TO: Planning Commission

FROM: Ed Gallagher, Community Development Director

SUBJECT: Greenhouse Gas Reduction Plan "Toolbox"

DATE: April 23, 2013

NEEDS: For the Planning Commission to consider the proposed Greenhouse Gas (GHG) Reduction Plan "Toolbox" measures, and to make a recommendation to the City Council on measures to include in the Plan.

FACTS:

1. The Toolbox measures are actions that would be implemented by the City to reduce GHG emissions from activities that occur within the community.

2. The GHG Toolbox was introduced to the Planning Commission at a Joint City Council/Planning Commission workshop on February 12, 2013. The Commission, Council and the public provided input on measures to consider including in the City's GHG Reduction Plan, measures to exclude, and those measures that should be researched further.

3. Staff analyzed the measures supported by the Commission and Council at the workshop to determine if the combination of those measures would meet the reduction targets. An amended Toolbox and GHG reduction analysis is included in this report in Attachment 1.

4. Staff prepared an analysis of potential impacts to City resources if the proposed measures are implemented. This analysis is provided in Attachment 2.

5. General GHG planning questions were also raised at the Joint Workshop. Answers to these questions are provided below.

ANALYSIS & CONCLUSION:

The project consultants prepared a "Toolbox" that includes a range of measures that can be selected from to reduce GHG emissions. The City may add additional measures to the Toolbox if desired. There are 36 measures in the Toolbox that cover topics including: Energy; Transportation and Land Use; Off-Road Equipment/Vehicles; Water; Solid Waste; and Trees and Open Space.

Direction received at the Joint Workshop was to include 31 of the 36 measures. A full description of the 31 measures that were generally supported is provided in Attachment 1. The five measures that were not included were deemed to be too onerous on businesses and/or the community. These measures are highlighted in red in Attachment 2, and are noted below.

- #4 – Energy Conservation Ordinance
- #9 – Community Choice Aggregation
- #18 – Employer-Based Transportation Demand Management (TDM)
- #21 – Public Parking Pricing
- #33 – Recycling at Public Events

The GHG Analysis indicates that if the City included the remaining 31 measures in the GHG Toolbox the City would meet the State target for reducing GHG emissions. The emissions calculated for Paso Robles were "adjusted" last November to reflect GHG emissions reductions from changes in State regulations on new clean fuel and vehicle efficiency standards. This reduced the amount of GHG that the City will need to reduce. See Attachment 3, Summary of GHG Targets and Measure Reductions.

When reviewing the Summary of GHG Targets and Measures, note that for some of the measures selected that some of the actions are "required". This means that if the City selects that measure that certain actions are prerequisites and need to be implemented as a part of the measure.

Questions raised at the workshop were in regard to specific toolbox measures, economic impacts, and general questions about the State regulations. These questions and answers are provided below.

- What would the cost be to employers if #18 on Transportation Demand Management for employers was selected?

  This measure would require businesses with 25 or more employees to provide encouragement, incentives and support for employees to reduce single-occupancy vehicle employee commuter trips. This measure differs from #19 (which is also a TDM measure) because it places the burden of encouragement with the employer, whereas in #19 it would be the responsibility of the City to work with the San Luis Obispo Rideshare Program to implement. The types of incentives and encouragement are the same, however an employers could go beyond encouragement by providing information on rideshare /carpool matching, transit, vanpooling availability, etc., and they could also offer incentives such as preferred parking, flexible work schedules, to financial incentives. However, measure #18 does not require financial contributions to employees; it would be an option. This measure may be something the City may want to reconsider including this since the estimated GHG reduction is fairly high - 883 metric tons of carbon dioxide equivalent (MTCO2e). If after reconsideration this measure is included, it may be either voluntary or mandatory.

- There was discussion regarding measure #27, Off-Road Equipment/Vehicles, and whether the measure is feasible since construction vehicles and equipment are typically diesel or gasoline fueled. This measure applies to construction-related vehicles and equipment only, not to off-road recreational vehicles.

  The target for this measure is to replace 20% of construction equipment with alternative fuel vehicles, such has electric or compressed natural gas (CNG). Staff confirmed with the Air District that the availability of alternative fueled vehicles is not readily available, at least not yet on the Central Coast. However, a CNG fueling

station is being planned in Paso Robles which will encourage the availability CNG vehicles and equipment in the future. This measure could potentially be implemented further into the planning period (the next 7 years), and could be adjusted to change the assumptions to 10% if that would seem feasible. GHG reduction from this measure is estimated to be very high - 2,073 MTCO2e.

- Could the City use a later year such as 2010 for the Baseline Year in the GHG Emissions Inventory?

The project consultants prepared a memorandum in response to this issue, which is included in Attachment 4. However, a summary of the memo is that if a later year were used for the City's GHG Emissions Inventory, the City may need to establish a greater reduction target for 2020 in order meet the targeted reductions. For the State, 15% below 2005 levels or 30% below "business-as-usual" projected 2020 levels is approximately equivalent to 1990 levels. In essence, the City would have less time to demonstrate reduction compliance. Using an earlier year allows the City to include reductions achieved since the baseline, which reduces the amount of GHG now required to be reduced.

- Would all the measures be implemented at once?

The short answer to this question is "no". The objective is to implement the measures included in the Plan over the timeframe of the project.

The GHG Plan will include a chapter on Implementation. The Implementation plan will be based on consideration of measures that are easier to pursue than those that are more difficult. For example, stepping up efforts on programs that the City is already pursuing would require less time and effort than developing new programs.

It would also be prudent to review the status of implementation measures on an annual basis to determine which efforts are successful, which might be adjusted or eliminated, and/or whether to add new measures that have yet to be identified. Program effectiveness would be measured by determining if the outcome meets the objectives or assumptions in the measure. For example, if the assumption for solar installations is to install 700 solar panels over 7 years, and if at "Year 3" only a few panels have been installed, perhaps the measure should be reviewed to determine how to remedy the situation, or reconsider the whether to continue with the measure.

- When would the various measures be implemented?

As noted above, measures would be implemented in accordance with a timeline to be developed as part of the Implementation Plan. The availability of staff resources to implement measures would be taken into account.

- Would “rural waivers” be available if the City cannot meet reduction targets?

There is no mechanism or process in the State law to waive requirements for meeting the reduction targets. The targets apply to all jurisdictions regardless of size. It is the City’s intention to include measures that meet the targets and that are feasible to implement.

- Is methane capture possible?

Yes. For instance, methane capture from the City’s wastewater treatment plant and landfill is already planned. The wastewater treatment plant upgrade includes an energy system that will capture methane produced at the plant and it will be used to help fuel the new plant.

The Paso Robles Landfill Master Plan identifies methane capture as a potential to create energy, however at this time it is cost prohibitive to pursue.

- How are GHGs being measured? Where will measurements take place? What instruments and models will be used?

The objective of this program is to reduce the amount of GHG emissions from activities in Paso Robles. GHGs in the air will not be measured as a part of this program. The State Air Resources Board has pre-determined the amount of GHG to be reduced by jurisdictions throughout the state.

- Does the City have to adopt a GHG Reduction Plan/Climate Action Plan?

The answer to this is two-fold. Under AB 32, the City is required by law to demonstrate how it will reduce GHG emissions to the 1990 level by 2020. (This equates to reducing emissions by 15% from the year 2005, by 2020.) Without a plan or strategy that is based on measurements of what was emitted by activities in the baseline year and measures or actions that have been calculated to reduce emissions, it would be impossible to quantify how the City is reducing emissions and demonstrate compliance. This could expose the City to legal liability of not complying with State law.

The other issue is that under SB 97, GHG emissions analysis became a part of the required environmental analysis under the California Environmental Quality Act (CEQA). Again, without a plan in place demonstrating consistency of development with AB 32, an adequate environmental determination under CEQA would be impossible to document, and it would expose the City and developers to legal challenge.

Additionally, integration of GHG reduction policies within the City’s General Plan would establish policy consistency between development proposals, CEQA compliance, and it would demonstrate compliance with AB 32. In the future, when the City updates the General Plan, integration of programs that reduce GHG should be included to make this consistency determination as seamless as possible.

Attachment 5 includes a "Frequently Asked Questions" sheet from the State Attorney General's Office provides information that helps address these issues.

The Council and Commission both raised concerns regarding potential cost impacts to the City and community. The GHG Toolbox model includes general information on costs for the City and the community associated with implementation of each measure. However, these estimates are presented as a "cost range" since there are variables that could change such as modifications to assumptions.

Therefore, staff prepared a more detailed analysis that identifies the number of in-kind staff time hours that are anticipated with implementation of each measure included in the toolbox. Some measures would require a "one-time" commitment of staff time that would be used for activities such as preparing codes or ordinances. Other items require "ongoing" staff time that may be intermittent.

If the in-kind staff time is divided over the 7 year planning period the cost in staff time would be approximately 335 hours per year which would be spread over a few departments such as Public Works, Community Development, and Administrative Services. Staff time used on implementing the programs would need to fit into the workloads and commitments of existing staff resources. Many of the measures are activities the City is already involved in such as pursuing grants and providing information on various programs. For those types of measures, staff would allocate a little more time to those specific activities.

It is not anticipated that approval of this plan would require hiring additional staff. If workloads increase in the future to the extent that staff could not keep up with their regular workload and implement GHG programs, the City could consider contract assistance. The Community Development Department has done this in the past when workloads are too much to handle efficiently, and the City is not ready to hire new staff.

Hard costs for materials and equipment would either need to be included in specifications for projects such as new streetlights when new development occurs, or be grant funded.

Costs to the public are structured so that they would be covered by grants or incentive programs, or they may require small financial contributions on a voluntary basis. For instance, the cost for solar system installations for residences (after rebates) may be as low as $2,475.

POLICY REFERENCE: Assembly Bill 32, California Environmental Quality Act

FISCAL IMPACT: As noted above, costs to the City would be absorbed through existing City resources and through grants and/or augmented through contract employees paid for as "pass-through" expenses.

OPTIONS: After opening the public hearing and taking public testimony, the Planning Commission is requested to take one of the actions listed below:

(1) Recommend that the City Council approve the Toolbox measures included in Attachment 1.
(2) Amend, modify or reject the foregoing option.

Attachments:

1 – GHG Toolbox
2 – City Resources Impact Analysis
3 – Draft GHG Target and Measure Reductions
4 - Baseline Inventory Memorandum
5 – Climate Change, CEQA and Frequently Asked Questions
6 - News Notice

CENTRAL COAST GHG PLANNING

SUMMARY OF MEASURES

City of Paso Robles

Category	Measure Name	Measure Description
Energy	Energy Efficiency Outreach and Incentive Programs	Expand participation in and the promotion of existing programs, such as San Luis Obispo County Energy Watch and Energy Upgrade California, to increase community awareness of existing energy efficiency rebates and financial incentives, and no- and low-cost actions community members can take to increase energy efficiency.
Energy	Energy Audit and Retrofit Program	Collaborate with San Luis Obispo County Energy Watch, local utility providers, local businesses and organizations to develop and promote a residential and commercial educational energy audit program with direct installation options, leveraging existing rebates.
Energy	Income-Qualified Energy Efficient Weatherization Programs	Facilitate energy efficient weatherization of low- and middle-income housing through promotion of existing programs.
Energy	Energy Conservation Ordinance	Require through a new City ordinance that cost-effective energy efficiency upgrades in existing buildings be implemented at point of sale or during major renovation of residential units. A maximum cost ceiling would be established to protect owners from excessive fees.
Energy	Incentives for Exceeding Title 24 Building Energy Efficiency Standards	Provide incentives (e.g., priority permitting, reduced permit fees, etc.) for new development and/or major remodels that voluntarily exceed State energy efficiency standards by an identified percentage.
Energy	Energy Efficient Public Realm Lighting Requirements	Require through a new City ordinance that new development utilize high efficiency lights in parking lots, streets, and other public areas.
Energy	Small Solar Photovoltaic (PV) Incentive Program	Facilitate the voluntary installation of small solar PV systems and solar hot water heaters in the community through expanded promotion of existing financial incentives, rebates, and financing programs, and by helping the average resident and business overcome common regulatory barriers and upfront capital costs.
Energy	Income-Qualified Solar PV Program	Facilitate the installation of solar PV systems on and solar hot water heaters in income-qualified housing units by promoting existing programs offered through the California Solar Initiative and New Solar Homes Partnership and by collaborating with organizations, such as Grid Alternatives, on outreach and eligibility.
Energy	Community Choice Aggregation Program (CCA)	Assembly Bill 117 (2002) enables California cities and counties, either individually or collectively, to supply electricity to customers within their jurisdiction by establishing a community choice aggregation (CCA) program. Unlike a municipal utility, a CCA does not own transmission and delivery systems, but is responsible for providing electricity to residents and businesses. The CCA may own electric generating facilities, but more often, it purchases electricity from private electricity generators. The City would either individually or through a regional partnership develop a CCA program and ensure that the energy generation portfolio of the electricity supplied has a higher percentage of clean energy than that mandated by the State Renewable Portfolio Standard (RPS).
Energy	Municipal Energy Efficiency Retrofits and Upgrades	Establish a target to reduce municipal energy use by a certain percent by 2020 and implement cost-effective improvements and upgrades to achieve that target.
Energy	Municipal Energy Efficient Public Realm Lighting	The City would continue to replace city-owned or -operated street, traffic signal, park, and parking lot lights with higher efficiency lamp technologies.
Energy	Energy Efficiency Requirements for New Municipal Buildings	Adopt a policy to exceed minimum Title 24 Building Energy Efficiency Standards by a certain percentage for the construction of new City buildings and facilities.
Energy	Renewable Energy Systems on City Property	The City would pursue municipally-owned renewable energy generation facilities.
Transportation and Land Use	Bicycle Network	Continue to improve and expand the city's bicycle network and infrastructure.
Transportation and Land Use	Pedestrian Network	Continue to improve and expand the city's pedestrian network.
Transportation and Land Use	Expand Transit Network	Work with the Regional Transit Authority (RTA) and transit service providers to expand the local transit network (i.e., additional routes or stops, and/or expanded hours of operation) based on the greatest demand for service.
Transportation and Land Use	Increase Transit Service Frequency/Speed	Work with the Regional Transit Authority (RTA) and transit services providers to increase transit service frequency (i.e., reducing headways) by identifying routes where increased bus frequency would improve service.
Transportation and Land Use	Employer-Based Transportation Demand Management (TDM) Program	Require through a new City ordinance that employers with 25 or more employees develop a TDM program that provides encouragement, incentives, and support for employees to reduce their single occupancy vehicle trips. Some examples of resources and incentives include telecommuting, alternative scheduling (e.g., 9/80 or 4/40 work schedules), rideshare matching, and walking, cycling and transit incentives.
Transportation and Land Use	Transportation Demand Management (TDM) Program - Voluntary	Work with San Luis Obispo Regional Ride Share and Ride-On to conduct additional outreach and marketing of existing TDM programs and incentives to discourage single-occupancy vehicle trips and encourage alternative modes of transportation, such as carpooling, taking transit, walking, and biking.
Transportation and Land Use	Parking Supply Management	Amend the Municipal Code to reduce parking requirements in areas such as the downtown where a variety of uses and services are planned in close proximity to each other and to transit.
Transportation and Land Use	Public Parking Pricing	Establish market-based pricing for public parking spaces, where appropriate.
Transportation and Land Use	Electric Vehicle Network and Alternative Fueling Stations	Facilitate the expanded use of alternative fuel vehicles and fueling infrastructure by streamlining permitting processes and promoting existing financial incentives.
Transportation and Land Use	Incentives for Infill and Transit Oriented Development	The City would identify and implement additional incentives to encourage mixed-use, higher density, and infill development near transit routes, in existing community centers/downtowns, and in other designated areas. Incentives may include, but are not limited to, priority permitting, lower permit fees, density bonuses, or reduced parking requirements.
Transportation and Land Use	Service Nodes	Work with private developers to encourage the development of convenient commercial and shopping opportunities near existing employment and/or residential areas, through incentives or the removal of existing regulatory barriers, as a means of shortening the distance between origins and destinations, and increasing the potential for walking or biking to obtain services.

Transportation and Land Use	Transportation Demand Management (TDM) Program for Municipal Employees	The City would implement a Transportation Demand Management (TDM) program for its own employees. Reduced single-occupant vehicle commuting would reduce GHG emissions.
Transportation and Land Use	Zero and Low Emission Municipal Fleet Vehicles	Continue to replace official City vehicles and equipment with low-emission and zero-emission vehicles, including smaller, hybrid, electric, compressed natural gas, biodiesel, and neighborhood electric vehicles.
Off-Road	Construction Equipment Techniques	Reduce GHG emissions from construction equipment by requiring various actions as appropriate to the construction project.
Off-Road	Equipment Upgrades, Retrofits, and Replacements	Expand the promotion of existing incentive programs that fund off-road equipment and vehicle upgrades, retrofits, and replacement, such as the Carl Moyer heavy-duty vehicle and equipment program.
Water	Exceed SB X7-7 (Water Conservation Act of 2009) Water Conservation Target	The City would adopt a water conservation target that exceeds the SB X7-7*, [Water Conservation Act of 2009], target and identify and implement additional water efficiency and conservation measures to meet that target by 2020.
Solid Waste	Solid Waste Diversion Rate	The City would adopt a specified solid waste diversion rate that exceeds the state-mandated rate of 50% and identify programs to meet the identified rate by 2020.
Solid Waste	Organic Waste Diversion Program	The City would develop a combined or separate organic waste (yard trimming, food scraps, and food-soiled paper) collection system and encourage residents and businesses to divert these materials from landfills. The City would develop a marketing campaign to educate the community and facilitate composting.
Solid Waste	Construction and Demolition Debris Diversion Requirements	Require the reuse or recycling of construction and demolition materials from development projects beyond the state-mandated 50% requirement.
Solid Waste	Recycling at Public Events	The City would adopt an ordinance requiring the provision of recycling receptacles at all events requiring a permit or held on City-owned or -operated property.
Solid Waste	Municipal Solid Waste Reduction	Adopt a specified solid waste diversion rate and identify steps to meet that rate by 2020.
Trees and Open Space	Tree Planting Program	Develop a program to facilitate tree planting within the community, working with local non-profit organizations and community partners. Develop and adopt tree planting guidelines that address tree and site selection.
Trees and Open Space	Municipal Tree Planting Program	Establish a tree planting program to increase the number of native, drought-tolerant trees on City-owned property, parks and streetscapes.

Energy Efficiency Outreach and Incentive Programs

Measure Name	Energy Efficiency Outreach and Incentive Programs
Description of Measure	Expand participation in and the promotion of existing programs, such as San Luis Obispo County Energy Watch and Energy Upgrade California, to increase community awareness of existing energy efficiency rebates and financial incentives, and no- and low-cost actions community members can take to increase energy efficiency.

Category	Energy
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	Yes

Menu of Implementation Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Conduct additional outreach and promotional activities, either individually or in collaboration with San Luis Obispo County Energy Watch, targeting specific groups or sectors within the community (e.g., homeowners, renters, businesses, etc.).	Yes	Required
Designate one week per year to conduct an energy efficiency outreach campaign targeting a specific group. The campaign week can also be used to recognize and encourage programs and educational outreach conducted by industry organizations, non-governmental entities, government agencies, and other community groups.	No	Required
Direct community members to existing program websites, such as San Luis Obispo County Energy Watch and Energy Upgrade California.	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	426

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	Very Low to Low	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Very Low to Low	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	Yes/No	Notes
Reduce Costs	Yes	From reduced energy use with average payback periods ranging from 0 to 5 years depending on upgrades.
Improve Public Health	Yes	By improved safety and/or indoor air quality depending on the improvement/upgrade.
Improve Air Quality	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	Yes	Depending on the upgrade/improvement.
Reduce Energy Consumption	Yes	
Increases Property Value	Yes	
Adaptation	Yes	

Case Studies

California Air Resources Board CoolCalifornia.org	http://www.coolcalifornia.org/article/energy-makeover
Sonoma County Climate Protection Campaign	http://climateprotection.org/our-work/sonoma-county/energy-efficiency

Implementation

Responsible Department/Agency	Community Development; Public Works
Actual Measure or Commitment	Percent of households and businesses participating; percent energy (electricity and natural gas) savings
Implementation Mechanism	Incentives

Implementation Timing	Near-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Note: This measure should use conservative assumptions to avoid double counting with other energy measures.

Key Assumptions for Calculations:

Percent of households participating by 2020	35%	Percent
Percent of businesses participating by 2020	35%	Percent
Targeted percent residential energy savings	5%	Percent
Targeted percent commercial energy savings	6%	Percent
Staff time needed for this measure	0.02	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Residential Electricity Savings (kWh) = Rp × Rs x 95% x Re Residential Natural Gas Savings (therms) = Rp × Rs x 5% x Rn Commercial Electricity Savings (kWh) = Cp x Cs x 95%x Ce Commercial Natural Gas Savings (kWh) = Cp x Cs x 5% x Cn		
	Where:		
	Rp=	35%	Percent of residences participating in rebate and programs by 2020
	Cp=	35%	Percent of businesses participating in rebate and incentive programs by 2020
	Rs=	5%	Percent residential energy savings (applied 95% electricity, 5% natural gas)
	Cs=	6%	Percent commercial energy savings (applied 95% electricity, 5% natural gas)
	Re=	78,439,999	2020 residential electricity usage (kWh)
	Rn=	5,355,948	2020 residential natural gas usage (therms)
	Ce=	80,726,652	2020 commercial electricity use (kWh)
	Cn=	2,354,906	2020 commercial natural gas usage (therms)
Resource Savings	1,304,065	Residential electricity saved (kWh)	
	4,686	Residential natural gas saved (therms)	
	1,610,497	Commercial electricity saved (kWh)	
	2,473	Commercial natural gas saved (therms)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e) = (Se/1,000 × 0.133) + (Sg/10 × 53.2/1,000)		
	Where:		
	Se=	Residential or commercial electricity savings	
	Sg=	Residential or commercial natural gas savings	
	1,000	= Conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= Conversion factor for therm to MMBtu	
	0.133	= Average projected emissions factor for electricity in 2020 in MT CO_2e/MWh	
	53.24	= Average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reduction	198	Residential Reduction (MT CO2e)	
	227	Commercial Reduction (MT CO2e)	
	426	Total Reduction (MT CO2e) in 2020	
Municipal Costs and Savings Calculations	Staff time to participate in and promote existing programs.		
	FTE =	0.02	Estimated staff time per year
	$/FTE=	$100,000	FTE cost per year
Municipal Costs and Savings	Municipal Cost =	$1,900	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Total savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Where:		
	Residential $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Residential $/therm=	$0.92	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/therm=	$0.81	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Total residential savings=	$252,084	Dollars per year
	Total commercial savings=	$301,555	Dollars per year
	Households =	12,864	Total number of households projected in 2020

	Households participating =	4,502	Households participating by 2020
	Commercial units =	2,178	Total number of projected commercial units in 2020
	Commercial units participating =	762	Commercial units participating by 2020
Community Cost and Savings	Residential Cost =	Very Low to Low	Dollars per household (varies depending on implementation)
	Commercial Cost =	Very Low to Low	Dollars per business (varies depending on implementation)
	Residential Savings =	Very Low to Low	Dollars per household (varies depending on implementation)
	Commercial Savings =	Very Low to Low	Dollars per business (varies depending on implementation)

Notes

Assumes that of the total percent reduction in energy use, 95% applies to electricity and 5% applies to natural gas.

References

1. Pacific Gas and Electricity Company. 2012. Energy Overview Tableau Reports.
2. Rincon Consultants. November 2012. Cities Greenhouse Gas Emissions Inventories.
3. California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast

Energy Audit and Retrofit Program

Measure Name	Energy Audit and Retrofit Program
Description of Measure	Collaborate with San Luis Obispo County Energy Watch, local utility providers, local businesses and organizations to develop and promote a residential and commercial educational energy audit program with direct installation options, leveraging existing rebates.

