	251,062	6.566	0.021	332,376	5.884
55	0.046	557,512	15.477	0.023	556,245	10.295
60	0.053	64,154	1.962	0.026	53,090	1.047
65	0.062	12,999	0.445	0.03	12,083	0.258
70	0.072	0	0	0.033	0	0
starts	0.009 (g/trip)[1]	1,511,239 (trips/d)[1]	6	0.012 (g/trip)[1]	2,282,799 (trips/d)[1]	11
		Total	**89**			**75**

[1] Distribution of soak times for all vehicles is unknown, so an average starting emission factors were used for NOx and PM10. The only trips counted for purposes of starting emissions were those that originated in Roseville (either internal or internal-external trips only, provided by Fehr and Peers using SACSIM 2010). Trips that started elsewhere and pass-through trips would not be sources of starting emissions in the City.

Source: Data compiled by AECOM 2010.

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APPENDIX B:

SUSTAINABLE ACTION PLAN MEASURES CALCULATION METHODS AND ASSUMPTIONS

This appendix summarizes the methods and assumptions used to calculate the emission reduction performance of recommended Sustainable Action Plan (SAP) measures for which a quantified reduction has been calculated.

TABLE B-1
Summary Table of Greenhouse Gas Reduction Measure Performance

Measure Number and Title	GHG Emission Reductions (MT CO2e)	
Transportation Measures	*Without Statewide Reductions*	*With Statewide Reductions*
T-3.1: Increase Carpool Mode Share	3,640	2,760
T-4.1: Increase Public Transit Mode Share	5,510	4,180
T-5.1: Increase Pedestrian and Bicycle Mode Share	5,510	4,180
T-8.1: Develop Low-Carbon Emitting Vehicle Program	31,050	-
T-9.1: Intelligent Traffic Management System (ITS)	3,420	3,420
Land Use and Green Building Measures		
LU-3.1: Green Infrastructure	1,580	1,580
Energy Measures		
E-1.1: Residential Energy Efficiency Retrofits	5,910	5,910
E-1.2: Commercial Energy Efficiency Retrofits	10,400	10,400
E-1.3: Increase Energy Efficiency in New Construction	3,150	3,150
Waste Measures		
WR-2.1: Increase Recycling, Composting, and Waste Diversion Programs	1,090	1,090
Water Measures		
WC-1.1: Residential Water Use Reduction	3,523	3,520
Statewide Legislation		
AB 1493: Vehicle Emission Standards	-	99,205
Low Carbon Fuel Standard (LCFS)	-	53,429
Total Reductions	***74,060***	***192,100***

Note:
1. Total may not add up as emission reductions in each sector have been rounded to the nearest whole number.
2. The SAP measures report GHG emissions without assuming Statewide reductions.
3. The GHG reductions with Statewide implementation of AB 1493 and LCFS mainly affect the transportation measures. The combined effects of statewide reductions along with the SAP measures will increase the efficiency of the plan.

Transportation

Greenhouse Gas Emission Reductions

Measure T-3.1: Develop rideshare program for City residents.

This measure requires the City to implement a series of prescribed actions that will facilitate and encourage the use of carpooling for City residents to commute to major employment centers. These actions include working with nearby cities and major companies to develop car-share and local car rental opportunities, requiring ride-share parking spaces at employment and commercial centers, and requiring ride-share parking spaces in new or majorly modified development pursuant to the Transportation Systems Management Ordinance. The efficacy of this measure is increased by Measure T-3.2, which continues Transportation System Management programs to provide services and incentives to increase the use of alternatives to single-occupancy travel.

Quantification of Measure T-3.1 assumes that implementation would result in a 2% mode shift from single-occupancy commute vehicles to carpool commute vehicles with at least two passengers. The US Census indicates that in 2000 10% of Roseville commuters traveled to work by rideshare. Literature indicates that ridesharing programs typically attract 5-15% of commute trips if they offer only information and encouragement, and 10-30% if they also offer financial incentives such as parking cash out or vanpool subsidies (York and Fabricatore, 2001). The measure assumes that enhanced ride matching and rideshare infrastructure will increase the mode share from 10% to 12%. The percent of total trips that are assumed to be commute trips was obtained from URBEMIS2007 Version 9.2.4.

Two tables have been provided below to show how the transportation sector emissions have been calculated both with and without statewide reductions from the implementation of LCFS and AB1493. Table B-2 below calculates the transportation sector emissions based on total 2020 projected transportation emissions (i.e. 633,494 MT CO_2e/ year) and does not account for statewide implementation of AB 1493 and LCFS. Note that reported emission reduction for measure T-3.1 of the SAP does not assume statewide reductions.

TABLE B-2: Transportation Emissions without Statewide Reductions

Transportation Sector Emissions (MT CO_2e)	Percent of LDV and MDV vehicles of total transportation fleet	Percent Commute Trips of Total Trips	Anticipated Mode Shift to Rideshare	Emissions Reduction (MT CO_2e/yr)
633,494	87%	33%	2%	**3,640**

Note: Emission reductions have been rounded to the nearest whole number.

In table B-3, the 480,854 MT CO_2e/year transportation emission was calculated as the difference between the 2020 transportation emissions projection (i.e 633,494 MT CO_2e/ year) and the emissions reduction anticipated from Statewide implementation of AB 1493 and LCFS (i.e. 152,630 MT CO_2e/ year). Therefore, the anticipated reduction from T-3.1 noted below includes the combined effect from SAP measure and statewide reductions.

TABLE B-3: Transportation Emissions with Statewide Reductions

Transportation Sector Emissions (MT CO_2e)	Percent of LDV and MDV vehicles of total transportation fleet	Percent Commute Trips of Total Trips	Anticipated Mode Shift to Rideshare	Emissions Reduction (MT CO_2e/yr)
480,854	87%	33%	2%	**2,760**

Note: Emission reductions have been rounded to the nearest whole number.

Sources of information:
York and Fabricatore (2001), Puget Sound Vanpool Market Assessment, Office of Urban Mobility, WSDOT
Rimpo and Associates Inc.. 2008. URBEMIS2007 for Windows Version 9.2.4. Available: http://www.urbemis.com/.