Category	Energy
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Collaborate with San Luis Obispo County Energy Watch, local utilities, and/or local jurisdictions to develop and promote a residential and commercial energy audit program with direct installation options, leveraging existing rebates.	Yes	Required
Collaborate with San Luis Obispo County Energy Watch to conduct outreach and promotional activities targeting specific groups (e.g., owners of buildings built prior to Title 24 [1980]).	Yes	Required
As part of the business licensing and renewal process, encourage businesses to participate in the program and receive an energy audit.	No	Yes
Participate in and promote a single-family residential energy efficiency financing program to encourage investment in energy efficiency upgrades.	No	Yes
Continue to participate in and promote the CaliforniaFIRST energy efficiency financing program for multi-family residential and commercial buildings.	Yes	Yes
Work with Energy Upgrade California, local utilities, and/or community businesses and organizations, to annually conduct a "do-it-yourself" workshop for building energy retrofits.	No	Yes
Highlight the effectiveness of energy audits and retrofits by showcasing the success of retrofits on the City's website or in its newsletter.	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	1,475

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	Very Low to High	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Very Low to Medium	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	From reduced energy use with average payback periods ranging from 1 to 6 years depending on upgrades.
Improve Public Health	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Air Quality	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	Yes	Depending on the upgrade/improvement.
Reduce Energy Consumption	Yes	
Increases property value	Yes	Efficient buildings have higher property values and resale prices than less efficient buildings.
Adaptation	Yes	

Case Studies

Fresno Energy Watch Program	http://www.pge.com/includes/docs/pdfs/mybusiness/energysavingsrebates/economicdevelopment/partners/FresnoEnergyWatch_fact_sheet.pdf
PG&E Energy Upgrade California Workshops	http://www.pgecurrents.com/2012/11/06/rebates-galore-workshops-teach-homeowners-how-to-save-money-and-energy/

City of Chula Vista Business Energy Evaluations (begins on page 5)	http://www.chulavistaca.gov/clean/conservation/climate/documents/AttA_ClimateActionPlanUpdate_Apr12ProgressReport_FINAL.pdf

Implementation

Responsible Department/Agency	Building Division, Planning Division
Actual Measure or Commitment	Number of residential and non-residential buildings retrofitted by 2020; percent energy (electricity and natural gas) savings
Implementation Mechanism	Incentives
Implementation Timing	Mid-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Number of households audited by 2020	700	Units
Number of businesses audited by 2020	600	Units
Target percentage of energy savings	30%	Percent
Staff time needed for this measure	0.05	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Residential Square Feet (Rsf) = Ru × 1,545 Residential Electricity Energy Savings (kWh)=E × 0.40 × Rsf × 4.1 Residential Natural Gas Savings (therms)=E × 0.40 × Rsf × 0.3		
	Ru=	700	# residential units audited by 2020
	Average residential unit size=	1,545	Square feet/dwelling unit (California Energy Commission [CEC] 2010 Residential Appliance Saturation Survey [RASS])
	Audit to retrofit conversion rate=	40%	Percentage of units that receive an audit that complete energy efficiency installation (EnergySavvy 1)
	Rsf=	432,600	# square feet of residential space retrofitted by 2020
	E=	30%	Target percentage of energy savings
	Residential electricity use intensity=	4.1	kWh/square foot/year (Average electric use intensity for residential buildings in kWh/square foot/year [RASS]).
	Residential natural gas use intensity=	0.3	Therms/square foot/year (Average natural gas usage intensity for residential buildings in therms/square foot/year [RASS]).
	Commercial Square Feet (Csf) = Cu × 4,500 Commercial Electricity Energy Savings (kWh)=E × 0.40 × Csf × 12.95 Commercial Natural Gas Savings (therms)=E × 0.40 × Csf × 0.3		
	Where:		
	Cu=	600	# of commercial units or buildings audited by 2020
	Average commercial unit size=	4,500	Average commercial unit/business size in square feet
	Audit to retrofit conversion rate=	40%	Percentage of units that receive an audit that complete energy efficiency installation (Energy Savvy)
	Csf=	1,080,000	Square feet of commercial space upgraded by 2020
	E=	30%	Target percentage of energy savings
	Commercial electricity use intensity=	12.95	kWh/square foot/year (Average electric use intensity for commercial buildings in kWh/square feet/year (California Energy Commission [CEC] 2005 California End Use Survey [CEUS], page 184)).
	Commercial natural gas use intensity=	0.3	therms/square foot/year (Average natural gas usage intensity for commercial buildings in therms/square feet/year (CEC 2005 CEUS, page 184)).
Resource Savings	532,098	Residential electricity saved (kWh)	
	45,423	Residential natural gas saved (therms)	
	4,197,420	Commercial electricity saved (kWh)	
	113,400	Commercial natural gas saved (therms)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e) = (Se/1,000 × 0.133) + (Sg/10 × 53.20/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	

GHG Emission Reduction Calculations	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.133	= average projected 2020 electricity emissions factor (MT CO2e/MWh)	
	53.24	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reduction	313	Residential Reduction (MT CO2e) in 2020	
	1,162	Commercial Reduction (MT CO2e) in 2020	
Municipal Cost and Savings Calculations	Staff time developing and administering program.		
	FTE =	0.05	Staff time needed for this measure
	$/FTE=	$100,000	Cost associated with staff time
Municipal Cost and Savings	Municipal Cost=	$5,000	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Total savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Where:		
	Residential $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Residential $/therm=	$0.92	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/therm=	$0.81	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	$142,888	Residential Savings ($/year)	
	$872,574	Commercial Savings ($/year)	
	Total cost of residential retrofit =	$10,000	Cost per home (average based on retrofits that achieve a 20-30% energy savings - EnergySavvy 2)
	Available residential rebates =	$3,000	Energy Upgrade California offers rebates ranging from $2,000-$4,000 ($3,000 rebate for 30% energy savings).
	Total cost of commercial retrofit =	$4,545	Cost per commercial unit ($1.01 per square foot - AECOM 2010; Gregerson 1997)
	Available commercial rebates =	$2,273	PG&E offers $0.09/kWh (PG&E Customized Retrofit Incentives) and SCE offers $1.00/therm (SCE Financial Incentives for Energy Efficiency) for retrofit projects, with the total incentive capped at 50% of the measure cost
Community Costs and Savings	Residential Cost =	$7,000	Dollars per household (costs will vary depending on the extent of the retrofit; costs shown here are based on a 20-30% energy savings)
	Commercial Cost =	$2,273	Dollars per business (costs will vary depending on the extent of the retrofit; costs shown here are based on a 20-30% energy savings)
	Residential Savings =	$204	Dollars per household
	Commercial Savings =	$1,454	Dollars per business

Notes

This is based on average energy consumption. Programs that emphasize audits and retrofits to buildings constructed prior to Title 24 (1980), will see greater reductions.

Audit to retrofit conversion rates and energy savings vary significantly by program. In a study of 16 audit programs around the country, audit to retrofit conversion rates ranged from 30% to 50% (Energy Savvy).

When combining energy measures, the City should be aware of double-counting emission reductions. Some actions in this measure overlap with actions in Measures 3a and 3d, and this overlay diminishes the overall effectiveness of the measure and its actions. If the City selects both measures, it should lower the commitment established in terms of units or percent reduction in order to address the issue of double-counting.

References

1. EnergySavvy 1 - Energy Audit Programs That Work http://www.energysavvy.com/blog/2010/09/14/energy-audit-programs-that-work/
2. NEEBPG - Residential Audit Programs Best Practices Report http://www.eebestpractices.com/pdf/BP_R7.PDF
3. California Energy Commission [CEC] 2010 Residential Appliance Saturation Survey [RASS] - http://www.energy.ca.gov/appliances/rass/
4. PG&E Energy House Calls - http://www.energyhousecalls.com/?WT.mc_id=GSEHC154&WT.srch=1&gclid=CJ6xi8_jmLMCFQSqnQodsAEAiA
5. Energy Upgrade California - http://www.pge.com/myhome/saveenergymoney/energysavingprograms/euca.shtml
6. Energy Information Administration, 1995 Commercial Buildings Energy Consumption Survey - http://www.eia.gov/emeu/consumptionbriefs/cbecs/pbawebsite/retailserv/retserv_howlarge.htm
7. CONSOL. August 2008. Meeting AB 32 -- Cost-Effective Green House Gas Reductions in the Residential Sector, available at: http://www.cbia.org/go/cbia/?LinkServID=D3BFD657-F8E2-4F63-97B404B55FD856B5&showMeta=0

8. PG&E Third Party Screen and Certification of Home Improvement Contractors - http://www.egia.org/Academy/rockymountainexchange2011/docs/JaneKruse.pdf

9. PG&E Customized Retrofit Incentives - http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ief/

10. SCE Financial Incentives for Energy Efficiency - http://www.socalgas.com/documents/business/EECIPFactSheet.pdf

11. U.S. Department of Energy (DOE). 2011a. Home Energy Saver. Available: <http://hes.lbl.gov/consumer>. Accessed: July 6, 2011.

12. American Council for an Energy-Efficient Economy (ACEEE), Berkeley RECO Case Study - http://aceee.org/sector/local-policy/case-studies/berkeley-california-residential-energ

13. EnergySavvy 2 - Efficiency Programs http://www.energysavvy.com/blog/2011/12/01/efficiency-program-qa-when-the-in-home-audit-is-the-retrofit/

Income-Qualified Energy Efficient Weatherization Programs

Measure Name	Income-Qualified Energy Efficient Weatherization Programs
Description of Measure	Facilitate energy efficient weatherization of low- and middle-income housing through promotion of existing programs.

Category	Energy
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Establish a partnership with an organization, such as Community Action Partnership of San Luis Obispo (CAPSLO) related to income-qualified weatherization programs.	No	Required
Collaborate with CAPSLO to identify and promote income-qualified weatherization programs, such as PG&E's Energy Savings Assistance program, to income-qualified households using additional sources of data available to the City, (e.g., water bills, housing records, etc.).	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	130

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Very Low	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	
Improve Public Health	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Air Quality	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Water Quality	No	
Improve Equity	Yes	Income-qualified families are particularly susceptible to high and fluctuating energy costs, based on the earnings to expenditure ratio. Estimates indicate that while the average U.S. household's energy costs are equal to 7% of household income, income-qualified households spend 17% of their household earnings (Source: Flex Your Power).
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	
Increases property value	Yes	Efficient buildings have higher property values and resale prices than less efficient buildings.
Adaptation	Yes	

Case Studies

City of Oakland	http://www2.oaklandnet.com/Government/o/DHS/s/CommunityActionPartnership/OAK022616
Community Action Partnership of San Luis Obispo County (CAPSLO)	http://www.capslo.org/programs/menu-energy-services/menu-weatherization

Implementation

Responsible Department/Agency	Community Development
Actual Measure or Commitment	Residential units upgraded by 2020; percent energy (electricity and natural gas) savings

Implementation Mechanism	Incentives
Implementation Time Frame	Near-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Residential units upgraded by 2020	100	Units
Staff time needed for this measure	0.04	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Residential Square Feet (Rsf) = Ru × 1,545 Residential Electricity Energy Savings (kWh)=E × Rsf × 4.1 Residential Natural Gas Savings (therms)=E × Rsf × 0.3		
	Ru=	100	Residential units upgraded by 2020
	Average residential unit size=	1,545	Square feet/dwelling unit California Energy Commission [CEC] 2010 Residential Appliance Saturation Survey [RASS])
	Rsf=	154,500	Square feet of residential space upgraded by 2020
	E=	35%	Average first-year weatherization energy savings (Oak Ridge National Laboratory (ORNL) 2010 Weatherization Assistance Program Technical Memorandum: Background Data and Statistics. Page 5.)
	Residential electricity use intensity=	4.1	kWh/square foot/year (Average electric use intensity for residential buildings in kWh/square foot/year [RASS]).
	Residential natural gas use intensity=	0.3	Therms/square foot/year (Average natural gas usage intensity for residential buildings in therms/square foot/year [RASS]).
Resource Savings	221,708	Residential electricity saved (kWh)	
	18,926	Residential natural gas saved (therms)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e)=(Se/1,000 × 0.133)+(Sg/10 × 53.2/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.133	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
	53.24	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reduction	130	MT CO2e	
Municipal Costs and Savings Calculations	Staff time coordinating with CAPSLO and local utilities, and conducting outreach.		
	FTE =	0.04	Staff time needed for this measures
	$/FTE=	$100,000	Dollars per year
Municipal Costs and Savings	Municipal Cost=	$4,000	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Residential cost savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Where:		
	Residential $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Residential $/therm=	$0.92	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Total Community Savings =	$59,537	Residential Savings
Community Cost and Savings	Community Cost =	$0	Dollars per household
	Community Savings =	$595	Dollars per household

Notes

The first-year energy savings for LIHEAP households is approximately 34.5% or $437 (ORNL). The average energy savings per low-income housing unit for Weatherization Assistance is estimated by the State of California Department of Community Services and Development (CSD) to be $418 per year.

When combining energy measures, the City should be aware of double-counting emission reductions. Some actions in this measure overlap with actions in Measures 3a and 3d, and this overlay diminishes the overall effectiveness of the measure and its actions. If the City selects both measures, it should lower the commitment established in terms of units or percent reduction in order to address the issue of double-counting.

PG&E and SoCalGas contract with CAPSLO to provide weatherization services to the region as part of the statewide Energy Savings Assistance Program (ESAP). http://www.cpuc.ca.gov/PUC/energy/Low+Income/liee.htm

For low-income households: no-cost weatherization under Energy Savings Assistance Program. For middle-income households: free weatherization under PG&E's Middle Income Direct Install program.

References

1. CSD - Helps Low-Income Families Manage and Reduce Energy Costs http://www.csd.ca.gov/Contractors/documents/Energy%20tab/LIHEAP-DOE%20Fact%20Sheet%20%282008%29.pdf
2. California Energy Commission [CEC] 2010 Residential Appliance Saturation Survey [RASS] - http://www.energy.ca.gov/appliances/rass/
3. ORNL 2010 Weatherization Assistance Program Technical Memorandum: Background Data and Statistics (page 5) - http://weatherization.ornl.gov/pdfs/ORNL_TM-2010-66.pdf
4. California Energy Commission (CEC) 2005 California End Use Survey - http://www.energy.ca.gov/2006publications/CEC-400-2006-005/CEC-400-2006-005.PDF
5. California Flex Your Power - http://www.fypower.org/feature/lowincome/
6. PG&E Direct Install -http://www.staplesenergy.com/residential-case-studies/pge-middle-income-direct-install-program

Energy Conservation Ordinance

Measure Name	Energy Conservation Ordinance
Description of Measure	Require through a new City ordinance that cost-effective energy efficiency upgrades in existing buildings be implemented at point of sale or during major renovation of residential units. A maximum cost ceiling would be established to protect owners from excessive fees.

Category	Energy
Community or Municipal?	Community
Voluntary or Mandatory?	Mandatory
Selected?	No

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Coordinate with the other local jurisdictions in the region to develop a local energy conservation ordinance.	No	No
Develop and adopt a local residential energy conservation ordinance.	No	Required
Enforce existing commercial energy disclosure rules, pursuant to (AB 1103) that require commercial businesses to provide twelve months of energy-use information using the U.S. Environmental Protection Agency's ENERGY STAR Portfolio Manager.	No	no

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	1,359

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	Very Low to Medium	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Very Low to Medium	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	From reduced energy use with average payback periods ranging from 1 to 6 years depending on upgrades.
Improve Public Health	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Air Quality	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	Yes	Depending on the upgrade/improvement.
Reduce Energy Consumption	Yes	
Increases property value	Yes	Efficient buildings have higher property values and resale prices than less efficient buildings.
Adaptation	Yes	

Case Studies

City of Berkeley	http://www.ci.berkeley.ca.us/reco/ http://aceee.org/sector/local-policy/case-studies/berkeley-california-residential-energ
City of Chico	http://www.chico.ca.us/building_development_services/building_services/home_page.asp

Implementation

Responsible Department/Agency	Building Services, Community Development and Planning
Actual Measure or Commitment	Number of residential and non-residential buildings retrofitted by 2020; percent energy (electricity and natural gas) savings
Implementation Mechanism	Codes and Standards

Implementation Time Frame	Mid-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Number of residential units retrofitted by 2020	700	Units
Number of non-residential buildings retrofitted by 2020	400	Units
Target percentage of energy savings	15%	Percent
Staff time needed for this measure	0.10	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Residential Square Feet (Rsf) = Ru × 1,545 Residential Electricity Energy Savings (kWh)=E × Rsf × 4.1 Residential Natural Gas Savings (therms)=E × Rsf × 0.3		
	Ru=	700	# residential units affected by ordinance by 2020
	Average residential unit size=	1,545	Square feet/dwelling unit (California Energy Commission [CEC] 2010 Residential Appliance Saturation Survey [RASS])
	Rsf=	1,081,500	# square feet of residential space retrofitted by 2020
	E=	15%	Target percentage of energy savings
	Residential electricity use intensity=	4.1	kWh/square foot/year (Average electric use intensity for residential buildings in kWh/square foot/year [RASS]).
	Residential natural gas use intensity=	0.3	Therms/square foot/year (Average natural gas usage intensity for residential buildings in therms/square foot/year [RASS]).
	Commercial Square Feet (Csf) = Cu × 4,500 Commercial Electricity Energy Savings (kWh)=E × Csf × 12.95 Commercial Natural Gas Savings (therms)=E × Csf × 0.3		
	Where:		
	Cu=	400	# of commercial units or buildings audited by 2020
	Average commercial unit size=	4,500	Average square feet for all commercial buildings
	Csf=	1,800,000	Square feet of commercial space upgraded by 2020
	E=	15%	Target percentage of energy savings
	Commercial electricity use intensity=	12.95	kWh/square foot/year (Average electric use intensity for commercial buildings in kWh/square feet/year(California Energy Commission [CEC] 2005 California End Use Survey [CEUS])).
	Commercial natural gas use intensity=	0.3	therms/square foot/year (Average natural gas usage intensity for commercial buildings in therms/square feet/year (CEC 2005 CEUS)).
Resource Savings	665,123	Residential electricity saved (kWh)	
	56,779	Residential natural gas saved (therms)	
	3,497,850	Commercial electricity saved (kWh)	
	94,500	Commercial natural gas saved (therms)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e) = (Se/1,000 × 0.133) + (Sg/10 × 53.20/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.133	= average projected 2020 electricity emissions factor (MT CO2e/MWh)	
	53.24	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reduction	391	Residential Reduction (MT CO2e) in 2020	
	968	Commercial Reduction (MT CO2e) in 2020	
Municipal Cost and Savings Calculations	Staff time developing and administering program.		
	FTE =	0.10	Staff time needed for this measure
	$/FTE=	$100,000	Cost associated with staff time
Municipal Cost and Savings	Municipal Cost=	$10,000	Dollars
	Municipal Savings =	$0	Dollars

Community Costs and Savings Calculations	Total Savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Where:		
	Residential $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Residential $/therm=	$0.92	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/therm=	$0.81	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	$178,610	Total Residential Savings ($/year)	
	$727,145	Total Commercial Savings ($/year)	
	Total cost of residential upgrades =	$3,000	Cost per home can ranges from approximately $800 to 1% of sale price (ACEEE)
	Available residential rebates =	$1,500	Energy Upgrade California offers rebates ranging from $2,000-$4,000 (% energy savings*1,000)
	Total cost of commercial upgrades =	$4,545	Cost per commercial unit (average $1.01 per square foot - from LBNL in SPUR)
	Available commercial rebates =	$2,273	PG&E offers $0.09/kWh (PG&E Customized Retrofit Incentives) and SCE offers $1.00/therm (SCE Financial Incentives for Energy Efficiency) for retrofit projects, with the total incentive capped at 50% of the measure cost
Community Costs and Savings	Residential Cost =	$1,500	Dollars per household
	Commercial Cost =	$2,273	Dollars per business
	Residential Savings =	$255	Dollars per household
	Commercial Savings =	$1,818	Dollars per business

Notes

Energy savings depends on the stringency of requirements. San Francisco estimates a 15% reduction in energy use as a result of their RECO (Eco Leader). Similarly, an evaluation of RECO ordinance options in Boulder found a range of 10%-20% reductions in energy use (Boulder).

When combining energy measures, the City should be aware of double-counting emission reductions. Some actions in this measure overlap with actions in Measures 3a and 3b, and this overlay diminishes the overall effectiveness of the measure and its actions. If the City selects both measures, it should lower the commitment established in terms of units or percent reduction in order to address the issue of double-counting.

References

1. California Energy Commission [CEC] 2010 Residential Appliance Saturation Survey [RASS] - http://www.energy.ca.gov/appliances/rass/
2. Eco Leader - Residential Energy Conservation Ordinance Factsheet http://ecoleader.org/assets/downloads/RECO/RECO_factsheet.pdf
3. City of Boulder RECO Report (page 4) -http://www.bouldercolorado.gov/files/reco_report_boulder.pdf.
4. American Council for an Energy-Efficient Economy (ACEEE), Berkeley RECO Case Study - http://aceee.org/sector/local-policy/case-studies/berkeley-california-residential-energ
5. SPUR - Reinstate the Commercial Energy Conservation Ordinance (CECO) - http://www.spur.org/publications/library/report/critical_cooling/option4 http://www.spur.org/publications/library/report/critical_cooling/option3

Incentives for Exceeding Title 24 Building Energy Efficiency Standards

Measure Name	Incentives for Exceeding Title 24 Building Energy Efficiency Standards
Description of Measure	Provide incentives (e.g., priority permitting, reduced permit fees, etc.) for new development and/or major remodels that voluntarily exceed State energy efficiency standards by an identified percentage.

Category	Energy
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Collaborate with community organizations and businesses, local utilities, and other local jurisdictions in the region to develop and promote a technical assistance and best practices program that aids developers in selecting and implementing energy efficiency measures that exceed State standards.	No	Yes
Identify and provide incentives (e.g., expedited or streamlined permitting, deferred fees, public recognition, etc.) for applicants whose project exceeds State requirements by a specified percent.	No	Required
Update the building permit process to incentivize higher building performance.	No	Yes
Launch an educational campaign for builders, permit applicants, and the general public to promote best practices and incentive program; provide information and assistance about energy efficiency options online and at permit counter.	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	114

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	Medium	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Very Low to Low	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	
Improve Public Health	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Air Quality	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	Yes	
Reduce Energy Consumption	Yes	
Increases property value	Yes	Efficient buildings have higher property values and resale prices than less efficient buildings.
Adaptation	Yes	

Case Studies

City of Chula Vista Green Building	http://www.chulavistaca.gov/clean/conservation/climate/documents/AttA_ClimateActionPlanUpdate_Apr12ProgressReport_FINAL.pdf
City of Santa Cruz	http://www.cityofsantacruz.com/index.aspx?page=1177 http://www.ca-ilg.org/post/city-santa-cruz-green-building-program-address-climate-change

Implementation

Responsible Department/Agency	Building Services, Community Development and Planning
Actual Measure or Commitment	New residential and commercial units that exceed State standards by 2020; percentage of energy (electricity and natural gas) savings
Implementation Mechanism	Incentives
Implementation Timing	Mid-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

New residential units exceeding State standards	50	Units
New non-residential buildings exceeding State standards	75	Units
Target percentage of energy savings above State standards	20%	Percent
Staff time needed for this measure	0.04	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Residential Square Feet (Rsf) = Ru × 1,545 Residential Electricity Energy Savings (kWh) = E × Eec × Rsf × (1 - CSP) × 4.1 Residential Natural Gas Savings (therms) = E × Egc × Rsf × (1 - CSP) × 0.3		
	Ru=	50	# of new residential units exceeding State standards by 2020
	Average residential unit size=	1,545	Square feet/dwelling unit (California Energy Commission [CEC] 2010 Residential Appliance Saturation Survey (RASS))
	Rsf=	77,250	# square feet of residential space that exceed State standards by 2020
	E=	20%	Target percentage of energy savings above State standards
	Eec=	32.8%	Percent of single family electricity use covered by Title 24 (Statewide Energy Efficiency Collaborative [SEEC] 2011 Greenhouse Gas Forecasting Assistant, page 7)
	Egc=	85.7%	Percent of single family natural gas use covered by Title 24 (SEEC 2011 Greenhouse Gas Forecasting Assistant, page 7)
	CSP=	25%	Percent single family residential energy savings above current State standards (CEC 2013 Building Efficiency Standards, slide 11)
	Residential electricity use intensity=	4.1	kWh/square foot/year (Average electric use intensity for residential buildings in kWh/square foot/year [RASS]).
	Residential natural gas use intensity=	0.3	Therms/square foot/year (Average natural gas usage intensity for residential buildings in therms/square foot/year [RASS]).
	Commercial Electricity Energy Savings (kWh)= E × Egc × (1 - CSP) × 12.95 × Csf Commercial Natural Gas Savings (therms)=E × Egc × (1 - CSP) × 0.3 × Csf		
	Where:		
	Cu=	75	# of commercial units or buildings audited by 2020
	Average commercial unit size=	4,500	Average square feet for all commercial buildings (Energy Information Administration)
	Csf=	337,500	# of new square feet of commercial space that exceeds State standards by 2020
	E=	20%	Target percentage of energy savings above State standards
	Eec=	64%	Percent of commercial electricity use covered by Title 24 (SEEC 2011 Greenhouse Gas Forecasting Assistant, page 9)
	Egc=	70%	Percent of commercial natural gas use covered by Title 24 (SEEC 2011 Greenhouse Gas Forecasting Assistant, page 9)
	CSP=	30%	Percent non-residential energy savings above current State standards (CEC 2013 Building Efficiency Standards, slide 17)
	Commercial electricity use intensity=	12.955	kWh/square foot/year (Average electric use intensity for commercial buildings in kWh/square feet/year (California Energy Commission [CEC] 2005 California End Use Survey [CEUS]))
	Commercial natural gas use intensity=	0.35	therms/square foot/year (Average natural gas usage intensity for commercial buildings in therms/square feet/year (CEC 2005 CEUS))
Resource Savings	15,583	Residential electricity saved (kWh)	
	3,476	Residential natural gas saved (therms)	
	391,759	Commercial electricity saved (kWh)	

	11,576	Commercial natural gas saved (therms)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e) = (Se/1,000 × 0.133) + (Sg/10 × 53.2/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.13	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
	53.24	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reduction	21	Residential Reduction (MT CO2e/year)	
	114	Commercial Reduction (MT CO2e/year)	
Municipal Costs and Savings Calculations	Staff time developing new materials, identifying and adopting incentives.		
	FTE =	0.04	Estimated staff time per year to develop new program
	$/FTE=	$100,000	FTE cost
Municipal Costs and Savings	Municipal Cost=	$4,000	Dollars per year
	Municipal Savings =	$0	Dollars per year
Community Costs and Savings Calculations	Total savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Where:		
	Residential $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Residential $/therm=	$0.92	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/therm=	$0.81	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Total residential savings =	$6,158	Residential Savings ($/year)
	Total commercial savings =	$82,244	Commercial Savings ($/year)
	Average residential Cost =	$0.91	Residential average cost to implement (sqft) - Projected PG&E Zone 5 Costs (US Department of Energy)
	Average commercial Cost =	$1.25	Commercial average cost to implement (sq ft) - Projected PG&E Zone 5 Costs (CA Department of Energy)
Community Costs and Savings	Residential Cost =	$1,406	Dollars per household
	Commercial Cost =	$5,625	Dollars per business
	Residential Savings =	$123	Dollars per household
	Commercial Savings =	$1,097	Dollars per business

Notes

Title 24 covers only 64% of commercial electricity use and 70% of natural gas use (SEEC, page 7). 2013 Title 24 updates are expected to reduce non-residential energy use by 30% (CEC).

Title 24 covers only 32.8% of single family residential electricity use and 85.7% of natural gas use (SEEC, page 7). 2013 Title 24 updates are expected to reduce single family residential energy use by 25% and multifamily residential by 14% (CEC).

When combining energy measures, the City should be aware of double-counting emission reductions. Some actions in this measure overlap with actions in Measure 3k and 3l, and this overlay diminishes the overall effectiveness of the measure and its actions. If the City selects both measures, it should lower the commitment established in terms of units or percent reduction in order to address the issue of double-counting.

References

1. 2005 California End Use Survey http://www.energy.ca.gov/ceus/
2. CEC 2013 Building Efficiency Standards, slide 17 - http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/2012-05-31_2013_standards_adoption_hearing_presentation.pdf
3. SEEC 2011 Greenhouse Gas Forecasting Assistant, page 7 - http://californiaseec.org/documents/forecasting-tools/seec-forecast-assistant-documentation
4. http://www.energy.ca.gov/title24/2008standards/ordinances/san_luis_obispo/CZ5_Cost-Effectiveness_Report-Final.pdf

Energy Efficient Public Realm Lighting Requirements

Measure Name	Energy Efficient Public Realm Lighting Requirements
Description of Measure	Require through a new City ordinance that new development utilize high efficiency lights in parking lots, streets, and other public areas.

Category	Energy
Community or Municipal?	Community
Voluntary or Mandatory?	Mandatory
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Develop and adopt an ordinance that requires new development to utilize high efficiency lights in parking lots, streets, and other public areas.	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	34

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	Very Low	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Very Low	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	Reduced operation and maintenance costs.
Improve Public Health	Yes	Improved safety from improved night visibility.
Improve Air Quality	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	
Adaptation	Yes	

Case Studies

San Francisco Commercial Lighting Ordinance	http://sfenvironment.org/article/commercial/commercial-lighting-ordinance http://www.nrel.gov/docs/legosti/old/16267.pdf
City of Palo Alto	http://www.ca-ilg.org/post/led-streetlights-palo-alto http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/gateway_palo-alto.pdf

Implementation

Responsible Department/Agency	Public Works, Community Development and Planning
Actual Measure or Commitment	Number of LED or CFL public realm lights installed by 2020
Implementation Mechanism	Codes and Standards
Implementation Timing	Near-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Note: This Measure should not be double counted with Measure 4e, Incentives for Exceeding State Building Energy Efficiency Standards, or 4j, Municipal Public Lighting. This measure addresses privately installed outdoor lighting.

Key Assumptions for Calculations:

Number of Private LED street lights installed by 2020	100	Street Lights
Number of other Private LED outdoor lights installed by 2020	400	Other Outdoor Lights
Staff time needed for this measure	0.04	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Total electricity saved (kWh) = (N x (Wi-We) x (h/Cf)		
	Where Street Lights:		
	N_{street} =	100	Number of street lights installed lights
	Wi =	200	Average estimated power rating in watts of high pressure sodium street light (Department of Energy [DOE] 2004. U.S. Lighting Market Characterization)
	We =	50	Average power rating in watts of LED street lighting (DOE and PG&E 2008. LED Street Lighting)
	h =	4,100	Number of hours per year operating
	Cf =	1,000	Conversion factor for W to kW
	Where Other Outdoor Public Realm Lighting:		
	N_{other} =	400	Number of other outdoor installed lights
	Wi =	150	Average estimated power rating in watts of public realm lighting (DOE 2004)
	We =	17	Average power rating in watts of LED public realm lighting (DOE 2004)
	h =	3,650	Number of hours per year operating
	Cf =	1,000	Conversion factor for W to kW
Resource Savings	61,500	Electricity saved from LED street lights (kWh)	
	194,180	Electricity saved from LED "other" public realm lighting (kWh)	
	255,680	Total electricity saved (kWh)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e)=(Se/1,000 × 0.133)		
	Where:		
	255,680	= Se (electricity savings)	
	1,000	= conversion factor for kWh to MWh	
	0.133	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
GHG Emission Reduction	34	MT CO2e/year	
Municipal Costs and Savings Calculations	Staff time needed to develop and adopt ordinance. Would be incorporated into permitting process.		
	FTE =	0.04	Estimated staff time to develop requirements
	$/FTE=	$100,000	Dollars
	Maintenance savings per fixture =	$17	Annual maintenance savings/fixture (City of Palo Alto)
	Maintenance savings =	$1,700	Dollars (for streetlights and traffic signals)
Municipal Costs and Savings	Municipal Cost=	$4,000	Dollars
	Municipal Savings =	$1,700	Dollars
Community Cost and Savings Calculations	Total Savings = kWh reduced/year x $/kWh		
	Where:		
	$/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Total capital savings =	$48,579	Dollars
	Maintenance savings per fixture =	$17	Annual maintenance savings/fixture (City of Palo Alto)
	Total maintenance savings =	$6,800	Dollars (other public realm lighting)
	Total Capital Cost = [Number of units installed x cost per unit] – [Available rebates]		
	Where Streetlights:		
	Number of units installed =	100	Units
	Cost per unit installed =	$350	Dollars/unit (Energy Solutions 2008; PNNL 2010)
	Total cost=	$35,000	Dollars
	Available rebates =	$125	Dollars/unit ($125 for 200 watt unit replaced - PG&E)

	Net cost =	$22,500	Dollars (total cost - available rebates)
	Where Other Outdoor Lighting (in Public Realm):		
	Number of units installed =	400	Units
	Cost per unit installed =	$300	Dollars/unit (Energy Solutions 2008; PNNL 2010)
	Cost installation =	$120,000	Dollars
	Available rebates =	$100	Dollars ($100 for 150 watt unit replaced - PG&E)
	Net cost =	$80,000	Dollars (total cost - available rebates)
Community Cost and Savings	Community Cost =	$205	Dollars per light
	Community Savings =	$114	Dollars per light

Notes

References

1. PG&E Streetlight program - http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ref/lighting/lightemittingdiodes/streetlightprogram.shtml
2. PG&E LED Street Light Turnkey Replacement Service - http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ref/lighting/lightemittingdiodes/ledturnkey/
3. DOE U.S. Lighting Market Characterization Study. National Lighting Inventory and Energy Consumption Estimate - http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/lmc_vol1_final.pdf
4. DOE and PG&E LED Street Lighting study - http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/gateway_sf-streetlighting.pdf
5. IES Model Lighting Ordinance - http://www.ies.org/PDF/MLO/MLO_FINAL_June2011.pdf

6. PG&E LED Streetlight Rebates - http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ref/lighting/lightemittingdiodes/incentives/index.shtml
7. Western Pacific Signal 2011; eLightBulbs 2011; Energy Solutions 2008; PNNL 2010 from Stockton Draft CAP - http://www.stocktongov.com/files/ClimateActionPlanDraftFeb2012.pdf
8. Palo Alto - Demonstration Assessment of Light-Emitting Diode (LED) Roadway Lighting on Residential and Commercial Streets - http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/gateway_palo-alto.pdf

Small Solar Photovoltaic (PV) Incentive Program

Measure Name	Small Solar Photovoltaic (PV) Incentive Program
Description of Measure	Facilitate the voluntary installation of small solar PV systems and solar hot water heaters in the community through expanded promotion of existing financial incentives, rebates, and financing programs, and by helping the average resident and business overcome common regulatory barriers and upfront capital costs.

Category	Energy
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Conduct a comprehensive review of the City's solar permitting process based on the Governor's Office of Planning and Research's (OPR) California Solar Permitting Guidebook (June 2012), identifying any existing barriers.	No	Yes
Improve the permit review and approval process for small solar PV systems by implementing recommendations for streamlined permitting identified in the California Solar Permitting Guidebook (e.g., use standardized forms, provide clear written instructions on the permitting process and a checklist of required application materials, make information available on the City's website and at the permit counter, etc.).	No	Required
Collaborate with other local jurisdictions in the region to standardize requirements across jurisdiction, by using common permit materials, such as checklists and standard plans, to reduce permit submittal errors among contractors working throughout a region.	No	Yes
Participate in and promote a residential and commercial renewable energy financing program (e.g., through CaliforniaFIRST, a joint powers authority with neighboring jurisdictions, or other mechanisms) allowing residential and commercial property owners to voluntarily invest in renewable energy upgrades for their buildings.	No	Yes
Expand education on and promotion of existing incentive, rebate, and financing programs for solar PV systems and solar hot water heaters targeting specific groups or sectors within the community.	No	Required
Designate one week per year to conduct a renewable energy outreach campaign targeting a specific group. The campaign week can also be used to recognize community members that have implemented noteworthy or unique renewable energy projects.	No	Yes

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	2,732

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	High	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Low to High	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	
Improve Public Health	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Air Quality	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	No	
Increase in Property Value	Yes	
Adaptation	Yes	

Case Studies

City of Berkeley - BerkeleyFirst	http://www.ci.berkeley.ca.us/berkeleyfirst/ http://www.ca-ilg.org/sites/main/files/file-attachments/resources_Berkeley-FIRST.pdf
City of San Jose - Energy Fund	http://www.ca-ilg.org/sites/main/files/file-attachments/resources_SanJose_EnergyFund.pdf

Implementation

Responsible Department/Agency	Public Works, Building Services, Community Development and Planning
Actual Measure or Commitment	kW of residential and commercial solar PV installations and number of solar hot water heaters installed
Implementation Mechanism	Incentives
Implementation Timing	Near-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Number of commercial solar PV installations (between 2013-2020)	180	Systems
Number of residential solar PV installations (between 2013-2020)	350	Systems
Number of residential solar water heaters installed by 2020*	167	Systems
Staff time needed for this measure	0.08	Full Time Equivalent (FTE)

*Approximately 0.013 installations per household as a result of the Solar Water Heating program established under Assembly Bill 1470, the Solar Thermal Heating Act of 2007.

Calculations:

Resource Savings Calculations	Commercial Electricity Energy Savings (kWh)= Csi × Acsi × 1,900 Residential Electricity Energy Savings (kWh)= (Rsi × Arsi × 1,900) + (Rsw × Ee) Residential Natural Gas Energy Savings (therms) = Rswg × Eg		
	Where:		
	Csi =	180	# of commercial solar installations by 2020
	Rsi =	350	# of residential solar installations by 2020
	Rsw =	17	# of residential solar electric water heater installations by 2020 (assumes 10% electric)
	Rswg =	150	# of residential solar natural gas water heater installations by 2020 (assumes 90% natural gas)
	Acsi =	46.9	average commercial solar installation size in kW (Cal Solar Initiative [CSI 1])
	Arsi =	5.4	average residential solar installation size in kW (CSI 1)
	Ee =	2,945	average expected residential solar water heater savings in kWh per year (California Solar Initiative (CSI 2) Thermal Program Cal Solar statistics)
	Eg =	139	average expected residential solar water heater savings in therms per year (CSI 2 - 2012 Thermal Program Cal Solar statistics)
	Conversion factor =	1,900	conversion factor from kW to kWh per year (Solar Energy Industries Association [SEIA] Solar Radiation Conversion Map)
Resource Savings	3,666,782	Residential electricity saved (kWh)	
	20,892	Residential natural gas saved (therms)	
	16,039,800	Commercial electricity saved (kWh)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e) = (Se/1,000 × 0.133) + (Sg/10 × 53.2/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.133	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
	53.24	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reduction	2,732	MT CO2e	
Municipal Costs and Savings Calculations	Staff time developing new materials and performing marketing and outreach activities.		
	FTE =	0.08	Estimated staff time per year to develop new program

	$/FTE	$100,000	Dollars per year
Municipal Costs and Savings	Municipal Cost =	$8,000	Dollars per year
	Municipal Savings =	$0	Dollars per year
Community Costs and Savings Calculations	Commercial cost savings = [Electricity Savings x $/kWh] Residential cost savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Where:		
	Residential $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Residential $/therm=	$0.92	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Total residential savings =	$715,909	Dollars
	Total commercial savings =	$2,983,403	Dollars
	Commercial solar installed cost =	$4.38	Commercial Solar Installations per watt (Green Tech Media)
	Residential solar installed cost =	$5.46	Residential Solar Installations per watt (Green Tech Media)
	Total cost of installed commercial solar =	$36,975,960	Dollars
	Total cost of installed residential solar =	$10,395,840	Dollars
	Residential solar water heater cost =	$4,650	Dollars (Incremental installed cost of solar hot water heater (National Renewable Energy Lab, August 2012))
	Available rebates =	$2,175	Dollars (available Rebate for replacing natural gas heater with solar (Go Solar CA))
	Cost of solar hot water heater with rebate =	$2,475	Dollars (cost of solar hot water heater installation minus rebate)
	Total cost of solar water heaters =	$413,325	Dollars
Community Cost and Savings	Residential Cost =	$20,907	Dollars per household
	Commercial Cost =	$205,422	Dollars per business
	Residential Savings =	$1,385	Dollars per household
	Commercial Savings =	$16,574	Dollars per business

Notes

Commercial and residential installation size assumptions are the averages for San Luis Obispo County PV installations for completed and PBI projects (Cal Solar). The installation size uses the CSI rating, which accounts for a design factor, and is a more accurate reflection of energy generated by the installation. Solar water heater savings is an average of the expected savings for all the projects that have applied for the CSI-Thermal rebate in San Luis Obispo County (CSI 2).

When combining energy measures, the City should be aware of double-counting emission reductions. Should not double count with Measure 3k, Low Income Solar Program, and Measure 3q, Municipal Solar Installations.

The model assumes that solar water heaters are installed in combination with both electric and natural gas water heaters. The model assumes that 90% of the systems installed offset natural gas water heaters; 10% offset electric water heaters.

Installed cost of conventional natural gas system is $1,350 and installed cost of residential solar water heaters: $6,000 (National Renewable Energy Lab).

Between 2006 and 2012, 1,410 kW of residential solar PVs were installed in Paso Robles (266 units at 5.3 kW each) and 4,339 kW of commercial solar PVs were installed. This excludes income-qualified solar PV installations.

References

1. Cal Solar - http://www.californiasolarstatistics.ca.gov/
2. California Solar Initiative CSI-Thermal Program - http://www.gosolarcalifornia.ca.gov/solarwater/index.php
3. CEC Planning and Permitting Resources For Renewable Energy Systems - http://www.energy.ca.gov/localgovernment/planning_resources/
4. SEIA Solar Radiation Conversion Map - http://www.getsolar.com/blog/what-can-one-kilowatt-of-solar-do-for-you/13483/
5. http://www.nrel.gov/docs/fy11osti/48986.pdf
6. http://www.greentechmedia.com/research/ussmi
7. National Renewable Energy Lab, August 2012 - http://www.nrel.gov/solar/
8. Go Solar CA - http://www.gosolarcalifornia.ca.gov/

Income-Qualified Solar PV Program

Measure Name	Income-Qualified Solar PV Program
Description of Measure	Facilitate the installation of solar PV systems on and solar hot water heaters in income-qualified housing units by promoting existing programs offered through the California Solar Initiative and New Solar Homes Partnership and by collaborating with organizations, such as Grid Alternatives, on outreach and eligibility.

Category	Energy
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Collaborate with Grid Alternatives and other community organizations to provide targeted education and outreach to developers and homeowners about incentives offered through the Single Family Affordable Solar Homes (SASH) Program and the Multifamily Affordable Solar Homes Program (MASH).	No	Required
Provide targeted outreach to homeowners about solar water heating incentives offered through the California Solar Initiative.	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	183

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Medium	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	
Improve Public Health	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Air Quality	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	No	
Increase in Property Value	Yes	
Adaptation	Yes	

Case Studies

GoSolarSF Program	http://sfenvironment.org/article/solar-electricity-photovoltaic/financial-incentives-for-solar-pv
Northeast Denver Housing Center	http://www1.eere.energy.gov/solar/pdfs/51075.pdf

Implementation

Responsible Department/Agency	Public Works, Building Services, Community Development and Planning
Actual Measure or Commitment	kW of PV and solar hot water heaters installed
Implementation Mechanism	Incentives
Implementation Timing	Near-Term
Outside Funding Available?	Yes

Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Number of low-income residential solar PV installations by 2020	120	Systems
Number of low-income residential solar water heaters installed by 2020	25	Systems
Staff time needed for this measure	0.02	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Residential Electricity Energy Savings (kWh)= (Rsi × Arsi × 1,900) + (Rsw × Ee) Residential Natural Gas Energy Savings (therms) = Rswg × Eg		
	Rsi=	120	# of low-income residential solar PV installations
	Rsw=	2.5	# of low-income residential solar electric water heater installations by 2020 (assumes 10% electric)
	Rswg=	22.5	# of residential solar natural gas water heater installations by 2020 (assumes 90% natural gas)
	Arsi=	5.4	average residential solar installation size in kW (Cal Solar Initiative [CSI 1])
	Ee=	2,945	average expected residential solar water heater savings in kWh per year (California Solar Initiative (CSI 2) Thermal Program Cal Solar statistics)
	Eg=	139	average expected residential solar water heater savings in therms per year (CSI 2 - 2012 Thermal Program Cal Solar statistics)
	Conversion factor=	1,900	conversion factor from kW to kWh per year (Solar Energy Industries Association [SEIA] Solar Radiation Conversion Map)
Resource Savings	1,247,683	Residential electricity saved (kWh)	
	3,128	Residential natural gas saved (therms)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e) = (Se/1,000 × 0.133) + (Sg/10 × 53.2/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.13	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
	53.24	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reductions	183	MT CO2e	
Municipal Costs and Savings Calculations	Staff time for collaboration and outreach.		
	FTE =	0.02	Estimated staff time per year to develop new program
	$/FTE=	$100,000	Dollars per year
Municipal Costs and Savings	Municipal Cost=	$2,000	Dollars per year
	Municipal Savings =	$0	Dollars per year
Community Costs and Savings Calculations	Residential savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Where:		
	Residential $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Residential $/therm=	$0.92	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Total residential savings =	$239,937	Dollars
Community Costs and Savings	Community Cost =	$0	Dollars per household (Assumes to be paid for through programs.)
	Community Savings =	$1,655	Dollars per household

Notes

Residential installation size assumptions are the averages for San Luis Obispo County PV installations for completed projects (Cal Solar 1). The installation size uses the CSI rating, which accounts for a design factor, and is a more accurate reflection of energy generated by the installation. Solar water heater savings is an average of the expected savings for all the projects that have applied for the CSI-Thermal rebate in San Luis Obispo County (Cal Solar 2).

When combining energy measures, the City should be aware of double-counting emission reductions. Some actions in this measure overlap with actions in Measures 3q, and this overlay diminishes the overall effectiveness of the measure and its actions. If the City selects both measures, it should lower the commitment established in terms of units or percent reduction in order to address the issue of double-counting.

The model assumes that solar water heaters are installed in combination with both electric and natural gas water heaters. The model assumes that 90% of the systems installed offset natural gas water heaters; 10% offset electric water heaters.

References

1. California Solar Initiative (CSI) - http://www.californiasolarstatistics.ca.gov/
2. California Solar Initiative CSI-Thermal Program - http://www.gosolarcalifornia.ca.gov/solarwater/index.php
3. CEC Planning and Permitting Resources For Renewable Energy Systems - http://www.energy.ca.gov/localgovernment/planning_resources/
4. SEIA Solar Radiation Conversion Map - http://www.getsolar.com/blog/what-can-one-kilowatt-of-solar-do-for-you/13483/

Community Choice Aggregation Program (CCA)

Measure Name	Community Choice Aggregation Program (CCA)
Description of Measure	Assembly Bill 117 (2002) enables California cities and counties, either individually or collectively, to supply electricity to customers within their jurisdiction by establishing a community choice aggregation (CCA) program. Unlike a municipal utility, a CCA does not own transmission and delivery systems, but is responsible for providing electricity to residents and businesses. The CCA may own electric generating facilities, but more often, it purchases electricity from private electricity generators. The City would either individually or through a regional partnership develop a CCA program and ensure that the energy generation portfolio of the electricity supplied has a higher percentage of clean energy than that mandated by the State Renewable Portfolio Standard (RPS).