Measure T-4.1: Implement strategies to increase transit ridership.

This measure requires the City to analyze a series of strategies that would help facilitate and encourage the use of public transportation by Roseville residents. The measure also requires the City to investigate and evaluate funding sources that could help finance the implementation and maintenance of these public transit strategies. The strategies include, but are not limited to expanding public transit services such as local transit, dial-a-ride, and "timed stop" locations; providing community incentives to reach popular community destinations via public transit; providing free or subsidized transit passes for new development residents; and displaying real-time information on emissions avoided by each rider. This measure is also supported by Measure T-4.2, which involves collaboration with regional transit agencies (e.g., train, light rail, bus rapid transit) to increase the frequency of transit systems serving the community and possibly extending transit and light rail infrastructure to Roseville.

Quantification of this measure assumes that implementation would result in a 1% mode shift from total single-occupancy vehicles to public transit. The anticipated mode shift assumption is based on the trend in transit ridership from Census data (2000 and 2008) and based on City's plans for operation and expansion of service. However, the transportation emission calculates mode shift to transit for *all types of trips* (for example, in addition to commute trips, home to recreational activities, home to shopping trips, etc.).

Two tables have been provided below to show how the transportation sector emissions have been calculated both with and without statewide reductions from the implementation of LCFS and AB1493. Table B-4 below calculates the transportation sector emissions based on total 2020 projected transportation emissions (i.e. 633,494 MT CO_2e/ year) and does not account for statewide implementation of AB 1493 and LCFS. Note that reported emission reduction for measure T-4.1 of the SAP does not assume statewide reductions.

TABLE B-4: Transportation Emissions without Statewide Reductions

Transportation Sector Emissions (MT CO_2e)	Percent of LDV and MDV vehicles of total transportation fleet	Anticipated Mode Shift to Transit	Emissions Reduction (MT CO_2e/yr)
633,494	87%	1%	**5,510**

Note: Emission reductions have been rounded to the nearest whole number.

In table B-5, the 480,854 MT CO_2e/year transportation emission was calculated as the difference between the 2020 transportation emissions projection (i.e 633,494 MT CO_2e/ year) and the emissions reduction anticipated from Statewide implementation of AB 1493 and LCFS (i.e. 152,630 MT CO_2e/ year). Therefore, the anticipated reduction from T-4.1 noted below includes the combined effect from SAP measure and statewide reductions.

TABLE B-5: Transportation Emissions with Statewide Reductions

Transportation Sector Emissions (MT CO_2e)	Percent of LDV and MDV vehicles of total transportation fleet	Anticipated Mode Shift to Transit	Emissions Reduction (MT CO_2e/yr)
480,854	87%	1%	**4,180**

Note: Emission reductions have been rounded to the nearest whole number.

Measure T-5.1: Expand and enhance the bicycle network and support facilities.

This measure requires the City to implement a series of infrastructure improvements and support facilities that would help facilitate and encourage bicycle ridership and walking by community residents. Infrastructure improvements include, but are not limited to bicycle boxes and bicycle priority signals, bicycle rental stations, bicycle racks, and showers and lockers at commercial buildings. Pedestrian infrastructure enhancements have also been assumed based on City's ADA Transition Plan. This measure is also supported by Measure T-5.2, which involves providing educational outreach programs to promote bicycle travel and measure 6.1 and 7.1 for increased pedestrian activity in the community.

Quantification of this measure assumes that implementation would result in a 1% mode shift from total single-occupancy vehicles to bicycle travel and walking. The anticipated mode shift assumption is based on the past trend shown for walking and biking options to commute to work per the Census data (2000 and 2008). However the final emission reduction calculation is based on mode shift in all types of trips (for example, commuter trips, home to shopping trips etc) excluding heavy-duty truck trips is not included.

Two tables have been provided below to show how the transportation sector emissions have been calculated both with and without statewide reductions from the implementation of LCFS and AB1493. Table B-6 below calculates the transportation sector emissions based on total 2020 projected transportation emissions (i.e. 633,494 MT CO_2e/ year) and does not account for statewide implementation of AB 1493 and LCFS. Note that reported emission reduction for measure T-5.1 of the SAP does not assume statewide reductions.

TABLE B-6: Transportation Emissions without Statewide Reductions

Transportation Sector Emissions (MT CO_2e)	Percent of LDV and MDV vehicles of total transportation fleet	Anticipated Mode Shift to Bike/ Pedestrian	Emissions Reduction (MT CO_2e/yr)
633,494	87%	1%	**5,510**

Note: Emission reductions have been rounded to the nearest whole number.

In table B-7, the 480,854 MT CO_2e/year transportation emission estimates were calculated as the difference between the 2020 transportation emissions projection (i.e 633,494 MT CO_2e/ year) and the emissions reduction anticipated from Statewide implementation of AB 1493 and LCFS (i.e. 152,630 MT CO_2e/ year). Therefore, the anticipated reduction from T-5.1 noted below includes the combined effect from SAP measure and statewide reductions.

TABLE B-7: Transportation Emissions with Statewide Reductions

Transportation Sector Emissions (MT CO_2e)	Percent of LDV and MDV vehicles of total transportation fleet	Anticipated Mode Shift to Bike/ Pedestrian	Emissions Reduction (MT CO_2e/yr)
480,854	87%	1%	**4,180**

Note: Emission reductions have been rounded to the nearest whole number.

Measure T-8.1: Develop a program to promote purchase and use of low-carbon emitting vehicles.

This measure requires the City to implement a series of infrastructure improvements, incentives, and educational programs to promote the use of alternative fueled vehicles. Infrastructure improvements include priority parking and charging stations for neighborhood electric vehicles and installation of secured charging stations at new residential, commercial, and office buildings. Incentive programs include financial incentives for purchasing lower-carbon vehicles such as hybrids, electric, and smaller automobiles. This measure is also supported by Measure T-8.2, which describes public outreach to educate the community on the environmental and financial benefits of purchasing low-carbon, fuel-efficient vehicles.

The emission reductions achieved through implementation of this measure were estimated using the ICLEI *Climate and Air Pollution Planning Assistant Version 1.0* calculator for alternative fueled vehicles (ICLEI 2010[1]). Implementation of Measure T-8.1 is assumes that over the next 10 years, Roseville will add 7,500 hybrid vehicles, 2,500 electric vehicles and 6,400 small vehicles that will replace old inefficient vehicles in the community. This measure is anticipated to achieve a GHG reduction of approximately **31,050** MT CO_2e/yr. To avoid double-counting this measure does not take credit when anticipated statewide reductions (implementation of AB 1493 and LCFS) are assumed to calculate potential emission reduction of measure T-8.1.

[1] Climate and Air Pollution Planning Assistant (CAPPA). Available: http://www.icleiusa.org/action-center/tools/cappa-decision-support-tool/.

ICLEI CAPPA V 1.0 - Hybrid Vehicle Calculations:

Degree of Implementation

The default values below are based on a typical degree of implementation of this strategy, as well as your previous responses to user input questions. However, your local scenario may vary signficantly. CAPPA will assume that if you choose to include this strategy in your local climate action plan, this degree of implementation will apply. Adjust as appropriate to your local circumstance by editing the cell in blue below. **Changes to the Degree of Implementation must be saved using the Save Changes button before navigating away from this**

Community

7,500	Number of Additional Hybrids Purchased over 10 Years

Save Changes

Cost Impacts

The default values below are based on the reported collective experience of US local governments throughout the ICLEI network. CAPPA will assist you in estimating emissions and cost impacts and developing a local climate action plan based on these values. Adjust as appropriate to your local circumstance by editing the blue cells below. **Changes made to blue cells here need to be saved using the Save function from the Excel File Menu.**

Community

$3.00	Price of Gasoline ($ per gallon)
46	Hybrid Miles per Gallon
19.7	Miles per Gallon of Vehicle Replaced
8,000	Average Annual Miles per Vehicle
$2,530	Incremental Cost of Hybrid
1,741,337	Annual Gasoline Savings (gallons)
$5,224,012	Annual Cost Savings
3.6	Simple Payback (years)

Restore Defaults

Associated Annual Greenhouse Gas and Criteria Air Pollutant Emissions Reductions

The values below are calculated using default emissions factors consistent with those contained in the Clean Air and Climate Protection software.

Community

CO2e (metric tons)	NOx (lbs)	SOx (lbs)	CO (lbs)	VOCs (lbs)	PM10 (lbs)
16,391	5,202	339	1,177,182	123,454	2,533

View Complete Emission Coefficients Set

Per Unit Reductions

CO2e (metric tons) per vehicle	NOx (lbs) per vehicle	SOx (lbs) per vehicle	CO (lbs) per vehicle	VOCs (lbs) per vehicle	PM10 (lbs) per vehicle
2.19	0.69	0.05	156.96	16.46	0.34

ICLEI CAPPA V 1.0 - Electric Vehicle Calculations:

Degree of Implementation

The default values below are based on a typical degree of implementation of this strategy, as well as your previous responses to user input questions. However, your local scenario may vary signficantly. CAPPA will assume that if you choose to include this strategy in your local climate action plan, this degree of implementation will apply. Adjust as appropriate to your local circumstance by editing the cell in blue below. **Changes to the Degree of Implementation must be saved using the Save Changes button before navigating away from this sheet.**

Save Changes

Community	
2,500	Number of Electric Vehicles

Cost Impacts

The default values below are based on the reported collective experience of US local governments throughout the ICLEI network. CAPPA will assist you in estimating emissions and cost impacts and developing a local climate action plan based on these values. Adjust as appropriate to your local circumstance by editing the blue cells below. **Changes made to blue cells here need to be saved using the Save function from the Excel File Menu.**

Restore Defaults

Community	
$3.00	Price of Gasoline ($ per gallon)
$ 0.1094	Price of Electricity ($ per kWh)
19.7	Miles per Gallon of Vehicle Replaced
8,000	Average Annual Miles per Vehicle
$10,000	Incremental Cost of Electric Vehicle
1,015,228	Annual Gasoline Savings (gallons)
8,008,008	Annual Electricity Use (kWh)
$2,169,609	Annual Cost Savings
11.5	Simple Payback (years)

Associated Annual Greenhouse Gas and Criteria Air Pollutant Emissions Reductions

The values below are calculated using default emissions factors consistent with those contained in the Clean Air and Climate Protection software.

Select utility region: WECC California (CAMX)

Community

CO2e (metric tons)	NOx (lbs)	SOx (lbs)	CO (lbs)	VOCs (lbs)	PM10 (lbs)
6,812	-1,914	-4,054	681,784	71,463	-2,527

Per Unit Reductions

CO2e (metric tons) per vehicle	NOx (lbs) per vehicle	SOx (lbs) per vehicle	CO (lbs) per vehicle	VOCs (lbs) per vehicle	PM10 (lbs) per vehicle
4.10	-1.15	-2.44	410.50	43.03	-1.52

ICLEI CAPPA V 1.0 - Small Vehicle Calculations:

Degree of Implementation

The default values below are based on a typical degree of implementation of this strategy, as well as your previous responses to user input questions. However, your local scenario may vary signficantly. CAPPA will assume that if you choose to include this strategy in your local climate action plan, this degree of implementation will apply. Adjust as appropriate to your local circumstance by editing the cell in blue below. **Changes to the Degree of Implementation must be saved using the Save Changes button before navigating away from**

Save Changes

Community

6,400	Number of Smaller Vehicles Used

Cost Impacts

The default values below are based on the reported collective experience of US local governments throughout the ICLEI network. CAPPA will assist you in estimating emissions and cost impacts and developing a local climate action plan based on these values. Adjust as appropriate to your local circumstance by editing the blue cells below. **Changes made to blue cells here need to be saved using the Save function from the Excel**

Restore Defaults

Community

$3.00	Price of Gasoline ($ per gallon)
29	Small Vehicle Miles per Gallon
19.7	Miles per Gallon of Vehicle Replaced
8,000	Average Annual Miles per Vehicle
833,468	Annual Gasoline Savings (gallons)
$2,500,403	Annual Cost Savings

Associated Annual Greenhouse Gas and Criteria Air Pollutant Emissions Reductions

The values below are calculated using default emissions factors consistent with those contained in the Clean Air and Climate Protection software.