Category	Energy
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	No

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Participate in and consider the results of the Renewable Energy Secure Communities project for San Luis Obispo County (SLO-RESCO), a regional partnership working to identify the best mix of resources for clean, secure and affordable energy.	No	No
Participate in a feasibility study and CCA program with an energy generation portfolio that exceeds PG&E's portfolio and that mandated under the State Renewable Portfolio Standard.	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	2,710

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Low	$1-$10,000	$10,000-$50,000	$50,000-$100,000	$100,000+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	Low	$1-$10,000	$10,000-$50,000	$50,000-$100,000	$100,000+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$100	$101-$250	$251-$500	$500+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Very Low - Low	$1-$100	$101-$250	$251-$500	$500+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	
Improve Public Health	Yes	
Improve Air Quality	Yes	
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	No	
Adaptation	Yes	

Case Studies

Marin Energy Authority (Marin County)	http://www.marinenergyauthority.org/
Clean Power SF (City and County of San Francisco)	http://cleanpowersf.org/

Implementation

Responsible Department/Agency	Community Development/Planning
Actual Measure or Commitment	Percent reduction in carbon intensity of electricity above PG&E's portfolio and RPS
Implementation Mechanism	City Program
Implementation Timing	Long-Term

Outside Funding Available?	No
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Percentage of commercial electricity use opting into CCA in 2020	75%	Percent
Percentage of residential electricity use opting into CCA in 2020	75%	Percent
Percentage of municipal electricity use opting into CCA in 2020	100%	Percent
Percent reduction in carbon intensity of electricity above the PG&E's portfolio and the Renewable Portfolio Standard (RPS)*	17%	Percent
Staff time needed for this measure	0.50	Full Time Equivalent (FTE)

*17% reduction in carbon intensity of electricity would result in 80-90% of electricity supplied by renewable sources

Calculations:

Resource Savings	None		
GHG Emission Reduction Calculations	GHG Savings (MT CO2e)=((Ceu x Commercial kWh) + (Reu x Residential kWh) + (Meu x Municipal kWh))/1,000 x (0.133 - 0.110)		
	Where:		
	Projected (2020) non-residential electricity use =	80,726,652	kWh
	Projected (2020) municipal electricity use =	1,889,150	kWh
	Projected commercial electricity use =	78,837,502	kWh
	Projected (2020) residential electricity use =	78,439,999	kWh
	Ceu=	75%	Percentage of commercial electricity use opting into CCA in 2020)
	Reu=	75%	Percentage of residential electricity use opting into CCA in 2020)
	Meu=	100%	Percentage of residential electricity use opting into CCA in 2020)
	1,000	= conversion factor for kWh to MWh	
	0.133	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
	17%	= percent reduction in carbon intensity of electricity above the RPS	
	0.110	= emissions factor for electricity in 2020 from CCA in MT CO2e/MWh	
GHG Emission Reduction	2,710	MT CO2e	
Municipal Costs and Savings Calculations	Staff time for collaboration and program development and implementation.		
	FTE =	0.50	Estimated staff time per year to develop new program (may vary depending on the City's decision to participate in a regional CCA)
	$/FTE=	$100,000	Dollars per year
	PG&E utility rate =	$0.19	Dollars per kWh
	Average utility rate savings =	5%	Percent (Average from Local Government Commissions' 2009 CCA Pilot Project)
	CCA utility rate =	$0.18	Dollars per kWh
Municipal Costs and Savings	Municipal Cost=	$50,000	Dollars per year
	Municipal Savings =	$17,947	Dollars per year
Community Costs and Savings Calculations	Aggregated residential savings =	$558,885	Dollars per year
	Aggregated commercial savings =	$561,717	Dollars per year
	Projected (2020) households =	12,864	Households
	Number of households opting in =	9,648	Households
	Projected (2020) commercial units =	2,178	Businesses

	Number of commercial units opting in =	1,634	Businesses
Community Costs and Savings	Residential Cost =	None	Dollars per household
	Commercial Cost =	None	Dollars per business
	Residential Savings =	$58	Dollars per household
	Commercial Savings =	$344	Dollars per business

Notes

17% reduction in carbon intensity of electricity would result in 80-90% of electricity supplied by renewable sources

A 2009 CCA Pilot Program of 12 California local governments found that forming a community choice aggregation could bring rate benefits to customers, anywhere from 1 percent to 10 percent of bills on average, due primarily to capital financing advantages the community choice aggregator would possess (Local Government Commission).

References

1. CPUC California Renewables Portfolio Standard http://www.cpuc.ca.gov/PUC/energy/Renewables/index.htm
2. LGC Community Choice Aggregation http://www.lgc.org/cca/what_is_cca.html
3. CPUC Community Choice Aggregation http://www.cpuc.ca.gov/PUC/energy/Retail+Electric+Markets+and+Finance/070430_ccaggregation.htm
4. Local Government Commission. Community Choice Aggregation Pilot Project (prepared for California Energy Commission). February 2009. http://www.energy.ca.gov/2008publications/CEC-500-2008-091/CEC-500-2008-091.PDF

Municipal Energy Efficiency Retrofits and Upgrades

Measure Name	Municipal Energy Efficiency Retrofits and Upgrades
Description of Measure	Establish a target to reduce municipal energy use by a certain percent by 2020 and implement cost-effective improvements and upgrades to achieve that target.

Category	Energy
Community or Municipal?	Municipal
Voluntary or Mandatory?	Mandatory
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Adopt a municipal energy target.	No	Required
Complete energy audits and benchmarking of all municipal facilities, leveraging existing programs, such as PG&E's Automated Benchmarking Service or the U.S. Environmental Protection Agency's ENERGY STAR Challenge program.	No	Required
Maintain a regular maintenance schedule for heating and cooling, ventilation and other building functions.	No	Required
Establish a prioritized list of energy efficiency upgrade project and implement as funding becomes available.	No	Required
Install an energy management system that monitors energy use and controls heating, cooling, and ventilation to increase efficiency.	No	No

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	746

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Varies	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	Medium	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	
Improve Public Health	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Air Quality	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	Yes	
Reduce Energy Consumption	Yes	
Adaptation	Yes	

Case Studies

City of Atascadero	http://www.fypower.org/bpg/case_study.html?b=institutional&c=Atascadero%2c_City_of
City of Redondo Beach	http://www.fypower.org/bpg/case_study.html?b=institutional&c=Redondo_Beach

Implementation

Responsible Department/Agency	Public Works, Building Services, Community Development
Actual Measure or Commitment	Percent energy (electricity and natural gas) savings
Implementation Mechanism	City Program
Implementation Timing	Near-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Note: This measure excludes reductions from street, traffic signal, and public lighting, which is accounted for in Municipal Public Lighting measure.

Key Assumptions for Calculations:

Target percentage of energy savings	50%	Percent
Staff time needed for this measure	0.08	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Municipal Electricity Energy Savings (kWh)=Em x P x 0.95 Municipal Natural Gas Savings (therms)=NGm x P x 0.05		
	Where:		
	Em=	11,515,201	Municipal electricity usage (GHG Emissions Inventory)
	NGm=	139,240	Municipal natural gas usage (GHG Emissions Inventory)
	P=	50%	Target percentage of energy savings (applied 95% electricity, 5% natural gas)
Resource Savings	5,469,720	Municipal electricity saved (kWh/year)	
	3,481	Municipal natural gas saved (therms/year)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e)=(Se/1,000 × 0.133)+(Sg/10 × 53.2/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.133	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
	53.24	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reduction	746	MT CO2e	
Municipal Cost and Savings Calculations	Staff time needed to apply for funding and implement the upgrades.		
	FTE =	0.08	Estimated staff time per year to develop new program
	$/FTE=	$100,000	FTE cost
	Cost of staff time =	$8,000	Dollars
	Total Savings = kWh reduced/year x $/kWh + therms reduced/year x $/therm		
	Where:		
	$/kWh =	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	$/Therm =	$0.92	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
Municipal Cost and Savings	Municipal Cost =	Varies	Dollars (costs will vary based on the level of implementation and financial rebates)
	Municipal Savings =	$1,042,449	Dollars

Notes

Actual energy and greenhouse gas emissions savings proposed upgrades. A study of building commissioning found whole-building energy savings of 15% at a cost of $0.27 per square foot (LBNL). An estimate of LEED for Existing Buildings found the program reduced energy use by 20% (SPUR).

Implementation Resources: PG&E webpage for local governments - http://www.pge.com/mybusiness/energysavingsrebates/incentivesbyindustry/government/local/

References

1. 2005 California End Use Survey http://www.energy.ca.gov/ceus/
2. Lawrence Berkeley National Laboratory. 2004. Cost-Effectiveness of Commercial-Buildings Commissioning: A Meta-Analysis of Energy and Non-Energy Impacts in Existing Buildings and New Construction in the United States (page 1). www.ga.wa.gov/eas/bcx/Cx_Cost Effectiveness.pdf
3. SPUR - San Francisco Commercial Energy Ordinance http://www.spur.org/publications/library/report/critical_cooling/option4

Municipal Energy Efficient Public Realm Lighting

Measure Name	Municipal Energy Efficient Public Realm Lighting
Description of Measure	The City would continue to replace city-owned or -operated street, traffic signal, park, and parking lot lights with higher efficiency lamp technologies.

Category	Energy
Community or Municipal?	Municipal
Voluntary or Mandatory?	Mandatory
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Conduct an inventory of existing outdoor public light fixtures.	No	Yes
Identify and secure funding to replace inefficient city-owned or -operated public lighting.	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	14

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	Reduced operation and maintenance costs.
Improve Public Health	Yes	Improved safety from improved night visibility.
Improve Air Quality	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	
Adaptation	Yes	

Case Studies

City of Palo Alto	http://www.ca-ilg.org/post/led-streetlights-palo-alto http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/gateway_palo-alto.pdf
City of La Mesa	http://www.fypower.org/bpg/case_study.html?b=institutional&c=La_Mesa%2c_City_of

Implementation

Responsible Department/Agency	Public Works
Actual Measure or Commitment	Number of LED or CFL lights installed
Implementation Mechanism	Capital Improvement
Implementation Time Frame	Near-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Number of LED street lights installed by 2020	50	Street Lights
Number of LED traffic signals installed by 2020	10	Traffic Signals
Number of high efficiency airport lights installed by 2020	35	Airport Lights
Number of other LED outdoor lights installed by 2020	50	Other Outdoor Lights
Staff time needed for this measure	0.02	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Total electricity saved (kWh) = (N x (Wi-We) x (h/Cf))		
	Where Street Lights:		
	N_{street} =	50	Number of street lights installed lights
	Wi =	200	Average estimated power rating in watts of high pressure sodium street light (Department of Energy [DOE] 2004. National Lighting Inventory and Energy Consumption Estimate)
	We =	50	Average power rating in watts of LED street lighting (DOE and PG&E 2008. LED Street Lighting)
	h =	4,100	Number of hours per year operating
	Cf =	1,000	Conversion factor for W to kW
	Where Traffic Signals:		
	$N_{traffic}$ =	10	Number of traffic installed lights
	Wi =	150	Average estimated power rating in watts of incandescent traffic signal light. (U.S.Department of Energy, 2004 in Stockton Climate Action Plan).
	We =	15	Average power rating in watts of LED traffic signal light (CAPCOA 2010)
	h =	8,760	Number of hours per year operating (24 hours a day)
	Cf =	1,000	Conversion factor for W to kW
	Where Other Outdoor Lighting:		
	N_{other} =	50	Number of other outdoor installed lights
	Wi =	200	Average estimated power rating in watts of public realm lighting (Department of Energy [DOE] 2004. National Lighting Inventory and Energy Consumption Estimate)
	We =	50	Average power rating in watts of LED public realm lighting (DOE 2004)
	h =	3,650	Number of hours per year operating
	Cf =	1,000	Conversion factor for W to kW
	Where Airport Lighting:		
	$N_{airport}$ =	35	Number of other outdoor installed lights
	Wi =	400	Average estimated power rating in watts of public realm lighting (City of Paso Robles 2013)
	We =	100	Average power rating in watts of LED public realm lighting (City of Paso Robles 2013)
	h =	3,650	Number of hours per year operating
	Cf =	1,000	Conversion factor for W to kW
Resource Savings	30,750	Electricity saved from LED street lights (kWh)	
	11,826	Electricity saved from LED traffic signals (kWh)	
	27,375	Electricity saved from LED "other" outdoor lighting (kWh)	
	38,325	Electricity saved from high efficiency airport lighting (kWh)	
	108,276	Total electricity saved (kWh)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e)=(Se/1,000 × 0.133)		
	Where:		
	108,276	= Se (electricity savings)	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	0.133	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
GHG Emission Reduction	14	MT CO2e/year	
	Total energy savings = kWh reduced/year * $/kWh		
	Where:		
	$/kWh =	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast

	Total annual energy cost savings=	$20,572	Dollars per year
	Maintenance savings per fixture =	$17	Annual maintenance savings/fixture (Palo Alto)
	Some staff time may be needed to implement the program.		
	FTE =	0.1	Estimated staff time per year to develop new program
	$/FTE=	$100,000	FTE cost
	Cost of staff time =	$10,000	Dollars
	Total Capital Cost = [Number of units installed x cost per unit] – [Available rebates]		
	Where Municipal Streetlights:		
	Number of units installed =	50	Units
	Cost per unit installed =	$350	Dollars/unit (Energy Solutions 2008; PNNL 2010)
	Total cost=	$17,500	Dollars
	Available rebates =	$125	Dollars/unit ($125 for 200 watt unit replaced - PG&E)
Municipal Costs and Savings Calculations	Net cost =	$11,250	Dollars (total cost - available rebates)
	Where Traffic Signals:		
	Number of units installed =	10	Units
	Cost per unit installed =	$193	Dollars/unit (assuming a standard three 12" (red, yellow, and green) balls per signal (Western Pacific Signal 2011; eLightBulbs 2011))
	Total cost =	$1,930	Dollars
	Available rebates =	$100	Dollars ($100 for 150 watt unit replaced - PG&E)
	Net cost =	$930	Dollars (total cost - available rebates)
	Where Other Municipal Outdoor Lighting:		
	Number of units installed =	50	Units
	Cost per unit installed =	$300	Dollars/unit (Energy Solutions 2008; PNNL 2010)
	Total cost =	$15,000	Dollars
	Available rebates =	$100	Dollars ($100 for 150 watt unit replaced - PG&E)
	Net cost =	$10,000	Dollars (total cost - available rebates)
	Where Airport Lighting:		
	Number of units installed =	35	Units
	Cost per unit installed =	$300	Dollars/unit (Energy Solutions 2008; PNNL 2010)
	Cost installation =	$10,500	Dollars
	Available rebates =	$150	Dollars
	Net cost =	$5,250	Dollars (total cost - available rebates)
	Municipal Cost =	$37,430	Dollars
Municipal Costs and Savings	Municipal Savings =	$21,517.44	Dollars

Notes

Lamp wattage varies. Stationary source outdoor lights range from 83W to 407 W (DOE, page 48). LED lamps are typically under 100 W (DOE and PG&E).

References

1. PG&E Streetlight program - http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ref/lighting/lightemittingdiodes/streetlightprogram.shtml
2. DOE National Lighting Inventory and Energy Consumption Estimate http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/lmc_vol1_final.pdf
3. DOE and PG&E LED Street Lighting study - http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/gateway_sf-streetlighting.pdf
4. PG&E LED Streetlight Rebates - http://www.pge.com/mybusiness/energysavingsrebates/rebatesincentives/ref/lighting/lightemittingdiodes/incentives/index.shtml
5. Western Pacific Signal 2011; eLightBulbs 2011; Energy Solutions 2008; PNNL 2010 from Stockton Draft CAP - http://www.stocktongov.com/files/ClimateActionPlanDraftFeb2012.pdf
6. Palo Alto - Demonstration Assessment of Light-Emitting Diode (LED) Roadway Lighting on Residential and Commercial Streets - http://apps1.eere.energy.gov/buildings/publications/pdfs/ssl/gateway_palo-alto.pdf

Energy Efficiency Requirements for New Municipal Buildings

Measure Name	Energy Efficiency Requirements for New Municipal Buildings
Description of Measure	Adopt a policy to exceed minimum Title 24 Building Energy Efficiency Standards by a certain percentage for the construction of new City buildings and facilities.

Category	Energy
Community or Municipal?	Municipal
Voluntary or Mandatory?	Mandatory
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Review existing municipal building policies and standards.	**No**	Required
Adopt a policy to exceed Title 24 building efficiency standards by a certain percent.	**No**	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	17

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Medium	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	
Improve Public Health	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Air Quality	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Water Quality	Yes	
Improve Equity	Yes	
Reduce Water Consumption	Yes	
Reduce Energy Consumption	Yes	
Adaptation	Yes	

Case Studies

City of Manhattan Beach	http://www.citymb.info/index.aspx?page=121
City of Berkeley	http://www.ci.berkeley.ca.us/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/Green%20Building%283%29.pdf http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=CA52R&re=0&ee=0

Implementation

Responsible Department/Agency	Building Services, Public Works, Community Development and Planning
Actual Measure or Commitment	New municipal building square feet by 2020; percent energy (electricity and natural gas) savings
Implementation Mechanism	Capital Improvement
Implementation Timing	Mid-Term

Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

New municipal building square feet by 2020	50,000	Square Feet
Target percentage of energy savings above State standards	20%	Percent
Staff time needed for this measure	0.03	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Municipal Electricity Energy Savings (kWh)=E × Eec × (1 - CSP) × 12.95 × Msf Municipal Natural Gas Savings (therms)=E × Egc × (1 - CSP) × 0.29 × Msf		
	Where:		
	Msf=	50,000	New municipal building square feet by 2020
	E=	20%	Target percentage of energy savings
	Eec=	64%	Percent of commercial electricity use covered by Title 24 (SEEC 2011 Greenhouse Gas Forecasting Assistant, page 9)
	Egc=	70%	Percent of commercial natural gas use covered by Title 24 (SEEC 2011 Greenhouse Gas Forecasting Assistant, page 9)
	CSP=	30%	Percent non-residential energy savings above current State standards (CEC 2013 Building Efficiency Standards, slide 17)
	Municipal electricity use intensity=	12.955	kWh/square foot/year (Average electric use intensity for commercial buildings in kWh/square feet/year (California Energy Commission [CEC] 2005 California End Use Survey [CEUS], page 8))
	Municipal natural gas use intensity=	0.35	therms/square foot/year (Average natural gas usage intensity for commercial buildings in therms/square feet/year (CEC 2005 CEUS, page 8))
Resource Savings	58,038	Municipal kWh/year saved	
	1,715	Municipal therms/year saved	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e) = (Se/1,000 × 0.133) + (Sg/10 × 53.2/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.133	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
	53.24	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reduction	17	MT CO2e	
Municipal Costs and Savings Calculations	Staff time developing policy Municipal cost savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Commercial $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/therm=	$0.81	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	FTE =	0.03	Estimated staff time per year to develop new program
	$/FTE=	$100,000	FTE cost
	Total cost off staff time =	$3,000	Dollars
	Cost of implementation =	$1.25	Average cost to implement (sq ft) - Projected PG&E Zone 5 Costs (CA Department of Energy)
	Total implementation cost =	$62,500	Dollars
Municipal Cost and Savings	Municipal Cost =	$65,500	Dollars
	Municipal Savings =	$12,184	Dollars

Notes

Title 24 covers only 64% of commercial electricity use and 70% of natural gas use (SEEC, page 7). 2013 Title 24 updates are expected to reduce non-residential energy use by 30% (CEC).

References

1. 2005 California End Use Survey http://www.energy.ca.gov/ceus/
2. CEC 2013 Building Efficiency Standards, slide 17 - http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/2012-05-31_2013_standards_adoption_hearing_presentation.pdf
3. SEEC 2011 Greenhouse Gas Forecasting Assistant, page 7 - http://californiaseec.org/documents/forecasting-tools/seec-forecast-assistant-documentation
4. http://www.energy.ca.gov/title24/2008standards/ordinances/san_luis_obispo/CZ5_Cost-Effectiveness_Report-Final.pdf

Renewable Energy Systems on City Property

Measure Name	Renewable Energy Systems on City Property
Description of Measure	The City would pursue municipally-owned renewable energy generation facilities.

Category	Energy
Community or Municipal?	Municipal
Voluntary or Mandatory?	Voluntary
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Complete a feasibility study on the installation of solar or other renewable energy projects at select City facilities and install where feasible.	Yes	Required
Identify funding sources and opportunities for municipal renewable energy generation.	No	Yes
Replace inefficient hot water heaters with those powered by solar energy.	No	Yes

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	563

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	High	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	
Improve Public Health	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Air Quality	Yes	Reduced energy use would contribute to reductions in regional air pollution (from reduced generation of electricity).
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	
Adaptation	Yes	

Case Studies

City of San Jose	http://energy.sanjoseca.gov/municipal-energy/default.asp#renewable-energy
City of Santa Barbara	http://icma.org/en/icma/knowledge_network/documents/kn/Document/304014/Santa_Barbara_California_Solar_Case_Study

Implementation

Responsible Department/Agency	Public Works, Building Services
Actual Measure or Commitment (solar installation size)	kw of municipal solar PV and number of solar water heaters installed
Implementation Mechanism	Capital Improvement
Implementation Timing	Mid-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

kW of municipal solar PV installations by 2020	2,895	kW
Number of solar hot water heaters	4	Systems
Staff time needed for this measure	0.10	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Municipal Electricity Energy Savings (kWh)=(kW × Cf) + (Msw × Ee)		
	Where:		
	Msi=	2,895	kW of solar installations by 2020
	Msw=	0.4	# of solar electric water heater installations by 2020
	Mswg=	3.6	# of solar natural gas water heater installations by 2020
	Ee=	2,945	average expected municipal solar water heater savings in kWh per year (California Solar Initiative (CSI 2) Thermal Program Cal Solar statistics)
	Eg=	139	average expected municipal solar water heater savings in therms per year (CSI 2 - 2012 Thermal Program Cal Solar statistics)
	Cf=	1,455	conversion factor from kW to kWh per year (Solar Energy Industries Association [SEIA] Solar Radiation Conversion Map)
Resource Savings	500	Municipal natural gas saved (therms/year)	
	4,211,984	Municipal electricity saved (kWh/year)	
GHG Emission Reduction Calculations	GHG Savings (MT CO2e) = (Se/1,000 × 0.133) + (Sg/10 × 53.2/1,000)		
	Where:		
	Se=	electricity savings	
	Sg=	natural gas savings	
	1,000	= conversion factor for kWh to MWh (electricity equation) or from kg to metric tons (natural gas equation)	
	10	= conversion factor for therm to MMBtu	
	0.133	= average projected emissions factor for electricity in 2020 in MT CO2e/MWh	
	53.24	= average emissions factor for natural gas (kg CO2e/MMBtu)	
GHG Emission Reductions	563	MT CO2e	
Municipal Costs and Savings Calculations	Municipal cost savings = [Electricity Savings x $/kWh] + [Natural Gas Savings x $/therms]		
	Where:		
	Commercial $/kWh=	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Commercial $/therm=	$0.81	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Staff time to obtain grant funding and implement project		
	FTE =	0.1	Estimated staff time to develop new program
	$/FTE	$100,000	Dollars per year
	Total Staff Cost=	$10,000	Dollars per year
	Total Capital Cost = Total Cost of Solar Units (bulk purchase + installation) + Total Staff Cost - Available Rebates		
	Where:		
	Commercial solar installation cost =	$4.38	Commercial Solar Installations per watt (Green Tech Media)
	Total solar PV installation cost =	$18,443,332	Average capital cost per kW (CSI statistics)
	Solar water heater cost =	$4,650	Dollars (incremental installed cost of solar hot water heater (National Renewable Energy Lab, August 2012))
	Available rebates =	$2,175	Dollars (available Rebate for replacing natural gas heater with solar (Go Solar CA))
	Cost of solar hot water heater with rebate =	$2,475	Dollars (cost of solar hot water heater installation minus rebate)
	Total cost of solar water heaters =	$9,900	Dollars
Municipal Costs and Savings	Municipal Cost =	$18,463,232	Dollars
	Municipal Savings =	$783,834	Dollars

Notes

Municipal installation size assumptions are the averages for PV installations in California. The installation size uses the CSI rating, which accounts for a design factor, and is a more accurate reflection of energy generated by the installation. Municipal solar water heater savings is an average of the expected savings for all the projects that have applied for the CSI-Thermal rebate in California (Cal Solar).

When combining energy measures, the City should be aware of double-counting emission reductions. Some actions in this measure overlap with actions in Measures 3r and this overlay diminishes the overall effectiveness of the measure and its actions. If the City selects both measures, it should lower the commitment established in terms of units or percent reduction in order to address the issue of double-counting.

The model assumes that solar water heaters are installed in combination with both electric and natural gas water heaters. The model assumes that 90% of the systems installed offset natural gas water heaters; 10% offset electric water heaters.