View Complete Emission Coefficients Set

Community

CO2e (metric tons)	NOx (lbs)	SOx (lbs)	CO (lbs)	VOCs (lbs)	PM10 (lbs)
7,845	2,490	162	563,442	59,090	1,212

Per Unit Reductions

CO2e (metric tons) per vehicle	NOx (lbs) per vehicle	SOx (lbs) per vehicle	CO (lbs) per vehicle	VOCs (lbs) per vehicle	PM10 (lbs) per vehicle
0.92	0.29	0.02	66.03	6.92	0.14

Measure T-9.1:	Continue to build and expand Intelligent Traffic Management System (ITS) to improve the flow of vehicular traffic in the City while maintaining (or enhancing) the bicycle and pedestrian environment.

This measure requires the City to implement a series of infrastructure and technological improvements to the existing transportation system. The measure would involve construction of street features such as roundabouts to achieve traffic calming and flow management. In addition, the measure would implement several features that allow real-time traffic information to be distributed to City residents.

The City's Traffic Operations Department analyzed the GHG emission reductions associated with the signal timing features of the measure and determined Measure T-9.1 would achieve a GHG reduction of approximately **3,420** MT CO_2e/yr. The gallons of fuel savings were estimated using syncro and actual intersection data. The fuel savings were then imported into the EPA emissions calculator below. http://www.epa.gov/cleanenergy/energy-resources/calculator.html

Following is Table B-8 on Traffic Improvements and their emission reductions by year. The measure takes credit for GHG emission reduction anticipated from ITS improvements beyond 2008.

Transportation Improvement Project Impacts on Greenhouse Gas (GHG) Emissions

TABLE B-8

Year	Project	Effect	Annual Greenhouse Gas (GHG) reduction*	This equates to...
2001	Use of LEDs in traffic signal heads	Annual savings of more than 3.6 million kilowatt hours	2,262 metric tons	Electricity use for 293 households a year
2004	Douglas/Sunrise flyover and tunnel	Annual fuel saving of 641,564 gallons of gasoline	5,652 metric tons	1,035 passenger cars not driven for one year; 13,145 barrels of oil
2004	Woodcreek Oaks/ Junction dual lefts	Annual fuel saving of 3,888 gallons of gasoline	34.3 metric tons	6.3 passenger cars not driven for one year; 79.7 barrels of oil
2004	Woodcreek Oaks/ Pleasant Grove dual lefts	Annual fuel saving of 13,609 gallons of gasoline	120 metric tons	22 passenger cars not driven for one year; 279 barrels of oil
2005	Washington/ Pleasant Grove dual lefts	Annual fuel saving of 58,324 gallons of gasoline	514 metric tons	94.1 passenger cars not driven for one year; 1,195 barrels of oil
2006	Foothills/Baseline/ Main dual lefts	Annual fuel saving of 9,721 gallons of gasoline	85.6 metric tons	15.7 passenger cars not driven for one year; 199 barrels of oil
2006	Roseville Parkway/ Pleasant Grove triple lefts	Annual fuel saving of 13,609 gallons of gasoline	120 metric tons	22 passenger cars not driven for one year; 279 barrels of oil
2006	Pleasant Grove/ Foothills triple lefts	Annual fuel saving of 1,944 gallons of gasoline	17.1 metric tons	17.1 passenger cars not driven for one year; 39.8 barrels of oil
2006	Roseville Parkway/ Galleria triple lefts	Annual fuel saving of 13,609 gallons of gasoline	120 metric tons	22 passenger cars not driven for one year; 279 barrels of oil
2007	Upgrades at the intersection of Sunrise Avenue and Cirby Way	Annual fuel savings of 137,748 gallons of gasoline	1,209 metric tons	262 passenger cars not driven for one year; 2,813 barrels of oil; 16 tanker trucks filled with gasoline
2007	Cirby/Sunrise dual lefts	Annual fuel saving of 132,201 gallons of gasoline	1,165 metric tons	213 passenger cars not driven for one year; 2,709 barrels of oil; 15.6 tanker trucks filled with gasoline
2008	Pleasant Grove/SB Hwy-65 Off-ramp	Annual fuel saving of 54,436 gallons of gasoline	480 metric tons	87.8 passenger cars not driven for one year; 1,115 barrels of oil

TABLE B-8

Year	Project	Effect	Annual Greenhouse Gas (GHG) reduction*	This equates to...
2008	Pleasant Grove/NB Hwy-65 Off-ramp	Annual fuel saving of 517,497 gallons of gasoline	154 metric tons	28.2 passenger cars not driven for one year; 358 barrels of oil
2008	Douglas/Santa Clara split phase & lane addition	Annual fuel saving of 7,777 gallons of gasoline	68.5 metric tons	12.5 passenger cars not driven for one year; 159 barrels of oil
2009	Washington/Blue Oaks dual NB lefts	Annual fuel saving of 3,888 gallons of gasoline	34.3 metric tons	6.3 passenger cars not driven for one year; 79.7 barrels of oil
2009	Washington/Sawtell dual NB thru	Annual fuel saving of 3,888 gallons of gasoline	34.3 metric tons	6.3 passenger cars not driven for one year; 79.7 barrels of oil
2009	Washington/Junction dual lefts	Annual fuel saving of 5,832 gallons of gasoline	51.4 metric tons	9.4 passenger cars not driven for one year; 119 barrels of oil
2009	Sierra College/E. Roseville Parkway dual lefts	Annual fuel saving of 15,553 gallons of gasoline	137 metric tons	25.1 passenger cars not driven for one year; 319 barrels of oil
2009	Sierra College/Douglas dual lefts	Annual fuel saving of 11,665 gallons of gasoline	103 metric tons	18.8 passenger cars not driven for one year; 239 barrels of oil
2009	Riverside/Douglas/ Vernon widening	Annual fuel saving of 11,665 gallons of gasoline	103 metric tons	18.8 passenger cars not driven for one year; 239 barrels of oil
2009	Riverside/Darling widening	Annual fuel saving of 5,832 gallons of gasoline	51.4 metric tons	9.4 passenger cars not driven for one year; 119 barrels of oil
2009	Cirby/Melody widening	Annual fuel saving of 5,832 gallons of gasoline	51.4 metric tons	9.4 passenger cars not driven for one year; 119 barrels of oil
2009	Cirby/Riverside widening	Annual fuel saving of 110,816 gallons of gasoline	976 metric tons	179 passenger cars not driven for one year; 2,270 barrels of oil; 13 tanker trucks filled with gasoline
2009	Cirby/Vernon widening	Annual fuel saving of 13,609 gallons of gasoline	120 metric tons	22 passenger cars not driven for one year; 279 barrels of oil
2009	Riverside/Darling widening	Annual fuel saving of 5,832 gallons of gasoline	51.4 metric tons	9.4 passenger cars not driven for one year; 119 barrels of oil

TABLE B-8

Year	Project	Effect	Annual Greenhouse Gas (GHG) reduction*	This equates to...
2009	Cirby/Foothills/Rsvl Rd widening	Annual fuel saving of 50,547 gallons of gasoline	445 metric tons	81.6 passenger cars not driven for one year; 1,036 barrels of oil
2009	Roseville Pkwy/ N. Sunrise triple lefts	Annual fuel saving of 13,609 gallons of gasoline	120 metric tons	22 passenger cars not driven for one year; 279 barrels of oil
FUTURE PROJECTS				
2010	Eureka/ N. Sunrise Improvements	Annual fuel saving of 3,888 gallons of gasoline	34.3 metric tons	6.3 passenger cars not driven for one year; 79.7 barrels of oil
2010	Eureka/ Taylor Improvements	Annual fuel saving of 30,050 gallons of gasoline	291 metric tons	53.3 passenger cars not driven for one year; 677 barrels of oil
2010	Blue Oaks/ Foothills 3rd EB thru	Annual fuel saving of 1,944 gallons of gasoline	17.1 metric tons	3.1 passenger cars not driven for one year; 39.8 barrels of oil
2010	Pleasant Grove/ Wal-Mart triple lefts	Annual fuel saving of 3,888 gallons of gasoline	34.3 metric tons	6.3 passenger cars not driven for one year; 79.7 barrels of oil
2010	Douglas/Sierra Gardens lane reconfiguration	Annual fuel saving of 9,721 gallons of gasoline	85.6 metric tons	15.7 passenger cars not driven for one year; 199 barrels of oil
2011	Sierra College/ Old Auburn NB dual lefts	Annual fuel saving of 11,665 gallons of gasoline	103 metric tons	18.8 passenger cars not driven for one year; 239 barrels of oil
2011	Cirby/ Rocky Ridge Improvements	Annual fuel saving of 15,553 gallons of gasoline	137 metric tons	25.1 passenger cars not driven for one year; 319 barrels of oil
2012	Cirby/Orlando dual rights	Annual fuel saving of 5,832 gallons of gasoline	51.4 metric tons	9.4 passenger cars not driven for one year; 119 barrels of oil
2014	Harding/Estates SB right	Annual fuel saving of 3,888 gallons of gasoline	34.3 metric tons	6.3 passenger cars not driven for one year; 79.7 barrels of oil
2015	N. Sunrise/ Lead Hill dual NB lefts	Annual fuel saving of 11,665 gallons of gasoline	103 metric tons	18.8 passenger cars not driven for one year; 239 barrels of oil
2015	Douglas/ Sunrise Improvements	Annual fuel saving of 27,218 gallons of gasoline	240 metric tons	43.9 passenger cars not driven for one year; 558 barrels of oil
2016	Roseville Parkway/ Taylor dual rights	Annual fuel saving of 1,944 gallons of gasoline	17.1 metric tons	3.1 passenger cars not driven for one year; 39.8 barrels of oil

NO_X and PM_{10} Emission Reductions

Recommended SAP transportation measures target reducing vehicle miles traveled (VMT) from on-road vehicles, which would also reduce NO_X and PM_{10} tailpipe emissions. As part of the SAP, the NO_X and PM_{10} emission reductions associated with Measures T-3.1, T-4.1, T-5.1, T-7.1, and T-8.1 were quantified using similar methods to those used to estimate GHG emissions. For each transportation reduction measure, the NO_X and PM_{10} emission reductions were assumed to be proportional to the percentage of GHG reduction achieved by the measure. In other words, the GHG reduction percentage of a measure (i.e., measure reductions [MT CO_2e] ÷ total transportation emissions [MT CO_2e]) was multiplied by the NO_X and PM_{10} on-road mobile source inventory to calculate the mass emissions that would be reduced by the measure. The NO_X and PM_{10} emission reductions from on-road mobile sources for each transportation measure without anticipated statewide reductions are presented below in Table B-9.

TABLE B-9: Transportation Emissions without Statewide Reductions

Recommended SAP Measure	Proposed GHG Emissions Reductions (MT CO_2e/year)	% GHG Reduction (GHG reductions/total transportation emissions)	NO_X Emission Reductions (tons/yr)	PM_{10} Emission Reductions (tons/yr)
T-3.1	3,640	0.57%	6.14	0.43
T-4.1	5,510	0.87%	9.30	0.65
T-5.1	5,510	0.87%	9.30	0.65
T-8.1	31,050	4.90%	52.40	– [1]
T-9.1	3,420	0.54%	5.77	– [1]
Total		--	**82.91**	**1.74**

Notes: [1]Measure is not anticipated to have PM_{10} emission reductions.

The NO_X and PM_{10} emission reductions from on-road mobile sources for each transportation measure with the combined effects of anticipated statewide reductions are presented below in Table B-10.

TABLE B-10: Transportation Emissions with Statewide Reductions

Recommended SAP Measure	Proposed GHG Emissions Reductions (MT CO_2e/year)	% GHG Reduction (GHG reductions/total transportation emissions)	NO_X Emission Reductions (tons/yr)	PM_{10} Emission Reductions (tons/yr)
T-3.1	2,760	0.44%	4.66	0.33
T-4.1	4,180	0.66%	7.05	0.50
T-5.1	4,180	0.66%	7.05	0.50
T-9.1	3,420	0.54%	5.77	– [1]
Total		--	**24.54**	**1.32**

Land Use and Urban Design

Greenhouse Gas Emission Reductions

Measure LU-4.1: Expand urban forestry and green infrastructure to increase carbon sequestration, reduce building energy consumption, and mitigate heat island effect.