References

1. California Solar Initiative (CSI) - http://www.californiasolarstatistics.ca.gov/
2. California Solar Initiative CSI-Thermal Program - http://www.gosolarcalifornia.ca.gov/solarwater/index.php
3. CEC Planning and Permitting Resources For Renewable Energy Systems -http://www.energy.ca.gov/localgovernment/planning_resources/
4. SEIA Solar Radiation Conversion Map - http://www.getsolar.com/blog/what-can-one-kilowatt-of-solar-do-for-you/13483/
5. http://www.greentechmedia.com/research/ussmi
6. National Renewable Energy Lab, August 2012 - http://www.nrel.gov/solar/
7. Go Solar CA - http://www.gosolarcalifornia.ca.gov/

Bicycle Network

Measure Name	Bicycle Network
Description of Measure	Continue to improve and expand the city's bicycle network and infrastructure.

Category	Transportation and Land Use
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary & Mandatory
Selected?	Yes

Menu of Implementation Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Continue to pursue public and private funding to expand and link the city's bicycle network in accordance with its General Plan and Bicycle Plan.	Yes	Required
Annually identify and schedule street improvement and maintenance projects to preserve and enhance the bicycle network.	Yes	Required
Incorporate bicycle facility improvements into pavement resurfacing, restriping, and signalization operations where the safety and convenience of users can be improved within the scope of work.	Yes	Yes
Coordinate with and support SLOCOG in the implementation of bicycle plans to facilitate non-auto travel within and between communities.	Yes	Required
Collaborate with the San Luis Obispo Bicycle Coalition to assist with event promotions and publications to increase awareness and ridership during Bike Month.	No	Required
Through conditions of approval, require new subdivisions and large developments to incorporate bicycle lanes, routes, and/or shared-use paths into street systems to provide a continuous network of routes, facilitated with markings, signage, and bicycle parking.	Yes	Yes
Continue to enforce mandatory California Green Building Standards Code bicycle parking standards for non-residential development.	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	771

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Varies	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	Private savings from avoided driving.
Improve Public Health	Yes	Shift to biking promotes active lifestyles.
Improve Air Quality	Yes	Reducing vehicle miles traveled (VMT) may reduce criteria pollutant emissions.
Improve Water Quality	Yes	Reducing VMT may reduce criteria pollutant emissions.
Improve Equity	Yes	New transportation options for those without access to a vehicle.
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	Reduced VMT reduces gasoline consumption.
Adaptation	Yes	Decreases air pollutants and improves air quality.

Case Studies

Santa Cruz Regional Transportation Bicycle Network investments	http://sccrtc.org/ http://www.santacruzlive.com/blogs/streetsmarts/2011/11/13/bicycle-pedestrian-trail-to-link-santa-cruz-monterey-counties/
San Francisco Bay Area Air Quality Management District Emissions Reduction Grants: Performance review (including bicycle facilities projects)	http://hank.baaqmd.gov/pln/grants_and_incentives/tfca/TFCA%20Performance%20Lit%20Review%20Final.pdf

Implementation

Responsible Department/Agency	Planning and Public Works Departments
Actual Measure or Commitment	Miles of new bike lanes, routes, and paths by 2020
Implementation Mechanism	Capital Improvement; Conditions of Approval
Implementation Timing	Near-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Miles of new bike lane by 2020	20	Miles
Staff time needed for this measure	0.03	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	VMT Reduction = (A*B)+(A*D)		
	City Area =	19.9	Square Miles
	Forecast VMT (2020) =	194,102,084	VMT in 2020
	Decrease in VMT (B) =	1.0%	Estimated VMT reduction factor for incorporating bike lanes into street design (CAPCOA) (Assumes 1% decrease in VMT per mile of new bike lane per square mile area. Maximum reduction capped at 1% to avoid double counting from alternative travel related VMT reductions.)
	VMT reduction for installing bicycle racks (D)=	0.06%	Percent - (CAPCOA, SDT-6)
Resource Savings	Total VMT Reduction =	2,062,335	VMT per year
GHG Emission Reduction Calculations	GHG Savings = VMT Reduction × Cef		
	Where: Cef =	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emission Reduction	Total GHG Savings =	771	MT CO2e
Municipal Costs and Savings Calculations	Staff time required for developing policies and acquiring grant funding for bicycle infrastructure. There would be minimal additional costs associated with staff time needed for plan checks; however, this cost will be absorbed through development/permitting fees.		
	FTE =	0.03	Estimated staff time per year to develop new program
	$/FTE=	100,000	Dollars per year
Municipal Costs and Savings	Municipal Cost =	$3,000	Dollars (Assumes that grant funding would be used to implement bicycle infrastructure. Minimal costs would occur as a result of incorporating multi-modal improvements into pavement resurfacing, restriping, and signalization operations (less than $5,000).)
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Community VMT Reduced=	2,062,335	Dollars per year
	Community operating cost per mile =	$0.57	Dollars
	Average round trip length =	17.82	Miles (Fehr & Peers)
	Round trips switching from driving to biking =	115,731	Round trips
	Cost per mile of new bicycle lane =	$40,000	Dollars per mile (Assumes $40,000 per mile average. Actual cost would depend on the type of bicycle lane being installed - see notes below)
	Total cost of new bicycle lanes =	$800,000	Dollars
	Cost of bicycle parking =	$0	Dollar (Bicycle parking standards for non-residential development went into effect January 1, 2001 as part of California Green Building Standards Code, and are therefore now a cost associated with doing business-as-usual)
Community Costs and Savings	Community Cost =	$0	Dollars per person (Assumes cost of bike lanes would be incurred by the City through grant funding and private developers.)

	Community Savings =	$10	Dollars per trip (Savings varies depending on how many bicycle trips are made by a single person.)

Notes

Calculation methodology derived from CAPCOA measures SDT-5 and SDT-6

The following is provided for informational purposes:
Cost of infrastructure development is highly variable. Cost estimates for bicycle infrastructure: Class I Bike Path - approximately $1,000,000 per mile; Class II Bike Lanes - $10,000 - $1,000,000 per mile (depending on level of roadway improvement required); Class III Bike Routes - $2,000 - $60,000 per mile (depending on the level of treatment; route signage only would be lower end, signage and shoulder striping, pavement markings, signal actuation would be higher end). The cost per mile of sidewalk is approximately $250,000.

References and Links

1. CAPCOA, Quantifying Greenhouse Gas Mitigation Measures (2010): http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf
2. Cambridge Systematics. Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions (2009). http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendices_Complete_102209.pdf
3. Sacramento Metropolitan Air Quality Management District (SMAQMD) Recommended Guidance for Land Use Emission Reductions. (p.13) http://www.airquality.org/ceqa/GuidanceLUEmissionReductions.pdf
4. US Department of Transportation, http://www.nhtsa.gov/people/injury/pedbimot/bike/Safe-Routes-2002/safe.html#8
5. SLO COG RTP - http://www.slocog.org/cm/Programs_and_Projects/2010_Regional_Transportation_Plan.html

Pedestrian Network

Measure Name	Pedestrian Network
Description of Measure	Continue to improve and expand the city's pedestrian network.

Category	Transportation and Land Use
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary & Mandatory
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Continue to pursue public and private funding to expand and link the City's pedestrian network.	Yes	Required
Annually identify and schedule sidewalk improvement and maintenance projects to preserve and enhance the pedestrian circulation network.	Yes	Required
Incorporate pedestrian-facilities improvements into pavement resurfacing, restriping, and signalization operations where the safety and convenience of users can be improved within the scope of work.	Yes	Yes
Expand and promote the Safe Routes to School program.	No	Yes
Require through conditions of approval that new development projects provide a pedestrian access network that internally links all uses and connects all existing or planned external streets and pedestrian facilities contiguous with the project site. It would also require that the project minimize barriers to pedestrian access and interconnectivity.	Yes	Yes
Require new development to implement traffic calming improvements as appropriate (e.g., marked crosswalks, count-down signal timers, curb extensions, speed tables, raised crosswalks, median islands, mini-circles, tight corner radii, etc.) through conditions of approval.	Yes	Yes

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	544

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Varies	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	Private savings from avoided driving.
Improve Public Health	Yes	Shift to walking promotes active lifestyles.
Improve Air Quality	Yes	Reducing VMT may reduce criteria pollutant emissions.
Improve Water Quality	Yes	Reducing VMT may reduce criteria pollutant emissions.
Improve Equity	Yes	New transportation options for those without access to a vehicle.
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	Reduced VMT reduces gasoline consumption.
Adaptation	Yes	Decreases air pollutants and improves air quality.

Case Studies

Sacramento Pedestrian Program Complete Streets Projects	http://www.cityofsacramento.org/transportation/dot_media/engineer_media/pdf/ProjectHandout_11x17_2010.pdf
Bay Area Air Quality Management District Emissions Reduction Grants: 2006 Performance review (including pedestrian facilities projects) Pg. 20-24	http://hank.baaqmd.gov/pln/grants_and_incentives/tfca/TFCA%20Performance%20Lit%20Review%20Final.pdf

Implementation

Responsible Department/Agency	Planning and Public Works Departments	
Actual Measure or Commitment	Miles of added sidewalk by 2020	
Implementation Mechanism	Capital Improvement	Policy
Implementation Timing	Near-Term	
Outside Funding Available?	Yes	
Synergies with Existing Initiatives/Partnerships	Yes	

Calculation Methodology and Equations

Key Assumptions for Calculations:

Miles of sidewalk added by 2020	10	Miles
Staff time needed for this measure	0.03	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	VMT Reduction = Forecast VMT x A x B		
	Forecast VMT (2020) =	194,102,084	VMT
	Percent VMT reduction from pedestrian network improvements (A) =	0.5%	Percent reduction in VMT (CAPCOA SDT-1)
	Traffic Calming Selected?	Yes	Traffic Calming Selected (Yes or No from cell G17)
	Percent VMT reduction from traffic calming improvements (B) =	0.25%	Percent reduction in VMT (CAPCOA SDT-2)
Resource Savings	Total VMT Reduction =	1,455,766	VMT per year
GHG Emission Reduction Calculations	GHG Savings = VMT Reduction × Cef		
	Where: Cef =	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emission Reduction	Total GHG Savings =	544	MT CO2e
Municipal Costs and Savings Calculations	Staff time required for review and approval of projects and acquiring grant funding for pedestrian infrastructure.		
	FTE =	0.0	Estimated staff time per year to develop new program
	$/FTE=	100,000	Dollars per year
Municipal Costs and Savings	Municipal Cost =	$3,000	Dollars (Assumes that grant funding would be used to implement pedestrian infrastructure. Minimal costs would occur as a result of incorporating multi-modal improvements into pavement resurfacing, restriping, and signalization operations (less than $5,000).)
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Community VMT Reduced=	1,455,766	Dollars per year
	Community operating cost per mile =	$0.57	Dollars
	Cost per mile of new sidewalk =	$250,000	Dollars per mile
	Total cost of new bicycle lanes =	$2,500,000	Dollars
Community Costs and Savings	Community Cost =	$0	Dollars per person (Assumes cost would be incurred by the City through grant funding and the private developer.)
	Community Savings =	Varies	Dollars per person (Varies based on number of trips made by foot and distance travelled. Savings of $0.555 per mile.)

Notes

Calculation methodology derived from CAPCOA measure SDT-1

References

1. CAPCOA, Quantifying Greenhouse Gas Mitigation Measures (2010): http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

2. Cambridge Systematics. Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions (2009). http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendices_Complete_102209.pdf
3. Sacramento Metropolitan Air Quality Management District (SMAQMD) Recommended Guidance for Land Use Emission Reductions. (p.13) http://www.airquality.org/ceqa/GuidanceLUEmissionReductions.pdf

Expand Transit Network

Measure Name	Expand Transit Network
Description of Measure	Work with the Regional Transit Authority (RTA) and transit service providers to expand the local transit network (i.e., additional routes or stops, and/or expanded hours of operation) based on the greatest demand for service.

Category	Transportation and Land Use
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary & Mandatory
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Work with RTA and transit service providers to implement the Short Range Transit Plan.	Yes	Required
Work with the San Luis Obispo Regional Transit Authority and local transit agency to identify and map existing and future bus lines (routes) and transit corridors.	Yes	Required
Support the addition of transit routes that provide intercity express services.	No	Required
Continue to research federal and local funding for transit service upgrade projects.	Yes	Required
Require new development to provide safe and convenient access to alternative transportation within the project area and safe access to public transportation as feasible.	Yes	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	192

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	Very Low	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Medium	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	Reduced private transportation costs for those using service. Additional public transit subsidies.
Improve Public Health	No	
Improve Air Quality	Yes	Reduced VMT may yield lower emissions of criteria pollutants.
Improve Water Quality	No	
Improve Equity	Yes	New transportation options for those without access to a vehicle.
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	Reduced VMT yeilds lower gasoline consumption.
Adaptation	Yes	Decreases air pollutants and improves air quality.

Case Studies

Bakersfield, California - Bus Service Expansion (p. 10-56)	http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_95c10.pdf
Santa Clara County, California (VTA) Transit Service Expansion (p. 10-58)	http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_95c10.pdf

Implementation

Responsible Department/Agency	
Actual Measure or Commitment	Percent increase in transit service

Implementation Mechanism	Policy
Implementation Timing	Near-Term
Outside Funding Available?	No
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Percent Increase in Transit Service	30%	Percent
Staff time needed for this measure	0.001	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	% VMT Reduction = Coverage * Elasticity * Mode* Adjustment (CAPCOA, Strategy TST-3, Page 277)		
	Forecast VMT (2020) =	194,102,084	VMT in 2020
	Coverage =	30%	Percent increase in transit service
	Elasticity =	1.01	Elasticity of transit ridership with respect to service coverage (CAPCOA, Strategy TST-3, Page 277)
	Mode =	1.3%	Existing transit mode share, countywide (CAPCOA, Strategy TST-3, Page 277)
	Adjustment =	0.67	Adjustments from transit ridership increase to VMT (CAPCOA, Strategy TST-3, Page 277)
	% VMT Reduction =	0.3%	Percent
Resource Savings	Total VMT Reduction due to transit network expansion=	512,261	VMT
GHG Emission Reduction Calculations	GHG Savings = VMT Reduction × Cef		
	Where: Cef =	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emission Reduction	Total GHG Savings =	192	MT CO2e
Municipal Costs and Savings Calculations	Staff time required for coordinating with RTA/transit agencies.		
	FTE =	0.00	Estimated staff time per year to develop new program
	$/FTE =	100,000	Dollars per year
Municipal Costs and Savings	Municipal Cost =	$100	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Private costs and savings of increasing transit service, scaled to City population.		
	Private VMT reduced =	512,261	VMT
	Private vehicle operating cost =	$0.57	Dollars per mile
	Private savings from avoided driving =	$289,427	Dollars
	Cost of transit fare =	$2	Dollars/day (may vary depening on pass) (SLO RTA)
	City forecast (2020) population =	32,137	People
	Number of people switching to from driving to transit =	85	People
	Private cost from transit fares =	$170	Dollars
Community Costs and Savings	Community Cost =	$2	Dollars
	Community Savings =	$3,413	Dollars

Notes

Calculation methodology derived from CAPCOA measure TST-3.

References

1. CAPCOA, Quantifying Greenhouse Gas Mitigation Measures (2010): http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

2. Transit Cooperative Research Program. TCRP Report 95 Traveler Response to System Changes – Chapter 10: Bus Routing and Coverage. 2004. (p. 10-8 to 10-10)

3. US Census Journey to Work

4. SLO RTA - http://www.slorta.org/fares/rta

Increase Transit Service Frequency/Speed

Measure Name	Increase Transit Service Frequency/Speed
Description of Measure	Work with the Regional Transit Authority (RTA) and transit services providers to increase transit service frequency (i.e., reducing headways) by identifying routes where increased bus frequency would improve service.

Category	Transportation and Land Use
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Work with RTA and transit service providers to implement the Short Range Transit Plan.	Yes	Required
Work with RTA and transit service providers to shorten regional service headways to 30 minutes or shorter at commute peaks subject to passenger load demand.	No	Required
Support streamlined transit services and infrastructure that create a Bus Rapid Transit (BRT) network on main commute corridors.	No	Yes

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	35

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	Very Low	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Medium	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	Reduce private transportation costs for those using service, but requires additional transit subsidies from public agencies.
Improve Public Health	Yes	Improved transportation choices may promote more active lifestyles.
Improve Air Quality	Yes	Reduced VMT may yield lower emissions of criteria pollutants.
Improve Water Quality	No	
Improve Equity	Yes	New transportation options for those without access to a vehicle.
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	Reduced VMT may yield lower emissions of criteria pollutants.
Adaptation	Yes	Decreases air pollutants and improves air quality.

Case Studies

Santa Clarita Transit (p. 9-9 and 9-10)	Transit Cooperative Research Program. TCRP Report 95 Traveler Response to System Changes – Chapter 9: Transit Scheduling and Frequency (p. 9-9 and 9-10) gulliver.trb.org/publications/tcrp/tcrp_rpt_95c9.pdf
Santa Monica, CA Big Blue Bus system (p. 9-10)	Transit Cooperative Research Program. TCRP Report 95 Traveler Response to System Changes – Chapter 9: Transit Scheduling and Frequency (9-10) gulliver.trb.org/publications/tcrp/tcrp_rpt_95c9.pdf

Implementation

Responsible Department/Agency	
Actual Measure or Commitment	Percentage reduction in transit headways
Implementation Mechanism	Policy

Implementation Timing	Near-Term
Outside Funding Available?	No
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Percentage reduction in headways (increase in frequency)	10%	Percent
Bus rapid transit selected? (1 for yes, 0 for no)	1	Yes or No
Staff time needed for this measure	0.001	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	% VMT Reduction = (Headway * B * C * Mode * E) + (% Reduction from BRT) (CAPCOA, TST-4 and TST-1)		
	Forecast VMT (2020) =	194,102,084	VMT
	Headway =	10%	Percent reduction in headways
	B =	0.38	Elasticity of transit ridership with respect to increased frequency of service (CAPCOA, TST-4, Page 283)
	C =	85%	Adjustment for level of implementation (CAPCOA, TST-4, page 281)
	Mode =	1.3%	Existing transit mode share, countywide (CAPCOA, TST-4, Page 281)
	E =	0.67	Ratio of decreased VMT to increased transit ridership (CAPCOA, TST-4, Page 281)
	% VMT Reduction from Headway=	0.03%	Percent VMT Reduction
	% VMT Reduction from Bus Rapid Transit =	0.02%	Percent VMT Reduciton if selected
	Total % VMT Reduction	0.05%	Percent VMT Reduction
Resource Savings	Total VMT Reduction due to transit network expansion=	93,428	Annual Reduced VMT due to transit frequency improvement
GHG Emission Reduction Calculations	GHG Savings = VMT Reduction × Cef		
	Where: Cef =	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emission Reduction	Total GHG Savings =	35	MT CO2e
Municipal Costs and Savings Calculations	Staff time required for coordinating with RTA/transit agencies.		
	FTE =	0.00	Estimated staff time per year to develop new program
	$/FTE=	100,000	Dollars per year
Municipal Costs and Savings	Municipal Cost =	$100	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Private VMT reduced =	93,428	VMT
	Vehicle operating cost per mile =	$0.57	Dollars per mile
	Private savings from avoided driving =	$52,787	Dollars
	Cost of transit fare =	$2	Dollars/day (may vary deepening on pass) (SLO RTA)
	City forecast (2020) population =	32,137	People
	Number of people switching to from driving to transit =	9	People
	Private cost from transit fares =	$18	Dollars
Community Costs and Savings	Community Cost =	$2	Dollars
	Community Savings =	$5,838	Dollars

Notes

Calculation methodology derived from CAPCOA measure TST-1 and TST-3.

References

1. Transit Cooperative Research Program. TCRP Report 95 Traveler Response to System Changes – Chapter 9: Transit Scheduling and Frequency (p. 9-14)

2. SLO RTA - http://www.slorta.org/fares/rta

Employer-Based Transportation Demand Management (TDM) Program

Measure Name	Employer-Based Transportation Demand Management (TDM) Program
Description of Measure	Require through a new City ordinance that employers with 25 or more employees develop a TDM program that provides encouragement, incentives, and support for employees to reduce their single occupancy vehicle trips. Some examples of resources and incentives include telecommuting, alternative scheduling (e.g., 9/80 or 4/40 work schedules), rideshare matching, and walking, cycling and transit incentives.

Category	Transportation and Land Use
Community or Municipal?	Community
Voluntary or Mandatory?	Mandatory
Selected?	No

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Develop and adopt a TDM ordinance for employees with 25 or more employees.	No	Required
Establish performance standards (e.g., trip reduction requirements).	No	Required
Set up system to require regular monitoring and reporting to assess the employer's status in meeting the ordinance goals (e.g., as part of the business licensing and renewal process).	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	1,585

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Very Low	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	Reduce private transportation costs for employees switching to alternative modes of travel.
Improve Public Health	Yes	Reduced VMT may yield lower emissions of criteria pollutants.
Improve Air Quality	Yes	Reduced VMT may yield lower emissions of criteria pollutants.
Improve Water Quality	No	
Improve Equity	Yes	
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	Reduced VMT reduces consumption of gasoline.
Adaptation	Yes	Decreases air pollutants and improves air quality.

Case Studies

City of Pasadena Trip Reduction Ordinance	http://www.ci.pasadena.ca.us/transportation/transportation_demand_management/
Genentech Corporate TDM Program (San Francisco Bay Area)	http://knowlton.osu.edu/ped/price.644/2012%20Webcasts/April%2020th/APA%20Webinar%20-%20Genentech%20gRide.pdf

Implementation

Responsible Department/Agency	Community Development; Planning/Transportation; Public Works
Actual Measure or Commitment	Percent of businesses with more than 25 employees

Implementation Mechanism	Codes and Standards
Implementation Timing	Near-Term
Outside Funding Available?	No
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Percent of employees in businesses with more than 25 employees	40%	Percent
Staff time needed for this measure	0.05	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	VMT Reduced = A x B x C (CAPCOA TRT-2)		
	Forecast Annual VMT (2020) =	194,102,084	VMT
	Forecast Annual Employee Commute VMT (2020) (A)=	50,466,542	Employee commute VMT in 2020 (Fehr & Peers)
	Percent Reduction in Commute VMT (B)=	21%	Percent in reduction in vehicle mode share from base commute trip reduction programs (CAPCOA, page 225)
	Percent of businesses with TDM Program (C)=	40%	Percent (from cell C63)
Resource Savings	VMT Reduction =	4,239,190	VMT
GHG Emission Reduction Calculations	GHG Reduction = VMT Reduction x Cef		
	Where:		
	Cef =	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Savings	Total GHG Savings =	1,585	MT CO2e
Municipal Costs and Savings Calculations	Annual staffing costs from program implementation as well as development and distribution to businesses of information, training, and incentives.		
	FTE =	0.05	Estimated staff time per year
	$/FTE =	$100,000	Total annual cost per FTE
Municipal Costs and Savings	Municipal Cost =	$5,000	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Private VMT Reduced =	4,239,190	VMT
	Private vehicle operating cost per mile =	$0.57	Dollars per mile
	Total community savings =	$2,395,142	Dollars
	Total employees =	13,000	Employees (projected in 2020)
	Employees participating in TDM =	#REF!	Employees
Community Costs and Savings	Community Cost=	$0	Dollars per employer (Assumes $0 capital cost - San Luis Obispo Rideshare works directly with employers to develop TDM programs, offering free tools and services.)
	Community Savings=	#REF!	Dollars per employee

Notes

Calculation methodology derived from RICAPS and CAPCOA measures TRT-1, TRT-2, TRT-7, TRT-11, and TRT-15; users should consult detailed CAPCOA guidance and example calculations when using this methodology.

References

1. CAPCOA, Quantifying Greenhouse Gas Mitigation Measures (2010): http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf
2. SLO COG Rideshare - http://www.rideshare.org/employers.aspx

Transportation Demand Management (TDM) Program - Voluntary

Measure Name	Transportation Demand Management (TDM) Program - Voluntary
Description of Measure	Work with San Luis Obispo Regional Ride Share and Ride-On to conduct additional outreach and marketing of existing TDM programs and incentives to discourage single-occupancy vehicle trips and encourage alternative modes of transportation, such as carpooling, taking transit, walking, and biking.