This measure includes a series of actions that will strategically maintain and enhance the City's tree and vegetation population. The planting of new trees and maintenance of existing trees is used to minimize cooling costs and capture and store carbon dioxide. The measure includes outreach programs for the installation of vegetated green roofs consistent with local building codes.

Quantification of Measure LU-4.1 was performed for two components: shade trees and urban forestry. For shade trees, GHG reductions were calculated using the electricity consumption associated with space cooling that would be avoided due to planting of shade trees. For urban forestry, GHG reductions were calculated based on the carbon sequestration potential of planted trees and the reduction in the urban heat island effect and subsequent electricity consumption.

TABLE B-11

Measure (Emission Reduction Source)	Added Number of Trees	Emissions Reduction (MT CO_2e/yr)
Shade Trees (Building Energy Reduction)	1,000	70
Urban Forest (Carbon Sequestration and Urban Heat Island)	6,000	1,510
Total		**1,580**

Note: Emission reductions have been rounded to the nearest whole number.

The emission reductions achieved through implementation of this measure were estimated using the ICLEI *Climate and Air Pollution Planning Assistant Version 1.0* calculator for shade trees and urban forestry.

Shade Trees (Building Energy Reduction) – ICLEI Calculator

Degree of Implementation

The default values below are based on a typical degree of implementation of this strategy, as well as your previous responses to user input questions. However, your local scenario may vary significantly. CAPPA will assume that if you choose to include this strategy in your local climate action plan, this degree of implementation will apply. Adjust as appropriate to your local circumstance by editing the cell in blue below. **Changes to the Degree of Implementation must be saved using the Save Changes button before navigating away from this sheet.**

-	Trees Planted to Shade Buildings

Save Changes

1,000	Trees Planted to Shade Buildings

Cost Impacts

The default values below are based on the reported collective experience of US local governments throughout the ICLEI network. CAPPA will assist you in estimating emissions and cost impacts and developing a local climate action plan based on these values. Adjust as appropriate to your local circumstance by editing the blue cells below. **Changes made to blue cells here need to be saved using the Save function from the Excel File Menu.**

Government Operations

$ 0.0988	Price of Electricity ($ per kWh)
204	Annual Energy Savings of one Mature Tree (kWh)
$224	Cost of Planting Tree
0	Total Annual Energy Savings (kWh)
$0	Annual Cost Savings
#DIV/0!	Simple Payback (years)

Restore Defaults

Community

$ 0.1094	Price of Electricity ($ per kWh)
204	Annual Energy Savings of one Mature Tree (kWh)
$224	Cost of Planting Tree
204,000	Total Annual Energy Savings (kWh)
$22,318	Annual Cost Savings
10.0	Simple Payback (years)

Associated Annual Greenhouse Gas and Criteria Air Pollutant Emissions Reductions

The values below are calculated using default emissions factors consistent with those contained in the Clean Air and Climate Protection software.

Select Utility Region: WECC California (CAMX)

Government Operations

(metric tons)	NOx (lbs)	SOx (lbs)	CO (lbs)	VOCs (lbs)	PM10 (lbs)
0	0	0	0	0	0

View Complete Emission Coefficients Set

Community

(metric tons)	NOx (lbs)	SOx (lbs)	CO (lbs)	VOCs (lbs)	PM10 (lbs)
70	126	108	115	13	102

Urban Forest (Carbon Sequestration and Urban Heat Island) – ICLEI Calculator

Degree of Implementation

The default values below are based on a typical degree of implementation of this strategy, as well as your previous responses to user input questions. However, your local scenario may vary signficantly. CAPPA will assume that if you choose to include this strategy in your local climate action plan, this degree of implementation will apply. Adjust as appropriate to your local circumstance by editing the cell in blue below. **Changes to the Degree of Implementation must be saved using the Save Changes button before navigating away from this sheet.**

Community

6,000	Trees Planted

Save Changes

Cost Impacts

The default values below are based on the reported collective experience of US local governments throughout the ICLEI network. CAPPA will assist you in estimating emissions and cost impacts and developing a local climate action plan based on these values. Adjust as appropriate to your local circumstance by editing the blue cells below. **Changes made to blue cells here need to be saved using the Save function from the Excel File Menu.**

Community

$ 0.1094	Price of Electricity ($ per kWh)
7	Annual Energy Savings of one Tree (kWh)
0.25	Annual CO2 Absorbed by one Mature Tree (metric tons)
$224	Cost of Planting Tree
42,000	Total Annual Energy Savings (kWh)
$4,595	Annual Cost Savings
293	Simple Payback (years)

Restore Defaults

Associated Annual Greenhouse Gas and Criteria Air Pollutant Emissions Reductions

The values below are calculated using default emissions factors consistent with those contained in the Clean Air and Climate Protection software.

Select Utility Region: WECC California (CAMX)

Community

(metric tons)	NOx (lbs)	SOx (lbs)	CO (lbs)	VOCs (lbs)	PM10 (lbs)
1,514	26	22	24	3	21

View Complete Emission Coefficients Set

Per Unit Reductions

(metric tons) per tree	NOx (lbs) per tree	SOx (lbs) per tree	CO (lbs) per tree	VOCs (lbs) per tree	PM10 (lbs) per tree
0.252	0.004	0.004	0.004	0.000	0.004

Energy Efficiency and Renewable Energy

Greenhouse Gas Emission Reductions

Measure E-1.1: By 2020, the City will strive to reduce overall household kWh and therm use by 20% from baseline year 2008 for existing homes through various education and incentive programs, technology innovation, and conservation.

This measure involves a series of public outreach programs to educate and encourage energy retrofits and auditing services within existing homes. The measure includes programs that target energy savings actions, financial assistance for energy retrofits, solar hot water heaters, energy efficiency packages, and energy audits.

Quantification of this measure assumes that 10% of existing residential homes would participate in the measure's energy efficiency retrofit and that the measure would achieve a 20% increase in energy efficiency (i.e., electricity and natural gas consumption) from baseline emissions for 2008. The community participation rates are assumed based on Roseville Electric's trends in implementing energy efficiency programs.

TABLE B-12

Emission Sub-Sector	2008 Emissions (MT CO_2e/yr)	Efficiency improvement from 2008	Participation Rate (% of households)	Emissions Reduction (MT CO_2e/yr)
Existing Residential Energy	259,263	20%	10%	5,190

Note: Emission reductions have been rounded to the nearest whole number.

Measure E-1.2: Develop a comprehensive outreach program to facilitate voluntary commercial building energy efficiency improvements in existing commercial land uses.

This measure involves a series of public outreach programs to educate and encourage energy retrofit and auditing services for existing commercial buildings. The measure includes programs that target energy savings actions, solar infrastructure rebates, comparative energy efficiency information, energy efficiency audits, and guaranteed energy efficiency program processing dates.

Quantification of this measure assumes that 20% existing commercial buildings would participate in the measure's energy efficiency retrofit and that the measure would achieve a 15% increase in energy efficiency (i.e., electricity and natural gas consumption) from baseline emissions for 2008. The community participation rates are assumed based on Roseville Electric's trends in implementing energy efficiency programs.

TABLE B-13

Emission Sub-Sector	2008 Emissions (MT CO_2e/yr)	Efficiency improvement from 2008	Participation Rate (% of businesses)	Emissions Reduction (MT CO_2e/yr)
Existing Commercial Energy	346,557	15%	20%	10,400

Note: Emission reductions have been rounded to the nearest whole number

Measure E-1.3 and 1.4: Develop new residential units and commercial buildings within the City to meet, at a minimum, Department of Energy "ENERGY STAR" rating.

(Please note measure language is modified in Appendix B to combine calculations for both E-1.3 and E-1.4)

Measures E-1.3 and E-1.4 involve a series of public outreach programs to educate and encourage energy efficiency design in new residential and commercial development. These measures include programs that target energy savings actions, solar infrastructure rebates, implementation of passive solar design features, solar hot water heaters, and guaranteed energy efficiency program processing dates.

Quantification of this measure assumes that 50% of new residential units and 15% of new commercial square footage would participate in the measure's energy efficiency retrofit and that the measure would achieve a 15% increase in energy efficiency (i.e., electricity and natural gas consumption) above existing energy efficiency requirements. The community participation rates are assumed based on Roseville Electric's trends in implementing energy efficiency programs. The increase is electricity and natural gas emissions in calculated based on the difference in 2020 and 2008 emissions. In 2008 emissions related to electricity consumption were156,267 MT CO_2e/year for residential and 292,730 MT CO_2e/year ;and in 2020 anticipated emissions are 185,639 MT CO_2e/year for residential and 309,935 MT CO_2e/year for commercial. In 2008 emissions related to natural gas consumption were 102,996 MT CO_2e/year for residential and 53,827 MT CO_2e/year for commercial; and in 2020 the projected emissions are 110,412 MT CO_2e/year for residential and 54,021 MT CO_2e/year for commercial.

TABLE B-14

Emission Sub-Sector	Increase in Electricity and Natural Gas Emissions (MT CO_2e/yr)	Efficiency Improvement	Participation Rate (% of households or businesses)	Emissions Reduction (MT CO_2e/yr)
Residential Energy	36,788	15%	50%	2,760
Commercial Energy	17,399	15%	15%	390
Total				**3,150**

Solid Waste Reduction

Greenhouse Gas Emission Reductions

Measure WR-2.1: Maximize reuse, recycling, and composting programs.

This measure includes a series of actions to promote and incentivize the reuse, recycling, and composting of otherwise landfilled solid waste. The measure includes infrastructure projects such as a food waste-to-energy biomass plant. Economically-based actions include creating a viable market for used articles and reducing rates for commercial businesses that use recycled paper. This measure would also promote viable commercial office paper recycling programs and businesses such as ReCreate and ReStore.

The GHG reductions quantified as part of this measure are associated with reductions achieved from the proposed food waste-to-energy biomass plant. Although it is anticipated that the other components of the measure would achieve GHG reductions, those reductions cannot be accurately quantified at this time. It is anticipated that the food waste-to-energy biomass plant would reduce electricity consumption emissions through the use of methane (CH_4) rather than the current electricity production portfolio. In addition, the diversion of food waste from typical landfilling practices would avoid CH_4 emissions from anaerobic decomposition. Thus, this measure would result in a GHG emissions reduction of approximately **1,090** MT CO2e/year in 2020.

TABLE B-15

Food Waste-to-Energy Biomass Plant Assumptions	
3,600	tons of food waste/year
2,000,000	kilowatt-hours/year
Methane Captured and Combusted Emissions Generated	
6,826,000,000	BTU for 2,000,000 kWh
7,501,099	Cubic feet of Methane
383	**MT CO_2e/yr**
Potential Main Grid Electricity Emissions Avoided	
793.8	lbs CO_2/MWh Roseville
0.0302	lbs CH_4/MWh CCAR
0.0081	lbs N_2O/MWh CCAR
723	**MT CO_2e/yr**
Potential Landfill Methane Emissions Avoided	
0.209	MT CO_2e/wet ton
752	**MT CO_2e/yr**
Total GHG Emissions Avoided	
1,090	**MT CO_2e/yr**

Assumptions:

Assumes US average landfilling practices.
Source: U.S. Environmental Protection Agency. 2006. Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks, Exhibit 6-6. September.
Total emissions (including NOx) are available from the City of Roseville, Environmental Utilities Department

Water Resources and Efficiency

Greenhouse Gas Emission Reductions

Measure WC-1.1: Develop an SB 7 implementation plan that will reduce per capita water consumption by 20% by 2020.

This measure involves a series of water efficiency and reduction actions that would serve as a SB 7 implementation plan. The goal of the SB 7 implementation plan is to reduce per capita water consumption 20% by 2020. Per capita water consumption includes water consumption from all sources (e.g., residential, commercial, landscape irrigation, firefighting, leaks). The measure includes actions such as water rate changes, increased metering capabilities, water budgets for commercial buildings, water recycling, and adding water efficiency and savings curriculum in schools.