Category	Transportation and Land Use
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Collaborate with San Luis Obispo Ride Share and Ride-On to conduct additional outreach through event promotions and publications, targeting specific groups or sectors within the community (e.g., employers, employees, students, seniors, etc.).	No	Required
Provide information on and promote existing employer based TDM programs as part of the business licensing and renewall process.	No	Yes
Collaborate with San Luis Obispo Ride Share and the San Luis Obispo Bicycle Coalition to assist with event promotions and publications to increase awareness and ridership during Bike Month and Rideshare month.	No	Required
Direct community members to existing program websites.	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	764

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Very Low	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	Reduce private transportation costs for employees switching to alternative modes of travel.
Improve Public Health	Yes	Reduced VMT may yield lower emissions of criteria pollutants.
Improve Air Quality	Yes	Reduced VMT may yield lower emissions of criteria pollutants.
Improve Water Quality	No	
Improve Equity	Yes	
Reduce Water Consumption	No	
Reduce Energy Consumption	No	
Adaptation	Yes	Decreases air pollutants and improves air quality.

Case Studies

Alameda County, CA TravelChoice Marketing	http://transformca.org/campaign/travelchoice
Stanford University Commute Club	http://www.mtc.ca.gov/news/transactions/ta10-08/stanford.htm

Implementation

Responsible Department/Agency	Community Development; Planning/Transportation; Public Works

Actual Measure or Commitment	Percent of employees participating
Implementation Mechanism	Policy
Implementation Timing	Near-Term
Outside Funding Available?	No
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Note: This measure should use conservative assumptions if used in combination with Measure 5e, TDM Ordinance.

Key Assumptions for Calculations:

Targeted percent of employees eligible to participate*	75%	Percent
Staff time needed for this measure	0.04	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	VMT Reduction = Forecast Employee Commute VMT x (A x B) (CAPCOA TRT-1)		
	Where:		
	Forecast Annual VMT (2020) =	194,102,084	VMT in 2020
	Forecast Annual Employee Commute VMT (2020)=	50,466,542	Employee commute VMT in 2020 (Fehr & Peers)
	Percent Reduction in Commute VMT (A) =	5.4%	Percent (CAPCOA, page 220)
	Percent of Employees Eligible to Participate (B) =	75%	Percent of employees eligible to participate in TDM programs
Resource Savings	VMT Reduction =	2,043,895	VMT in 2020
GHG Emission Reduction Calculations	GHG Reduction = VMT Reduction x Cef		
	Where:		
	Cef =	0.000374	Composite emission factor, MT CO2 per VMT (EMFAC 2011)
GHG Emission Reduction	Total GHG Savings =	764	MT CO2e
Municipal Costs and Savings Calculations	Annual staffing costs associated with coordination and marketing.		
	FTE =	0.04	Estimated cost of staff time
	$/FTE =	$100,000	Total annual cost per FTE
Municipal Costs and Savings	Municipal Cost =	$4,000	Dollars
	Municipal Savings =	$0	Dollars
Community Cost and Savings Calculations	Private VMT Reduced =	2,043,895	VMT
	Private vehicle operating cost per mile =	$0.57	Dollars per mile
	Total community savings =	$1,154,801	Dollars
	Total employees =	13,000	Employees (projected in 2020)
	Employees participating in TDM =	9,750	Employees
Community Costs and Savings	Community Cost=	$0	Dollars per employee
	Community Savings=	$118	Dollars per employee

Notes

Calculation methodology derived from CAPCOA measures TRT-7, page 240.

References

1. CAPCOA, Quantifying Greenhouse Gas Mitigation Measures (2010): http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

2. Fehr & Peers calculation of countywide VMT associated with employee commute from the San Luis Obispo Council of Governments Regional Traffic Model 2.0, November 2012.

Parking Supply Management

Measure Name	Parking Supply Management
Description of Measure	Amend the Municipal Code to reduce parking requirements in areas such as the downtown where a variety of uses and services are planned in close proximity to each other and to transit.

Category	Transportation and Land Use
Community or Municipal?	Community
Voluntary or Mandatory?	Mandatory
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Amend the Municipal Code to reduce parking requirements (e.g., eliminate or reduce minimum parking requirements, create maximum parking requirements, and/or provide shared parking).	**No**	Required
Establish optional in-lieu fees in place of minimum parking requirements where appropriate.	**Yes**	**Yes**

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	641

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Very Low	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	Reduces parking construction costs for new development.
Improve Public Health	Yes	Reduced VMT may yield lower emissions of criteria pollutants.
Improve Air Quality	Yes	Reduced VMT may yield lower emissions of criteria pollutants.
Improve Water Quality	Yes	Reduces stormwater runoff by reducing impermeable surface coverage.
Improve Equity	Yes	Reduced development costs may improve housing affordability.
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	Minimal savings from less parking lot lighting.
Adaptation	Yes	Decreases air pollutants and improves air quality.

Case Studies

City of Sacramento Parking Code Update	http://www.sacgp.org/ZoningCodeParkingUpdate.html
City of Mountain View Downtown Precise Plan (including parking code update)	http://www.mountainview.gov/civica/filebank/blobdload.asp?BlobID=2768

Implementation

Responsible Department/Agency	
Actual Measure or Commitment	Net reduction in parking spaces; new parking spaced by 2020 forecast under existing regulations
Implementation Mechanism	Codes and Standards
Implementation Timing	Mid-Term
Outside Funding Available?	No

Synergies with Existing Initiatives/Partnerships	No

Calculation Methodology and Equations

Key Assumptions for Calculations:

Implementation Year	2015	Year
Net reduction in parking spaces	800	Parking Spaces
New parking spaces by 2020 forecast under existing regulations	4,000	Parking Spaces
Staff time needed for this measure	0.04	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	VMT Reduction = VMT Growth x (((N - O)/O) x 0.5)		
	Baseline VMT (2005) =	147,306,705	Annual Vehicle Miles Traveled (VMT)
	Forecast VMT (2020) =	194,102,084	Annual VMT
	VMT Growth =	15,598,460	VMT generated by forecast development between implementation year and 2020
	N =	3,200	Parking spaces forecast under proposed regulations. (Placeholder value assumes 1,000,000 square feet of new development and 3.5 spaces per 1,000 square feet)
	O=	4,000	Parking forecast under existing regulations. (Placeholder value assumes 1,000,000 square feet of forecast development and 4 spaces per 1,000 square feet)
	P =	0.5	Estimated ratio of reduction in parking supply to reduction in vehicle trips (CAPCOA PDT-1)
	Percent change =	-20%	Percent change in new parking supply
Resource Savings	Annual VMT Reduction =	1,712,711	Annual reduction in VMT (CAPCOA PDT-1)
GHG Emission Reduction Calculations	GHG Savings = VMT Reduction × Cef		
	Where:		
	2020 Composite Emissions Factor Cef=	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emission Reduction	Total GHG Savings =	641	MT CO2e
Municipal Costs and Savings Calculations	Staff time to develop policy and establish in-lieu fees.		
	FTE =	0.04	Estimated staff time per year
	$/FTE=	$100,000	FTE cost per year
Municipal Costs and Savings	Municipal Cost =	$4,000	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Private costs and savings of increasing transit service, scaled to City population. Change in private costs = (A*B)+((D*E)/G)		
	Private VMT Reduced (A) =	1,712,711	VMT
	Private vehicle operating cost per mile (B) =	$0.57	Dollars per mile
	Private Savings from avoided driving (C) =	$967,682	Dollars
	Reduction in required parking spaces (D) =	800	Reduction in required parking spaces
	Surface parking construction costs (Excludes cost of land) =	$10,000	Dollars per space (U.S. parking structure construction costs are reported to average about $15,000 per space in 2008. Adjusted to reflect cost of ground floor spaces.) (Victoria Transport Policy Institute)
	Total cost savings from reduced parking construction (F) =	$8,000,000	Dollars (This is a savings for the project applicant/developer, not the general public.)
Community Costs and Savings	Community Cost =	$0	Dollars per parking space reduced
	Community Savings =	$1,210	Dollars per parking space reduced (Excludes savings to private developers.)

Notes

Calculation methodology derived from CAPCOA measure PDT-1.

References

1. California Air Pollution Control Officers Association (CAPCOA) Quantifying Greenhouse Gas Mitigation Measures (August 2010): http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

2. Nelson\Nygaard (2005). Crediting Low-Traffic Developments (p. 16): http://www.montgomeryplanning.org/transportation/documents/TripGenerationAnalysisUsingURBEMIS.pdf

3. SF Bay Area Metropolitan Transportation Commission Parking Code Guidance - http://www.mtc.ca.gov/planning/smart_growth/parking/6-12/Parking_Code_Guidance_June_2012.pdf

4. Victoria Transport Policy Institute - www.vtpi.org/tca/tca0504.pdf

Public Parking Pricing

Measure Name	Public Parking Pricing
Description of Measure	Establish market-based pricing for public parking spaces, where appropriate.

Category	Transportation and Land Use
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	No

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Decouple parking and housing and commercial development in order to allocate the true cost of parking directly to users.	No	Required
Add meters to public parking spaces, where appropriate, and charge market prices.	No	Required
Set prices to achieve an 85% utilization on each block face and 90% utilization in each off-street lot.	No	Required
Conduct parking occupancy studies to consider priority areas for price increases.	No	No

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	343

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	High	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	Medium	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Very Low	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	No	Raises fees for drivers while increasing public revenue.
Improve Public Health	Yes	Reduced VMT may yield lower emissions of criteria pollutants.
Improve Air Quality	Yes	Reduced VMT may yield lower emissions of criteria pollutants.
Improve Water Quality	No	
Improve Equity	Yes	Reduced development costs may improve housing affordability.
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	Reduced VMT yields lower consumption of gasoline.
Adaptation	Yes	Decreases air pollutants and improves air quality.

Case Studies

Old Pasadena Parking Management Plan	http://www.metroplanning.org/news-events/article/6510
City of Ventura Downtown Parking Management	http://www.cityofventura.net/parking http://www.cityofventura.net/files/community_development/planning/planning_communities/resources/downtown/Ventura_FinalMobility+PkngMngmntPlan.04.06_Accepted.pdf

Implementation

Responsible Department/Agency	
Actual Measure or Commitment	Number of public parking spaces where parking pricing would apply; percentage increase in parking prices
Implementation Mechanism	Capital Improvement

Implementation Timing	Mid-Term
Outside Funding Available?	No
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Total public parking spaces where parking pricing would apply	4,000	Parking Spaces
Percentage increase in parking prices	25%	Percent
Staff time needed for this measure	0.25	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	VMT Reduction = Baseline VMT associated with Public Parking x (P × Epp)		
	Public parking spaces =	4,000	Total number of on- and off-street public parking spaces where parking pricing would apply
	Baseline VMT associated with public parking =	33,312,000	VMT calculated by multiplying public parking spaces by: (a) The number of times a public space "turns over" (e.g. twice per day) (b) The average vehicle trip length times two for inbound and outbound trips (e.g. 6 x 2 = 12 miles) (c)Annual miles are calculated using an annualization factor of 347 to account for reduced weekend and holiday mileage (consistent with California Air Resources Board standard practice).
	P =	25%	Percent increase in parking prices (minimum of 25% increase: Moving Cooler, p. B-10)
	Epp =	0.11	Elasticity of VMT with respect to parking price (Clinch & Kelly)
Resources Savings	Annual VMT Reduction =	916,080	Annual reduction in vehicle miles traveled
GHG Emission Reduction Calculations	GHG Savings = VMT Reduction × Cef		
	Where: Cef =	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emission Reduction	Total GHG Savings =	343	MT CO2e
Municipal Costs and Savings Calculations	New meters and some staff time may be needed to implement the programs. Additional revenue to cover meter and staff costs will be generated due to on-street parking prices. Change in public costs = B -		
	FTE =	0.25	Estimated staff time to develop new program
	$/FTE =	$100,000	Total annual cost per FTE
	Daily revenue per fee parking space =	$6.00	Dollars (Assumes parking cost is $1 per hour and each parking space is occupied 6 hours per day.)
	Total annual municipal revenue from parking fees =	$8,760,000	Dollars
Municipal Costs and Savings	Municipal Cost =	$25,000	Dollars
	Municipal Savings =	$8,660,000	Dollars
Community Costs and Savings Calculations	Private costs increase as drivers pay parking fees. New costs are offset somewhat by reduced driving costs.		
	Private VMT reduced =	916,080	VMT
	Private vehicle operating cost per mile =	$0.57	Private vehicle operating cost per mile
	Private savings from avoided driving =	$517,585	Private savings from avoided driving.
	Increase in parking fees paid =	$8,760,000	Increase in parking fees paid
Community Costs and Savings	Community Cost =	$2,190	Dollars per new paid parking space
	Community Savings =	$129	Dollars per new paid parking space

Notes

Calculation methodology derived from CAPCOA measure PDT-3; users should consult detailed CAPCOA guidance and example calculations when using this methodology.

Where on-street parking is currently above 85% occupancy, market-priced parking will also reduce VMT and congestion by eliminating driver's need to circle for parking. This potential reduction is not accounted for in the above calculations.

References

1. California Air Pollution Control Officers Association (CAPCOA) Quantifying Greenhouse Gas Mitigation Measures (August 2010): http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

2. Cambridge Systematics. Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions. Technical Appendices. Prepared for the Urban Land Institute. (p. B-10)

3. J. Peter Clinch and J. Andrew Kelly (2003), Temporal Variance Of Revealed Preference On-Street Parking Price Elasticity, Department of Environmental Studies, University College Dublin (www.environmentaleconomics.net)

Electric Vehicle Network and Alternative Fueling Stations

Measure Name	Electric Vehicle Network and Alternative Fueling Stations
Description of Measure	Facilitate the expanded use of alternative fuel vehicles and fueling infrastructure by streamlining permitting processes and promoting existing financial incentives.

Category	Transportation and Land Use
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Continue to work with the San Luis Obispo County Air Pollution Control District (APCD), Central Coast Clean Cities Coalition, and neighboring jurisdictions to create and implement the electric vehicle readiness plan and pursue funding for plug-in electric vehicle charging stations.	Yes	Required
Provide streamlined installation and permitting procedures for vehicle charging facilities, utilizing tools provided in the electric vehicle readiness plan.	Yes	Yes
Promote existing financial incentives for low- and zero-emissions vehicles, either individually or in collaboration with the Central Coast Clean Cities Coalition.	Yes	Yes

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	2,271

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	Depending on the vehicles purchased, more efficient vehicles may yield a long-run cost savings.
Improve Public Health	No	
Improve Air Quality	Yes	Reduced vehicle emissions may yield lower emissions of criteria pollutants.
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	More efficient vehicles will require less gasoline.
Adaptation	Yes	Decreases air pollutants and improves air quality.

Case Studies

City of Rancho Cucamonga Electric Vehicle (EV) Charging Stations	http://www.cityofrc.us/news/displaynews.asp?NewsID=385
City of Rohnert Park Electric Vehicle Promotion Program	http://www.rpcity.org/index.aspx?page=520

Implementation

Responsible Department/Agency	Planning; Public Works
Implementation Mechanism	Percent adoption of electric vehicles based on implementation of comprehensive EV Network; number of new plug-in electric vehicle charging and alternative fueling stations

Implementation Timing	Policy
Outside Funding Available?	Near-Term
Synergies with Existing Initiatives/Partnerships	No
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations

Percent Adoption of Electric Vehicles Based on Implementation of Comprehensive EV Network	5%	Percent
Staff time needed for this measure	0.04	Full Time Equivalent

Calculations:

GHG Emission Reduction Calculations	GHG reduction = (City Forecast VMT x B) x D		
	City Forecast VMT (2020)	194,102,084	VMT
	Estimated percent of drivers switching to EV's by 2020 (B) =	5%	Percent
	VMT driven by those shifting to EV's (C) =	9,705,104	VMT
	Default composite emissions factor =	0.00037	MT CO2e per VMT
	Emissions factor for plug-in hybrid vehicle =	0.00014	MT CO2e per VMT (Ex. Toyota Prius Plug-in Hybrid, http://www.google.org/recharge/experiment/CO2.html)
	Emissions-per mile difference between average car and EV (D) =	0.00023	MT CO2e per VMT
GHG Emission Reduction	Total GHG Savings =	2,271	MT CO2e
Municipal Costs and Savings Calculations	Staff time needed for EV Readiness streamlining and coordination with APCD and Central Coast Clean Cities Coalition. (A specific program of investments has not yet been identified by APCD and the Central Coast Clean Cities Coalition. It is expected that localities would seek outside funds to support investments in EV charging stations and alternative fuel stations.)		
	FTE =	0.0	Estimated staff time to develop new program
	$/FTE =	$100,000	Total annual cost per FTE
Municipal Costs and Savings	Municipal Cost =	$4,000	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Cost of EV charging station =	$8,000	Dollars (Average total cost for commercial charging station including hardware and installation for AC Level 2, 7.5 kW, 240V Charger) (Ready Set Charge California)
Community Costs and Savings	Community Cost =	$0	Dollars per charging station (Assumes cost of EV charging stations would be incurred by private developer. Developer costs may be covered by applicable grants.)
	Community Savings =	$0	Dollars per charging station

Notes

References

1. Argonne National Laboratory. 2009. Multi-Path Transportation Futures Study: Vehicle Characterization and Scenario Analyses. ANL/ESD/09-5. Table 3-11a, p. 53.).

2. "Electric Vehicle Infrastructure, A Guide for Local Governments in Washington State: Model Ordinance, Model Development Regulations, and Guidance Related to Electric Vehicle Infrastructure and Batteries per RCW 47.80.090 and 43.31.970." http://www.psrc.org/assets/4325/EVI_full_report.pdf

3. RechargeIT Driving Experiment: Demonstration of energy efficiency for electric vehicles. Google, org, 2007. http://www.google.org/recharge/

4. Ready, Set, Charge California - A Guide to EV Ready Communities - http://www.rmi.org/Content/Files/Readysetcharge.pdf

Incentives for Infill and Transit Oriented Development

Measure Name	Incentives for Infill and Transit Oriented Development
Description of Measure	The City would identify and implement additional incentives to encourage mixed-use, higher density, and infill development near transit routes, in existing community centers/downtowns, and in other designated areas. Incentives may include, but are not limited to, priority permitting, lower permit fees, density bonuses, or reduced parking requirements.

Category	Transportation and Land Use
Community or Municipal?	Community
Voluntary or Mandatory?	Mandatory
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Update land use and zoning code to allow new development in the mixed-use and medium- and high-density land use categories located within ¼-mile of a transit node, existing bus route, or park and ride facility with regularly scheduled, daily service at a minimum density of 20 dwelling units per acre.	No	Required
Provide and promote incentives (e.g., parking reductions, priority permitting, etc.) for mixed-use and medium- and high-density land use categories located within ¼-mile of a transit node, existing bus route, or park and ride facility with regularly scheduled, daily service at a minimum density of 20 dwelling units per acre.	No	Required
Develop a form-based zoning code for the central business district/downtown. Form-based codes emphasize building form rather than use. This increases flexibility for a variety of complementary uses to be permitted in the same area, and the potential for mixed-use development, which helps to reduce vehicle miles traveled.	Yes	Yes
Develop and adopt incentives for live/work developments, such as reduced permit fees, expedited permits, or waiving business license fees for residents in live/work units. Live/work developments allow residents to live at their place of work and thereby reduce vehicle miles traveled and associated GHG emissions.	No	Yes

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	2,674

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	Varies	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Medium	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	May reduce barrier to development, decreasing long-term housing costs. More homes near transit reduces transportation costs for some.
Improve Public Health	Yes	Improved transportation choices may promote more active lifestyles.
Improve Air Quality	Yes	Reduced VMT may yield lower emissions of criteria pollutants.
Improve Water Quality	No	
Improve Equity	Yes	New transportation options for those without access to a vehicle.
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	Reduced VMT will reduce gasoline consumption.
Adaptation	Yes	Decreases air pollutants and improves air quality.

Case Studies

Santa Monica General Plan Land Use and Circulation Element	http://www.shapethefuture2025.net/PDF/luce_2010/0.01_executive_summary.pdf

Uptown District TOD, San Diego (pg. 11)	http://transitorienteddevelopment.dot.ca.gov/PDFs/TOD%20Study%20Exectutive%20Summary.pdf

Implementation

Responsible Department/Agency	Planning department
Actual Measure or Commitment	Number of new homes and/or businesses within 0.25 miles of transit
Implementation Mechanism	Policy
Implementation Timing	Near-Term
Outside Funding Available?	No
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Note: This measure includes a rough estimate of GHG reductions that may occur. Quantification using the regional travel demand model will yield more accurate results.

Key Assumptions for Calculations:

Number of new residential units located within 0.25 miles of transit by 2020	600	Units
Staff time needed for this measure	0.04	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	VMT Reduction = new residences x persons per household x per capita VMT reduction		
	Number of new residences =	600	Units
	City forecast (2020) Population =	32,137	People
	City forecast (2020) Households =	12,864	Households
	Average persons per household =	2.50	Persons per household
	Annual reduction in VMT per person in residence within 0.25 miles of transit =	4,770	Annual VMT reduction per person (ICLEI CAPPA)
Resource Savings	Annual VMT Reduction =	7,149,883	Vehicle miles traveled
GHG Emission Reduction Calculations	GHG Savings = VMT Reduction × Cef		
	Where: Cef =	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emissions Reduction	Total GHG Savings =	2,674	MT CO2e
Municipal Costs and Savings Calculations	Staff time needed to identify incentives and update codes and regulations.		
	FTE =	0.0	Estimated staff time to develop new program
	$/FTE =	$100,000	Total annual cost per FTE
Municipal Costs and Savings	Municipal Cost =	$4,000	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Private developers will gain from a wider choice of potential development opportunities, costs of which would vary based on the incentives provided.		
	Private VMT reduced =	7,149,883	VMT
	Private vehicle operating cost per mile =	$0.57	Private vehicle operating cost per mile
	Private savings from avoided driving =	$4,039,684	Private savings from avoided driving.
Community Costs and Savings	Community Cost =	Varies	Dollars per unit
	Community Savings =	$6,733	Dollars per unit

Notes

CAPCOA measures LUT- (see link below); users should consult detailed CAPCOA guidance and example calculations when using this methodology.

References

1. CAPCOA, Quantifying Greenhouse Gas Mitigation Measures (2010):
http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

3. Nelson\Nygaard, 2005. Crediting Low-Traffic Developments (p.12). Journal of the American Planning Association:
http://www.montgomeryplanning.org/transportation/documents/TripGenerationAnalysisUsingURBEMIS.pdf

4. Boarnet, Marlon and Handy, Susan. 2010. "Draft Policy Brief on the Impacts of Residential Density Based on a Review of Empirical Literature."

5. Criteron Planner/Engineers and Fehr & Peers Associates (2001). Index 4D Method. A Quick-Response Method of Estimating Travel Impacts from Land-Use Changes. Technical Memorandum prepared for US EPA, October 2001.

6. TCRP Report 95, Transit Oriented Development Traveler Response to Transportation System Changes, Transit Oriented Development. (p 17-35)
http://www.fta.dot.gov/documents/Transit_Oriented_Development_-_Traveler_Response_to_Transportation_System_Changes_TCRP_Report_95.pdf

7. ICLEI CAPPA version 1.5 - Transit Oriented Development tab

Service Nodes

Measure Name	Service Nodes
Description of Measure	Work with private developers to encourage the development of convenient commercial and shopping opportunities near existing employment and/or residential areas, through incentives or the removal of existing regulatory barriers, as a means of shortening the distance between origins and destinations, and increasing the potential for walking

Category	Transportation and Land Use
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	No

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Conduct a study of key unserved areas of demand for retail and services.		Yes
Adjust zoning and regulations as necessary to encourage and incentivize the development of service nodes.		Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	462

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low to Low	$1-$10,000 Very Low	$10,001- Low	$50,001- Medium	$100,001+ High
2. Annual Municipal Savings	None	$1-$10,000 Very Low	$10,001- Low	$50,001- Medium	$100,001+ High
3. One Time Community Cost (per household or business)	Varies	$1-$500 Very Low	$501- Low	$1,001-$5,000 Medium	$5,001+ High
4. Annual Community Savings (per household or business)	Varies	$1-$500 Very Low	$501- Low	$1,001-$5,000 Medium	$5,001+ High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	More services near homes reduces transportation costs for some
Improve Public Health	Yes	Retail and services near homes may promote more active lifestyles
Improve Air Quality	Yes	Reduced VMT may yield lower emissions of criteria pollutants
Improve Water Quality	No	
Improve Equity	Yes	New transportation options for those without access to a vehicle
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	Reduced VMT will reduce gasoline consumption.
Adaptation	Yes	Decreases air pollutants and improves air quality.