In order to estimate the GHG reductions associated with implementation of these water conservation measures, 2008 urban water consumption and population values were used to estimate baseline per capita water consumption. Water consumption in 2020, under a business-as-usual scenario, was estimated using 2020 population growth estimates consistent with the General Plan. Assuming achievement of the water conservation target, a 20 percent reduction (from the 2008 baseline) per capita water consumption rate and the projected 2020 population were used to estimate 2020 water consumption levels with conservation, which were subtracted from the projected 2020 water consumption levels without conservation to calculate the annual water savings achieved in year 2020. Similar to the methods used to calculate water-related GHG emissions for the inventory, these annual water savings were used to calculate the amount of electricity consumption and GHG emissions (associated with conveyance, distribution, and treatment of the water) that would be avoided as a result of achieving the 20% target. Thus, this measure would result in a GHG emissions reduction of approximately **3,520** MT CO_2e/yr.

TABLE B-16

Year	2008	2020
Population	109,154	151,199
Water Use (acre-feet/year)	33,680	46,664
Water use per capita (acre-feet/year/person)	0.309	0.309
20% Reduction per capita from 2008 levels (acre-feet/year/person)		0.247
Estimated 2020 water usage without implementation of SB 7 (acre-feet/year)		46,664
Estimated 2020 water usage with implementation of SB 7 (acre-feet/year)		37,332
Total water savings achieved in 2020 (acre-feet/year)		9,332
Total electricity savings in 2020 (MWh)		12,386
GHG Emissions Reduction in 2020 (MT CO_2e/year)		**3,520**

Assumptions:
- Assumes 30% of water used indoors and 70% outdoors for irrigation.
- Assumes energy water proxies of 1,763 kWh/acre-foot/year and 1,140 kWh/acre-foot/year for indoor and outdoor water use respectively.
- Assumes emission factors of 626.0784 lbs CO_2/MWh, 0.0052 lbs CH_4/MWh and a global warming potential of 23 times CO_2, and 0.0029 lbs N_20/MWh and a global warming potential 296 times CO_2.

Statewide Greenhouse Gas Emission Reductions

Assembly Bill 1493 (Pavley)

AB 1493, California's mobile-source GHG emissions regulations for passenger vehicles, was signed into law in 2002. The GHG reductions associated with AB 1493 that would affect the City in 2020 were calculated using ARB's *Pavley I + Low Carbon Fuel Standard Postprocessor* Version 1.0 (ARB 2010 [2]). This model applies an approximate 18.0% reduction to light and medium duty vehicle on-road mobile-source GHG emissions for AB 1493 in 2020 (ARB 2010).

TABLE B-17

Transportation Sector Emissions	Regulated Performance Improvement in 2020	% of Fleet Light and Medium Duty Vehicle	Emission Reductions (MT CO_2e/year)
633,494	18.0%	87.0%	**99,205**

Sources of information:
ARB. 2010. Pavley I and Low Carbon Fuel Standard Postprocessor Version 1.0.
Available: http://www.arb.ca.gov/cc/sb375/tools/postprocessor.htm.

Low Carbon Fuel Standard

The Low Carbon Fuel Standard (LCFS) is a program developed to reduce the carbon intensity of fuels used within California. In addition, the LCFS is designed to accelerate the availability and diversity of low-carbon fuels. The ARB's *Pavley I + Low Carbon Fuel Standard Postprocessor* Version 1.0 was used to quantify the GHG reductions from LCFS that would apply to the City in 2020. This model applies an approximate 10.0% reduction to on-road mobile-source GHG emissions for LCFS in 2020 (ARB 2010).

TABLE B-18

Total 2020 Transportation Sector Emissions	2020 Transportation Sector Emissions minus AB 1493	Regulated Performance Improvement in 2020	Emissions Reductions (MT CO_2e/year)
633,494	534,289	10.0%	**53,429**

Sources of information:
ARB. 2010. Pavley I and Low Carbon Fuel Standard Postprocessor Version 1.0.
Available at http://www.arb.ca.gov/cc/sb375/tools/postprocessor.htm.

Notes:
[1] Transportation emissions shown represent the total 2020 transportation emissions after reductions associated with AB 1493 have been achieved. This method was used to avoid double counting and overestimating GHG reductions associated with statewide actions.

[2] Pavley I and Low Carbon Fuel Standard Postprocessor Version 1.0. Available: http://www.arb.ca.gov/cc/sb375/tools/postprocessor.htm.

TABLE B-19

Pavley I + Low Carbon Fuel Standard Postprocessor Version 1.0 Outputs (also in Appendix A)

Vehicle Category	Vehicle Population	Weekday VMT from EMFAC (VMT/day)	Weekday CO_2 Emissions from EMFAC (tons/day)	Weekday CO_2 Emission Reduction from Pavley I (tons/day)	Weekday CO_2 Emissions after adopting Pavley I (tons/day)	% CO_2 Emission Reduction from LCFS	Weekday CO_2 Emission Reduction from LCFS (tons/day)	Weekday CO_2 Emissions after adopting Pavley I & LCFS (tons/day)	Annual CO_2 Emissions after adopting Pavley I & LCFS (MMTCO2/year)
LDA	150,993	1,345,424	524.74	111.95	412.79	10.00%	41.28	371.51	0.12
LDT1	51,653	476,644	232.71	48.18	184.53	10.00%	18.45	166.08	0.05
LDT2	78,059	718,092	357.16	51.73	305.43	10.00%	30.54	274.89	0.09
MDV	38,528	371,611	251.35	33.28	218.07	10.00%	21.81	196.26	0.06
Total	**319,232**	**2,911,770**	**1,365.96**	**245.13**	**1,120.82**	**10.00%**	**112.08**	**1,008.74**	**0.32**

Notes: EF= emission factor; CO_2e = carbon dioxide equivalent; MT= metric tons.

[1] GWP values are 100-year warming potentials from IPCC's Third Assessment Report (IPCC 2001).

[2] 2008 VMT estimates are interpolated from 2005 and 2035 values, based on SACOG's SACSIM Traffic Model.

Source: Data compiled by AECOM 2010.