Case Studies

Berkeley, CA: West Berkeley Plan (Commercial Zoning section)	http://webserver.ci.berkeley.ca.us/contentdisplay.aspx?id=396
City of Oakland Retail Enhancement Strategy	http://www2.oaklandnet.com/Government/o/PBN/OurOrganization/PlanningZoning/DOWD008389

Implementation

Responsible Department/Agency	Planning department
Actual Measure or Commitment	Percent of new homes within walking distance of retail and services.
Implementation Mechanism	Policy
Implementation Timing	Near-Term
Outside Funding Available?	No
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

CAP development.

Resource Savings	Quantification to be carried out through regional travel demand model. A potential range of impacts has not been identified for this strategy.
Costs and Savings	Specific municipal and community costs and savings associated with measure not quantified. Generally, municipal costs of zoning adjustments would be very low to low, while private developers will gain from a wider choice of potential development opportunities. In addition, community savings would vary based on the incentives provided.

Notes

References

Transportation Demand Management (TDM) Program for Municipal Employees

Measure Name	Transportation Demand Management (TDM) Program for Municipal Employees
Description of Measure	The City would implement a Transportation Demand Management (TDM) program for its own employees. Reduced single-occupant vehicle commuting would reduce GHG emissions.

Category	Transportation and Land Use
Community or Municipal?	Municipal
Voluntary or Mandatory?	Voluntary
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Establish an ordinance that requires the City to meet employee commute trip VMT reduction targets by offering one or more services from a menu of options, including: Encourage the use of the carpools; Provide ride matching services and assistance; Allow flexible work schedules and telecommuting; Provide end of trip facilities (parking, showers, lockers); Providing subsidized transit passes; hiring a transportation coordinator to manage TDM programs; or others at the employer's discretion.	No	Required
Hire a transportation coordinator to manage TDM programs.	No	No
Require parking cash-out (a requirement that City employers who subsidize employee parking costs provide an equivalent cash reimbursement for employees who choose not to drive).	No	No

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	49

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	No	
Improve Public Health	Yes	Reduced VMT may yield lower emissions of criteria pollutants.
Improve Air Quality	Yes	Reduced VMT may yield lower emissions of criteria pollutants.
Improve Water Quality	No	
Improve Equity	Yes	
Reduce Water Consumption	No	
Reduce Energy Consumption	No	Reduced VMT reduces consumption of gasoline.
Adaptation	Yes	Decreases air pollutants and improves air quality.

Case Studies

City of Pasadena Trip Reduction Ordinance	http://www.ci.pasadena.ca.us/transportation/transportation_demand_management/
City of Glendale TDM Ordinance (and supporting narrative)	http://www.ci.glendale.ca.us/planning/pdf_files%5CMobilityPlan/ParkingTDMREPORT_06.05.06.pdf

Implementation

Responsible Department/Agency	Community Development; Planning/Transportation; Public Works

Actual Measure or Commitment	Percent City employee participation
Implementation Mechanism	Codes and Standards
Implementation Timing	Near-Term
Outside Funding Available?	No
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Percent City employee participation	20%	Percent
Staff time needed for this measure	0.0	Full Time Equivalent (FTE)

Calculations: MANDATORY TDM PROGRAM w/ option for vanpool/shuttle and parking "cash-out."

Resource Savings Calculations	VMT Reduced from TDM program(C) = Vehicle Miles Travelled for City Employee Commute (A) x Percent Participation		
	Vehicle Miles Travelled for City Employee Commute (A) =	651,608	VMT
	Percent City Employee Participation=	20%	Percent
Resource Savings	VMT Reduced from "Base" TDM program (C) =	130,322	VMT
GHG Emission Reduction Calculations	Cef =	0.000374	Composite emission factor; MT CO2 per VMT (EMFAC 2011)
GHG Emission Reduction	Total GHG Savings =	49	MT CO2e
Municipal Costs and Savings Calculations	Annual staffing costs from program development and implementation.		
	FTE =	0.0	Staff time needed for this measure
	$/FTE=	$100,000	FTE cost per year
	Private VMT Reduced =	130,322	VMT
	Private vehicle operating cost per mile =	$0.57	Dollars per mile
Municipal Costs and Savings	Municipal Cost =	$4,000	Dollars (Assumes $0 capital cost - San Luis Obispo Rideshare works directly with employers to develop TDM programs, offering free tools and services.)
	Municipal Savings =	$73,632	Dollars

Notes

Calculation methodology derived from RICAPS and CAPCOA measures TRT-1, TRT-2, TRT-11, and TRT-15; users should consult detailed CAPCOA guidance and example calculations when using this methodology.

References

1. CAPCOA, Quantifying Greenhouse Gas Mitigation Measures (2010): http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

2. SLO COG Rideshare - http://www.rideshare.org/employers.aspx

Zero and Low Emission Municipal Fleet Vehicles

Measure Name	Zero and Low Emission Municipal Fleet Vehicles
Description of Measure	Continue to replace official City vehicles and equipment with low-emission and zero-emission vehicles, including smaller, hybrid, electric, compressed natural gas, biodiesel, and neighborhood electric vehicles.

Category	Transportation and Land Use
Community or Municipal?	Municipal
Voluntary or Mandatory?	Mandatory
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Develop and adopt a low- and zero- emissions replacement/purchasing policy for official City vehicles and equipment.	No	Yes
Work with the Central Coast Clean Cities Coalition to obtain funding for low-emission and zero-emission fleet vehicles.	No	Yes
Identify fleet vehicles near replacement and replace with lower emission vehicles.	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	66

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Medium	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	Depending on the vehicles purchased, more efficient vehicles may yield a long-run cost savings.
Improve Public Health	No	
Improve Air Quality	Yes	Reduced vehicle emissions may yield lower emissions of criteria pollutants.
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	More efficient vehicles will require less gasoline.
Adaptation	Yes	Decreases air pollutants and improves air quality.

Case Studies

Los Angeles Low-Emissions Fleet Vehicles	http://www.afdc.energy.gov/case/17
City of San Jose Green Fleet Policy	http://greenvision.sanjoseca.gov/CleanFleetVehicles.aspx

Implementation

Responsible Department/Agency	Department of Public Works
Actual Measure or Commitment	Number of municipal vehicles replaced by 2020

Implementation Mechanism	Policy
Implementation Timing	Near-Term
Outside Funding Available?	No
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Number of municipal vehicles replaced by 2020	20	Vehicles
Staff time needed for this measure	0.04	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Fuel savings (gallons) = V x M (1/Fi - 1/Fe)		
	Where:		
	Number of vehicles replaced (V) =	20	Vehicles
	Average miles driven per year (M) =	12,500	Miles per year
	Average fuel economy of replaced vehicles (Fi) =	20	Miles per gallon
	Average fuel economy of newer (more efficient) vehicles (Fe) =	50	Miles per gallon
Resource Savings	Fuel Savings =	7,500	Gallons of gasoline fuel
GHG Emission Reduction Calculations	GHG reduced (MT CO2e) = Fuel savings (gallons gasoline) x 8.81 / 1,000		
	8.81	= GHG emission from gasoline (kg CO2/gallon)	
	1,000	= Conversion from kg to metric tons	
GHG Emission Reduction	Total GHG Savings	66	MT CO2e
Municipal Costs and Savings	Energy cost per mile of regular gasoline vehicle =	$0.1468	Dollars per mile (standard car. Ex, Toyota Corolla) (RechargeIT)
	Energy cost per mile of hybrid vehicle =	$0.0690	Dollars per mile (Electric vehicles. Ex, Toyota Prius Plug-in Hybrid, RechargeIT)
	Difference in energy cost per mile =	$0.0778	Dollars per mile
	Estimate average miles driven per year =	12,500	Miles per year
	Difference in purchase price for hybrid above similar non-hybrid vehicle =	$4,315	Dollars (US DOE)
Municipal Costs and Savings	Municipal Costs =	$86,300	Dollars (Assumes no staff time needed above that required for purchasing regular gasoline vehicles.)
	Municipal Savings =	$2,918	Dollars

Notes

References

1. RechargeIT Driving Experiment: Demonstration of energy efficiency for electric vehicles. Google, org, 2007. http://www.google.org/recharge/

2. US Department of Energy (DOE)- fueleconomy.gov

Construction Equipment Techniques

Measure Name	Construction Equipment Techniques
Description of Measure	Reduce GHG emissions from construction equipment by requiring various actions as appropriate to the construction project.

Category	Off-Road
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Require a percentage of construction equipment to be electrically-powered or use alternative fuels such as compressed natural gas (CNG).	No	Required
Limit heavy-duty equipment idling time to a period of three minutes or less, exceeding the California Air Resources Board's standard of five minutes.	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	1,956

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	Varies	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Varies	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	Reduced cost from decreased fuel usage.
Improve Public Health	Yes	
Improve Air Quality	Yes	
Improve Water Quality	Yes	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	
Adaptation	Yes	Decreases air pollutants and improves air quality.

Case Studies

San Francisco Clean Construction Ordinance	http://www.nrdc.org/media/2007/070406a.asp http://www.sfbos.org/ftp/uploadedfiles/bdsupvrs/ordinances07/o0070-07.pdf

Implementation

Responsible Department/Agency	Community Development
Actual Measure or Commitment	Percent of construction equipment replaced with electric equipment/alternatively fueled equipment
Implementation Mechanism	Codes and Standards
Implementation Timing	Long-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Percentage of construction equipment replaced with electric equipment	20%	Percent
Percentage of construction equipment replaced with alternatively fueled equipment	25%	Percent
Limit idling time to 3 minutes	Yes	Yes or No
Staff time needed for this measure	0.05	Full Time Equivalent (FTE)

Calculations:

GHG Emission Reduction Calculations	GHG Emissions Reduced = Reduction from Replacement with Electric Equipment + Reduction from Alternative Fuels + Reduction from Reduced Idling Time 1 - GHG Reduced from Replacement with Electric Equipment = (Forecast Construction Emissions x Percent Equipment Replaced x Percent Diesel Equipment x Diesel Reduction) + (Forecast Construction Emissions x Percent Equipment Replaced x Percent Gasoline Equipment x Gasoline Reduction) 2 - GHG Emissions Reduced from Alternative Fuels = (Forecast Construction Emissions x Percent Equipment Replaced x Percent Diesel Equipment X Diesel Reduction) + (Forecast Construction Emissions x Percent Equipment Replaced x Percent Gasoline Equipment x Gasoline Reduction) 3 - Reduction from Reduced Idling Time = Remaining GHG Emissions x 0.40%		
	Forecast (2020) construction GHG emissions=	10,077	MT CO2e
	Percentage construction emissions from diesel equipment=	99%	Percent
	Percentage construction emissions from gasoline equipment=	1%	Percent
	GHG Reduction from Replacing Diesel Equipment with Electric Equipment =	72.9%	Percent (CAPCOA C-2, page 421)
	GHG Reduction from Replacing Gasoline Equipment with Electric Equipment =	72.4%	Percent (CAPCOA C-2, page 421)
	GHG Reduction from Replacement with Electric Equipment =	1,469	MT CO2e
	Emission Reduction Due to Fuel Switch from Diesel to Compressed Natural Gas =	18%	Percent (CAPCOA C-1, page 415)
	Emission Reduction Due to Fuel Switch from Gasoline to Compressed Natural Gas =	20%	Percent (CAPCOA C-1, page 415)
	GHG Reduction from use of alternative fuels =	454	MT CO2e
	Limit Idling Time to 3 Minutes =	1	"1" = Yes, "0" = No
	Reduction from Reducing Idling Time from 5 to 3 Minutes =	0.4%	Percent (CAPCOA, C-3)
	Remaining Emissions (After Reduction from Equipment Replacement and Alternative Fuels) =	8,154	MT CO2e
	GHG Reduction from limiting idling time =	33	MT CO2e
GHG Emission Reduction	Total GHG Reduction =	1,956	MT CO2e
Municipal Costs and Savings Calculations	Staff time needed to develop efficient construction equipment codes and standards.		
	FTE =	0.05	Estimated staff time needed
	$/FTE =	$100,000	FTE cost per year
Municipal Costs and Savings	Municipal Cost =	$5,000	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings	Community Cost =	Varies	Dollars (Varies based on vehicle/equipment replacement type.)

Equipment Upgrades, Retrofits, and Replacements

Measure Name	Equipment Upgrades, Retrofits, and Replacements
Description of Measure	Expand the promotion of existing incentive programs that fund off-road equipment and vehicle upgrades, retrofits, and replacement, such as the Carl Moyer heavy-duty vehicle and equipment program.

Category	Off-Road
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Continue to support the Carl Moyer grant program and direct community members to existing program websites (e.g., San Luis Obispo Air Pollution Control District, Carl Moyer Grant page).	Yes	Required
Conduct additional outreach and promotional activities targeting specific groups (e.g., equipment rental companies, construction companies, homeowners, etc.).	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	526

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Varies	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	
Improve Public Health	No	
Improve Air Quality	Yes	
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	
Adaptation	Yes	Decreases air pollutants and improves air quality.

Case Studies

Air Resources Board Audit of San Luis Obispo County APCD's Carl Moyer Program	http://www.arb.ca.gov/msprog/moyer/audits/2010/sloauditrpt.pdf
Bay Area AQMD - Carl Moyer Program	http://www.baaqmd.gov/Divisions/Strategic-Incentives/Funding-Sources/Carl-Moyer-Program.aspx

Implementation

Responsible Department/Agency	
Actual Measure or Commitment	Percent of off-road equipment replaced with electric equipment/alternative fuel vehicles
Implementation Mechanism	Incentives
Implementation Timing	Mid-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Is this measure selected in conjunction with Measure 5a - Construction Equipment Efficiency?	Yes	Yes or No
Percentage of off-road equipment replaced with electric equipment	15%	Percent
Percentage of off-road equipment replaced with alternative fuels	10%	Percent
Staff time needed for this measure	0.05	Full Time Equivalent (FTE)

Calculations:

GHG Emission Reduction Calculations	GHG Emissions Reduced = Reduction from Replacement with Electric Equipment + Reduction from Alternative Fuels 1 - GHG Reduced from Replacement with Electric Equipment = Forecast Off-Road Emissions x Percent Equipment Replaced x (Percent Diesel Equipment x Diesel Reduction) x (Percent Gasoline Equipment x Gasoline Reduction) 2 - GHG Emissions Reduced from Alternative Fuels = Forecast Off-Road Emissions x Percent Equipment Replaced x (Percent Diesel Equipment X Diesel Reduction) x (Percent Gasoline Equipment x Gasoline Reduction)		
	Total Forecast (2020) Off-Road GHG Emissions =	14,291	MT CO2e
	Forecast (2020) Off-Road GHG Emissions from Construction Equipment =	10,077	MT CO2e
	Percentage GHG Emissions from Diesel Equipment =	90%	Percent
	Percentage GHG Emissions from Gasoline Equipment =	8%	Percent
	Percentage GHG Emissions from Compressed Natural Gas =	2%	Percent
	GHG Reduction from Replacing Diesel Equipment with Electric Equipment =	72.9%	Percent (CAPCOA C-2, page 421)
	GHG Reduction from Replacing Gasoline Equipment with Electric Equipment =	72.4%	Percent (CAPCOA C-2, page 421)
	GHG Reduction from Purchase of Electric Equipment =	451	MT CO2e
	Emission Reduction Due to Fuel Switch from Diesel to Compressed Natural Gas =	18%	Percent (CAPCOA C-1, page 415)
	Emission Reduction Due to Fuel Switch from Gasoline to Compressed Natural Gas =	20%	Percent (CAPCOA C-1, page 415)
	GHG Reduction from Use of Alternative Fuels =	75	MT CO2e
GHG Emission Reduction	Total GHG Reduction =	526	MT CO2e
Municipal Costs and Savings Calculations	Staff time needed to conduct outreach and promotional activities		
	FTE =	0.1	Estimated staff time per year
	$/FTE =	$100,000	FTE cost per year
Municipal Costs and Savings	Municipal Cost =	$5,000	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings	Community Cost =	$0	Dollars (Assumes equipment replacement and upgrades would be funded through the Carl Moyer program.)
	Community Savings =	Varies	Dollars (Varies based on vehicle/equipment replacement type.)

Notes

Exceed SB X7-7 (Water Conservation Act of 2009), Water Conservation Target

Measure Name	Exceed SB X7-7 (Water Conservation Act of 2009), Water Conservation Target
Description of Measure	The City would adopt a water conservation target that exceeds the SB X7-7*, (Water Conservation Act of 2009), target and identify and implement additional water efficiency and conservation measures to meet that target by 2020.

Category	Water
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary & Mandatory
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Adopt a water conservation ordinance to exceed SB X7-7 by a specified percentage.	No	Required
Enhance retrofit programs for existing residences and commercial buildings.	No	Required
Adopt CALGreen Tier 1 or Tier 2 standards for water efficiency and conservation in new development.	No	Yes
Expand the use of grey water or recycled water infrastructure.	No	Yes

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	41

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	Varies	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	Varies	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	
Improve Public Health	No	
Improve Air Quality	No	
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	Yes	
Reduce Energy Consumption	Yes	
Adaptation	Yes	

Case Studies

San Diego - Climate Mitigation and Adaptation Plan	http://www.sandiego.gov/environmental-services/sustainable/eestf.shtml

Implementation

Responsible Department/Agency	
Actual Measure or Commitment	Percent water savings above SBx7-7
Implementation Mechanism	Codes and Standards
Implementation Timing	Mid-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Calculations:

Percent water savings	10%	Percent
Staff time needed for this measure	0.08	Full Time Employee (FTE)

Calculations:

Resource Savings Calculations	Total Water Savings (gallons) = (Projected Water Consumption x Percentage Residential) x Savings Total Electricity Savings (kWh) = Gallons saved x 0.0013 kWh/gallon		
	Where:		
	Projected water consumption (2020 w/ SBx7 7) =	2,263,890,965	Gallons
	Savings =	10%	Expected water use savings target per capita (recommend 10%)
	0.0013	= kWh saved per gallon of water reduced (California Energy Commission, December 2006)	
Resource Savings	Total Water Savings =	226,389,097	gallons/year
	Total Electricity Savings =	305,399	kWh/year
GHG Emission Reduction Calculations	Total Emissions Savings (MT) from Electricity Reductions = Electricity Savings (kWh)/1000 x 0.13		
	Where:		
	0.133	= Projected PG&E emissions factor in metric Ton per MWh (LGOP)	
	1,000	= Conversion factor from kWh to MWh (electricity equation)	
GHG Emission Reduction	Total GHG Emissions Savings =	41	MT CO2e
Municipal Costs and Savings Calculations	Staff time needed to write, implement, and enforce water policy. No capital costs expected.		
	FTE =	0.1	Estimated staff time per year
	$/FTE =	$100,000	FTE cost per year
Municipal Costs and Savings	Municipal Cost =	$8,000	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Residential cost savings = [Electricity Savings x $/kWh]		
	$/kwh =	$0.19	California Energy Commission, California Energy Demand 2010-2020, Adopted Forecast
	Aggregated community savings=	$58,026	Dollars
Community Cost and Savings	Community Cost =	Varies	Dollars (Costs will vary based on implementation programs and mechanisms.)
	Community Savings =	Varies	Dollars (Per unit savings varies since the number of participating households and businesses is currently unknown.)

Notes

Senate Bill X7-7* (Water Conservation Act of 2009) was enacted in November 2009, requiring all water suppliers to increase water use efficiency. The legislation sets an overall goal of reducing per capita urban water use by 20% by December 31, 2020.

2020 energy rates are calculated based on information provided in the CEC's Report, California Energy Demand 2010-2020, Adopted Forecast. See Table 7, and also Form 2.3-California Energy Demand 2009 Natural Gas Rates, and Form 2.3: Electricity Prices (2007 cents/kwh) - PG&E.

References

1. California Energy Commission (CEC) Refining Estimates of Water-Related Energy Use in California (December 2006)
2. Paso Robles 2010 Urban Water Management Plan. June 2011. http://www.water.ca.gov/urbanwatermanagement/2010uwmps/Paso%20Robles.%20City%20of/2010%20UWMP%20ADOPTED%20FINAL%20June%2020
3. California Energy Commission (CEC) California Energy Demand 2010-2020, Adopted Forecast.
4. ICLEI Local Government Operations Protocol Version 1.1 (May 2010)
5. California Department of Water Resources - http://www.water.ca.gov/wateruseefficiency/sb7/

Solid Waste Diversion Rate

Measure Name	Solid Waste Diversion Rate
Description of Measure	The City would adopt a specified solid waste diversion rate that exceeds the state-mandated rate of 50% and identify programs to meet the identified rate by 2020.

Category	Solid Waste
Community or Municipal?	Community
Voluntary or Mandatory?	Mandatory
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Adopt a solid waste diversion rate that exceeds the state-mandated rate by a certain percentage.	**No**	Required
Identify programs to meet the identified diversion rate.	**No**	Required
Develop a combined or separate organic waste (yard trimming, food scraps, and food-soiled paper) collection system and encourage residents and businesses to divert these materials from landfills. The City would develop a marketing campaign to educate the community and facilitate composting.	**No**	**Yes**
The City would adopt an ordinance requiring the provision of recycling receptacles at all events requiring a permit or held on City-owned or -	**No**	**Yes**
Require the reuse or recycling of construction and demolition materials from development projects beyond the state-mandated 50% requirement.	**No**	**Yes**
Develop an education and outreach program in support of the measure.	**No**	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	3,012

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	Yes/No	Notes
Reduce Costs	Yes	
Improve Public Health	No	
Improve Air Quality	Yes	
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	
Adaptation	No	

Case Studies

Alameda County 75% Diversion Goal	http://www.acgov.org/sustain/documents/75waste_reduction_resolution.pdf
Oceanside 75% Diversion Goal	http://www.ci.oceanside.ca.us/civica/filebank/blobdload.asp?BlobID=25844

Implementation

Responsible Department/Agency	Public Works
Actual Measure or Commitment	Percent waste diversion beyond State-mandated 50% (2020)
Implementation Mechanism	Policy
Implementation Time Frame	Mid-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Key Assumptions for Example Calculations:

Target additional diversion rate (2020)*	25%	Percent
Estimated staff time needed for this measure	0.04	Full Time Employee (FTE)

*AB 341 establishes a statewide goal of 75% (25% beyond what is currently mandated)

Calculations:

Tons Diverted = Future Year Landfilled Tonnage x Future Year Diversion Rate

1. Future Year Landfilled Tonnage = (1 + CAGR)^15 x Baseline Year

Baseline Year (2005) Landfilled Solid Waste	37,575	Tons
Baseline Year (2005) GHG Emissions from	13,433	MT CO2e

Resource Savings Calculations	Projected (2020) GHG Emissions from	14,745	MT CO2e
	Compound Annual	1.02%	Percent
	Total City Future Year (2020)	41,244	Tons
	Paper Products =	21.0%	Percent
	Food Waste =	14.6%	Percent
	Plant Debris =	6.9%	Percent
	Wood/Textiles =	21.8%	Percent
	All Other Waste =	35.7%	Percent
	Future Year Paper	8,661	Tons
	Future Year Food Waste =	6,022	Tons
	Future Year Plant Debris	2,846	Tons
	Future Year Wood/Textile	8,991	Tons
	Future Year All Other Waste =	14,724	Tons
	Paper Products	2,165	Tons
	Food Waste Diverted =	1,505	Tons
	Plant Debris Diverted =	711	Tons
	Wood/Textiles Diverted =	2,248	Tons
	All Other Waste	3,681	Tons
Resource Savings	Future Year Total Waste Diverted	10,311	Tons
GHG Emission Reduction Calculations	Total MT CO2e Diverted = (2.138)(Paper Products)(0.9072) + (1.120)(Food Waste)(0.9072) + (0.686)(Plant Debris)(0.9072) + (0.605)(Wood/Textiles)(0.9072) + (0.00)(All Other Waste)(0.9072) 1 - Emission Reduction Per Waste Category = Emissions Factor for Category		
	0.9072	= Conversion from short tons to metric tons	
	Emission Factor - Paper	2.138	MT CO2e / MT waste
	Emission Factor - Food Waste =	1.210	MT CO2e / MT waste
	Emissions Factor - Plant	0.686	MT CO2e / MT waste
	Emission Factor -	0.605	MT CO2e / MT waste
	Emission Factor - All	0.000	MT CO2e / MT waste
	Emissions from Paper Products =	4,200	MT CO2e
	Emissions from Food	1,653	MT CO2e
	Emissions from Plant Debris	443	MT CO2e
	Emissions from Wood/Textile	1,234	MT CO2e
	Emissions from All Other Waste	0	MT CO2e

	Emissions captured at landfill =	60%	Percent
GHG Emission Reduction	Total GHG Emissions Reductions =	3,012	MT CO2e
Municipal Costs and Savings Calculations	Cost may include additional staff time.		
	FTE =	0.0	Estimated staff time per year
	$/FTE =	$100,000	FTE cost per year
Municipal Costs and Savings	Municipal Costs=	$4,000	Dollars
	Municipal Savings=	$0	Dollars
Community Costs and Savings	Community Costs =	$0	Dollars
	Community Savings =	$0	Dollars

Notes

All cities are assumed to have a baseline year diversion rate of 50%. This diversion has already been accounted for in the baseline year landfilled solid waste tonnage.

CAGR growth rates were calculated based on population growth.

ICLEI's CACP software incorporates emission factors for the diversion of certain materials from the waste stream, derived from the EPA WARM model.

GHG Emissions Calculations assume a landfill methane recovery rate of 60%.

References

1. DRAFT City of Stockton Climate Action Plan (February 2012) - pg. C-77,C-78

2. Hayward Climate Action Plan (October, 2009) - pg. 170

3. County of San Bernardino Greenhouse Gas Emissions Reduction Plan (September 2011) - pg. 91

4. EPA's Waste Reduction Model (WARM), available at: http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html

5. ICELI's Clean Air Climate Protection (CACP) Software (for members), available at: http://www.icleiusa.org/a

Organic Waste Diversion Program

Measure Name	Organic Waste Diversion Program
Description of Measure	The City would develop a combined or separate organic waste (yard trimming, food scraps, and food-soiled paper) collection system and encourage residents and businesses to divert these materials from landfills. The City would develop a marketing campaign to educate the community and facilitate composting.

Category	Solid Waste
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Develop a program for the expanded collection of organic waste.	**No**	Required
Establish a community-wide organics composting program.	**No**	Required
Develop a marketing campaign to educate the community about the program.	**No**	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	0

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	
Improve Public Health	No	
Improve Air Quality	Yes	
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	No	
Adaptation	No	

Case Studies

San Diego Commercial Food Waste Recycling Program	http://www.sandiego.gov/environmental-services/miramar/greenery/foodwaste/foodwasteparticipants.shtml
Curbside Collection of Residential Food Waste (San Francisco - pg 3, Alameda - pg 5)	http://swana.org/www/Portals/ARF/Curbside_Collection_of_Resid_Food_Waste-SWANA-ARF-FY08.pdf

Implementation

Responsible Department/Agency	Public Works
Actual Measure or Commitment	Percent diversion of organic waste
Implementation Mechanism	Incentives
Implementation Timing	Mid-Term
Outside Funding Available?	Yes

Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

NOTE: This measure should only be quantified if measure 8a is NOT quantified. The quantification of this measure and 8a will result in double-counting of reductions.

Key Assumptions for Example Calculations:

Target organic waste diversion rate (2020)	75%	Percent
Staff time needed for this measure	0.08	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	In general, this measure should be considered supplemental to 7a: Raising Diversion Rates and associated actions. However, to calculate independent of 7a:		
	Tons Organic Waste Diverted = Future Organic Waste Tonnage x Diversion Rate (2020) 1 - Future Organic Waste Tonnage = Paper Products + Plant Debris + Food Debris Paper Products = Total Future Year Landfilled Solid Waste x Percentage Paper Products (21.0%) Food Waste Tonnage = Total Future Year Landfilled Solid Waste x Percentage Food Waste (14.6%) Plant Debris Tonnage = Total Future Year Landfilled Solid Waste x Percentage Plant Debris (6.9%) 2 - Total Future Year Landfilled Solid Waste = (1 + CAGR)^15 x Baseline Year Landfilled Solid Waste		
	Baseline Year (2005) Landfilled Solid Waste (Community-Wide) =	37,575	Tons
	Baseline Year (2005) GHG Emissions from Landfilled Solid Waste =	13,433	MT CO2e
	Compound Annual Growth Rate (CAGR) =	1.02%	Percent
	Total City Future Year (2020) Solid Waste Tonnage =	43,783	Tons
	Paper Products =	21.0%	Percent
	Food Waste =	14.6%	Percent
	Plant Debris =	6.9%	Percent
	Future Year Paper Products =	9,195	Tons
	Future Year Food Waste =	6,392	Tons
	Future Year Plant Debris =	3,021	Tons
	Future Year Total Organic Waste Tonnage =	18,608	Tons
	Paper Products Diverted =	6,896	Tons
	Food Waste Diverted =	4,794	Tons
	Plant Debris Diverted =	2,266	Tons
Resource Savings	Future year total Organic Waste Tonnage Diverted =	13,956	Tons
GHG Emission Reduction Calculations	MT CO2e Diverted = (2.138)(Paper Products)(0.9072) + (1.120)(Food Waste)(0.9072) + (0.686)(Plant Debris)(0.9072) Note: Effectiveness typically ranges between 2-5%. Make sure to apply effectiveness factor.		
	0.9072	= Conversion from short tons to metric tons	
	Emission Factor - Paper Products =	2.138	MT CO2e / MT waste
	Emission Factor - Food Waste =	1.210	MT CO2e / MT waste
	Emissions Factor - Plant Debris =	0.686	MT CO2e / MT waste

	MT CO2e diverted from paper products =	13,375	MT CO2e
	MT CO2e diverted from Food Waste =	5,263	MT CO2e
	MT CO2e diverted from Plant Debris =	1,410	MT CO2e
	Emissions captured at landfill =	60%	Percent
	Total GHG Emissions Reduction at 100% =	8,019	MT CO2e
GHG Emission Reduction	Total GHG Emissions Reduction at 5% Effectiveness =	401	MT CO2e
Municipal Costs and Savings	Cost may include additional staff time.		
	FTE =	0.08	Estimated staff time per year
	$/FTE	$100,000	FTE cost per year
Municipal Costs and Savings	Municipal Costs=	$8,000	Dollars
	Municipal Savings=	$0	Dollars
Community Costs and Savings	Community Costs =	$0	Dollars
	Community Savings =	$0	Dollars

Notes

All cities are assumed to have a baseline year diversion rate of 50%. This diversion has already been accounted for in the baseline year landfilled solid waste tonnage.

ICLEI's CACP software incorporates emission factors for the diversion of certain materials from the waste stream, derived from the EPA WARM model.

Assumed 5% effectiveness.

CAGR growth rates were calculated based on population growth.

GHG Emissions Calculations assume a landfill methane recovery rate of 60%.

References

1. Hayward Climate Action Plan (October, 2009) - pg. 169
2. EPA's Waste Reduction Model (WARM), available at: http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html
3. ICELI's Clean Air Climate Protection (CACP) Software (for members), available at: http://www.icleiusa.org/action-center/tools/cacp-software

Construction and Demolition Debris Diversion Requirements

Measure Name	Construction and Demolition Debris Diversion Requirements
Description of Measure	Require the reuse or recycling of construction and demolition materials from development projects beyond the state-mandated 50% requirement.

Category	Solid Waste
Community or Municipal?	Community
Voluntary or Mandatory?	Mandatory
Selected?	**Yes**

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Adopt an ordinance requiring that a specified percentage of construction and demolition debris from development projects be diverted from landfills.	**No**	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	0

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	No	
Improve Public Health	No	
Improve Air Quality	Yes	
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	No	
Adaptation	No	

Case Studies

Alameda County Waste Management Authority (WMA) Job Site Case Study	http://www.calrecycle.ca.gov/LGCentral/Library/canddmodel/instruction/CaseStudies.htm
Los Angeles Construction and Demolition Debris Diversion	http://www.epa.gov/region9/waste/solid/construction/casestud.html

Implementation

Responsible Department/Agency	Public Works
Actual Measure or Commitment	Percent waste diversion beyond State-mandated 50% (2020)
Implementation Mechanism	Codes and Standards
Implementation Time Frame	Mid-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

NOTE: This measure should only be quantified if measure 8a is NOT quantified. The quantification of this measure and 8a will result in double-counting of reductions.

Key Assumptions for Example Calculations:

Percent waste diversion beyond State-mandated 50% (2020)	15%	Percent
Staff time needed for this measure	0.05	Full Time Equivalent (FTE)

Calculations:

Emissions Reduction Calculations	Tons C&D Waste Diverted = Future Year C&D Landfilled Waste x Diversion Rate (202) 1 - C&D Diversion Emission Reduction = Future Year Landfilled Solid Waste Emissions x Percentage C&D X Percentage Non-Hazardous Recyclable x Diversion Rate		
	Future Year (2020) GHG Emissions from Landfilled Solid Waste=	14,745	MT CO2e
	Percent of Waste Attributed to Construction and Demolition Debris =	29%	Percent
	Future Year C&D Emissions =	4,276	MT CO2e
	Percent of Non-Hazardous and Recyclable Construction and Demolition Debris =	40%	Percent
	Future Year Non-Hazardous Recyclable C&D Emissions =	1,710	MT CO2e
GHG Emission Reduction	Additional C&D Diversion Emission Reduction=	257	MT CO2e
Municipal Costs and Savings Calculations	Cost may include additional staff time.		
	FTE =	0.05	Estimated staff time per year
	$/FTE =	$100,000	FTE cost per year
Municipal Costs and Savings	Municipal Costs=	$5,000	Dollars
	Municipal Savings=	$0	Dollars
Community Costs and Savings	Community Costs =	$0	Dollars
	Community Savings =	$0	Dollars

Notes

According to the California 2008 Statewide Waste Characterization Study, construction and demolition debris makes up 29% of the waste stream and 40% of that is non-hazardous and recyclable.

It is assumed that emissions are directly proportional to mass (this means all types of materials are reduced in the same portions).

CAGR growth rates were calculated based on population growth.
All cities currently meet the 50 percent requirement for C&D. GHG emissions reductions associated with this diversion were accounted for in the gap analysis.
ICLEI's CACP software incorporates emission factors for the diversion of certain materials from the waste stream, derived from the EPA WARM model.

GHG Emissions Calculations assume a landfill methane recovery rate of 60%.

References

1. California 2008 Statewide Waste Characterization Study
2. California Air Pollution Control Officers Association (CAPCOA) Quantifying Greenhouse Gas Mitigation Measures (August 2010) - p. 43; SW-2
3. County of San Bernardino Greenhouse Gas Emissions Reduction Plan (September 2011) - pg. B-56, B-57
4. EPA's Waste Reduction Model (WARM), available at: http://www.epa.gov/climatechange/wycd/waste/calculators/Warm_home.html
5. ICELI's Clean Air Climate Protection (CACP) Software (for members), available at: http://www.icleiusa.org/action-center/tools/cacp-software

Recycling at Public Events

Measure Name	Recycling at Public Events
Description of Measure	The City would adopt an ordinance requiring the provision of recycling receptacles at all events requiring a permit or held on City-owned or -operated property.

Category	Solid Waste
Community or Municipal?	Community
Voluntary or Mandatory?	Mandatory
Selected?	No

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Develop and adopt an event recycling ordinance.	Yes	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	2

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Very Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	Yes	
Improve Public Health	No	
Improve Air Quality	No	
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	Yes	
Adaptation	No	

Case Studies

City of San Francisco Special Events Ordinance	http://www.epa.gov/wastes/conserve/tools/rogo/documents/sf-ca-ord.pdf
City of San Diego Recycling Ordinance	http://www.sandiego.gov/environmental-services/recycling/ro/events/index.shtml http://docs.sandiego.gov/municode/MuniCodeChapter06/Ch06Art06Division07.pdf

Implementation

Responsible Department/Agency	Public Works
Actual Measure or Commitment	Percentage of waste recycled at public events
Implementation Mechanism	Codes and Standards
Implementation Time Frame	Near-Term
Outside Funding Available?	No
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

NOTE: This measure should only be quantified if measure 8a is NOT quantified. The quantification of this measure and 8a will result in double-counting of emission reductions.

Key Assumptions for Example Calculations Below:

Percentage of recycling at events	90%	Percent Effectiveness
Average number of visitors per event	200	Visitors/Event
Average number of events per year	20	Events/Year
Staff time needed for this measure	0.05	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Waste Generation at Public Event = Visitors Per Event x Events per Year x (Pounds of Trash Per Visitor/2000)		
	Average Waste Generated per Visitor =	2.44	Pounds of Waste/Visitor (CA Integrated Waste Management Board, June 2009)
	2000	= Conversion from pounds to tons	
	Total Event Waste =	5	Tons
	Event Paper Products =	38.9%	Percent of Total Event Waste
	Event Food Waste =	18.4%	Percent of Total Event Waste
	Event Plant Debris =	17.9%	Percent of Total Event Waste
	Event Wood/Textiles =	1.8%	Percent of Total Event Waste
	Event All Other Waste =	23.0%	Percent of Total Event Waste
Resource Savings	Event Paper Products =	1.90	Tons
	Event Food Waste =	0.90	Tons
	Event Plant Debris =	0.87	Tons
	Event Wood/ Textiles =	2.95	Tons
	Event All Other Waste =	0.00	Tons
GHG Emission Reduction Calculations	Total MT CO2e Diverted = (2.138)(Event Paper Products)(0.9072) + (1.120)(Event Food Waste)(0.9072) + (0.686)(Event Plant Debris)(0.9072) + (0.605)(Event Wood/Textiles)(0.9072) + (0.00)(Event All Other Waste)(0.9072) 1 - Emission Reduction Per Waste Category = Emissions Factor for Category x Future Year Category Tonnage Diverted x 0.9072		
	0.9072	= Conversion from short tons to metric tons	
	Emission Factor - Paper Products =	2.138	MT CO2e / MT waste
	Emission Factor - Food Waste =	1.210	MT CO2e / MT waste
	Emissions Factor - Plant Debris =	0.686	MT CO2e / MT waste
	Emission Factor - Wood/Textiles =	0.605	MT CO2e / MT waste
	Emission Factor - All Other Waste =	0.000	MT CO2e / MT waste
	Emissions from Event Paper Products =	1.47	Metric Tons CO2e
	Emissions from Event Food Waste =	0.39	Metric Tons CO2e
	Emissions from Event Plant Debris =	0.22	Metric Tons CO2e
	Emissions from Event Wood/Textiles =	0.65	Metric Tons CO2e
	Emissions from Event All Other Waste =	0.00	Metric Tons CO2e
	Emissions captured at landfill =	60%	Percent
GHG Emission Reduction	Total GHG Emissions Reduction Accounting for Effectiveness and Implementation =	2	Metric Tons of CO2
Municipal Costs and Savings Calculations	Cost may include additional staff time.		
	FTE =	0.05	Estimated staff time per year
	$/FTE =	$100,000	FTE cost per year
Municipal Costs and Savings	Municipal Costs=	$5,000	Dollars
	Municipal Savings=	$0	Dollars

Municipal Solid Waste Reduction

Measure Name	Municipal Solid Waste Reduction
Description of Measure	Adopt a specified solid waste diversion rate and identify steps to meet that rate by 2020.

Category	Solid Waste
Community or Municipal?	Municipal
Voluntary or Mandatory?	Mandatory
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Develop and adopt a City purchasing policy that emphasizes recycled and recyclable materials.	No	Yes
Install recycling receptacles at municipal buildings and facilities.	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	47

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	Yes/No	Notes
Reduce Costs	Yes	
Improve Public Health	No	
Improve Air Quality	No	
Improve Water Quality	No	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	No	
Adaptation	No	

Case Studies

City of Fresno - Local Government Policies and Procedures	http://www.fresno.gov/NR/rdonlyres/9112A6F3-33A3-428E-9762-6EBC0E0523B7/0/ZeroWasteStrategicActionPlan.pdf
City of San Francisco Executive Directive 08-02	http://greencitiescalifornia.org/assets/waste/SF_resource-conserv_enhancement.pdf http://charmeck.org/mecklenburg/county/SolidWaste/ManagementPlan/Documents/BestPracticesRecyclingStudy.pdf

Implementation

Responsible Department/Agency	Recreation & Maintenance Services
Actual Measure or Commitment	Percent waste diversion beyond State-mandated 50% (2020); number of new recycling receptacles
Implementation Mechanism	Policy
Implementation Time Frame	Near-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	No

Calculation Methodology and Equations

Key Assumptions for Example Calculations:

Target diversion rate by 2020 (beyond baseline)	25%	Percent
Number of new recycling receptacles	15	Recycling Receptacles
Staff time needed for this measure	0.1	Full Time Equivalent (FTE)

Calculations:

Resource Savings Calculations	Tons Diverted = Landfilled Tonnage x Targeted Diversion Rate		
	Total City Future Year (2020) Solid Waste Tonnage =	647	Tons
	Paper Products =	21.0%	Percent
	Food Waste =	14.6%	Percent
	Plant Debris =	6.9%	Percent
	Wood/Textiles =	21.8%	Percent
	All Other Waste =	35.7%	Percent
	Future Year Paper Products =	136	Tons
	Future Year Food Waste =	94	Tons
	Future Year Plant Debris =	45	Tons
	Future Year Wood/Textiles =	141	Tons
	Future Year All Other Waste =	231	Tons
	Paper Products Diverted =	34.0	Tons
	Food Waste Diverted =	23.6	Tons
	Plant Debris Diverted =	11.2	Tons

Tree Planting Program

Measure Name	Tree Planting Program
Description of Measure	Develop a program to facilitate tree planting within the community, working with local non-profit organizations and community partners. Develop and adopt tree planting guidelines that address tree and site selection.

Category	Trees and Open Space
Community or Municipal?	Community
Voluntary or Mandatory?	Voluntary
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Develop a tree planting assistance program.	No	Required
Develop and adopt tree planting guidelines that address tree and site selection. Emphasis should be placed on native, drought-tolerant trees.	No	Required
Require through conditions of approval that new development projects require planting of additional trees beyond those required as mitigation.	No	Yes
Track the number of trees planted annually.	No	Required

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	18

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	Very Low	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	No	
Improve Public Health	Yes	
Improve Air Quality	Yes	
Improve Water Quality	Yes	
Improve Equity	Yes	Depending on location
Reduce Water Consumption	No	
Reduce Energy Consumption	No	
Increase Property Value	Yes	
Adaptation	Yes	Reduces urban heat island effect

Case Studies

Riverside Tree Power Program	http://www.ca-ilg.org/SustainabilityManyFaces
Santa Monica Urban Forest	http://www.smgov.net/Portals/UrbanForest/contentWithSidebar.aspx?id=14796

Implementation

Responsible Department/Agency	Community Development; Public Works
Actual Measure or Commitment	Number of trees planted (net new trees)
Implementation Mechanism	Capital Improvement
Implementation Timing	Near-Term
Outside Funding Available?	Yes

Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Note: There is no reduction in GHG emissions associated with preservation of existing trees or mitigation of trees removed.

Key Assumptions for Calculations:

Target number of trees planted (net new trees)	1,500	Trees
City subsidy of tree cost and planting	10%	Percent Subsidized by City
Cost per tree	$79	Dollars per Tree
Staff time needed for this measure	0.04	Full Time Equivalent (FTE)

Calculations:

GHG Emission Reduction Calculations	GHG Emissions Reduction=Number of Trees Planted x Carbon Sequestration Rate		
	0.0121	= Average carbon sequestration rate (MT CO_2/Tree)	
	1,500	= Number of Trees Planted	
GHG Emission Reduction	Total GHG Emissions Reduced =	18	MT CO2e
Municipal Costs and Savings Calculations	Cost per tree =	$79	Dollars/tree (McPherson, et al)
	City subsidy of tree cost and planting =	10%	Percent subsidized
	City cost per tree =	$8	Dollars per tree
	Total capital cost=	$11,850	Dollars
	FTE =	0.04	Estimated staff time to develop program
	$/FTE	$100,000	FTE cost per year
	Cost of staff time =	$4,000	Dollars
Municipal Costs and Savings	Municipal Cost =	$15,850	Dollars
	Municipal Savings =	$0	Dollars
Community Costs and Savings Calculations	Capital cost = (cost per tree x number of trees planted x percentage of city subsidy)		
	Where:		
	Community cost per tree =	$71	Dollars/tree
	Number of trees planted =	1,500	Trees
	Total tree capital cost (for community)=	$106,650	Dollars
	Maintenance cost = maintenance cost per tree x number of trees planted. (Assumes community covers all maintenance costs.)		
	Maintenance cost=	$34	Dollars/tree (McPherson, et al)
	Total maintenance cost (for community) =	$51,000	Dollars
Community Costs and Savings	Community Cost =	$105	Dollars per tree
	Community Savings =	$0	Dollars per tree

Notes

Carbon sequestration rate from CAPCOA Quantifying GHG Mitigation Measures Report p. 403. There is no reduction in GHG emissions associated with preservation of existing trees or mitigation of trees removed. Account for net new trees only.

References

1. California Air Pollution Control Officers Association (CAPCOA) Quantifying Greenhouse Gas Mitigation Measures (August 2010) - pg. 403

2. McPherson, et al as cited in Stockton Draft CAP - http://www.stocktongov.com/government/boardcom/clim.html

Municipal Tree Planting Program

Measure Name	Municipal Tree Planting Program
Description of Measure	Establish a tree planting program to increase the number of native, drought-tolerant trees on City-owned property, parks and streetscapes.

Category	Trees and Open Space
Community or Municipal?	Municipal
Voluntary or Mandatory?	Mandatory
Selected?	Yes

Menu of Actions	**Existing and/or Completed Action?**	**Selected?**
	Yes or No	**Yes or No**
Develop and adopt a formal tree planting policy and program.	No	Required
Identify and secure grant funding for tree planting.	No	Yes

Estimated GHG Reduction Potential

GHG Reduction Potential from Calculations Below (Metric Tons CO_2e)	6

Estimated Costs & Savings

	Select				
1. Aggregated Municipal Cost	Low	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
2. Annual Municipal Savings	None	$1-$10,000	$10,001-$50,000	$50,001-$100,000	$100,001+
		Very Low	Low	Medium	High
3. One Time Community Cost (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High
4. Annual Community Savings (per household or business)	None	$1-$500	$501-$1,000	$1,001-$5,000	$5,001+
		Very Low	Low	Medium	High

Co-Benefits

Co-Benefits	**Yes/No**	**Notes**
Reduce Costs	No	
Improve Public Health	Yes	
Improve Air Quality	Yes	
Improve Water Quality	Yes	
Improve Equity	No	
Reduce Water Consumption	No	
Reduce Energy Consumption	No	
Adaptation	Yes	Reduces urban heat island effect.

Case Studies

Municipal Forest Benefits and Costs in 5 U.S. Cities (Berkeley, CA)	http://www.fs.fed.us/psw/programs/uesd/uep/products/2/cufr_646_Muncpl%20For%20Bnfts%20Costs%20Five%20Cty.pdf
ICLEI Urban Forestry Toolkit for Local Governments (Sacramento, pg. 53-57)	http://www.milliontreesnyc.org/downloads/pdf/talking_trees_urban_forestry_toolkit.pdf

Implementation

Responsible Department/Agency	Public Works, Parks and Recreation
Actual Measure or Commitment	Number of net new trees planted on City-owned property
Implementation Mechanism	City Program
Implementation Timing	Mid-Term
Outside Funding Available?	Yes
Synergies with Existing Initiatives/Partnerships	Yes

Calculation Methodology and Equations

Note: There is no reduction in GHG emissions associated with preservation of existing trees or mitigation of trees removed. Cannot double count with measure 9a.

Key Assumptions for Calculations:

Target number of trees planted on City-owned property	500	Trees
Capital cost per tree ($0 if to be paid for through grant funding)	$79	Dollars per Tree
Staff time needed for this measure	0.04	Full Time Equivalent (FTE)

Calculations:

GHG Emission Reduction Calculations	GHG Emissions Reductions = Number of Trees Planted x Carbon Sequestration Rate		
	0.0121	= Average carbon sequestration (MT CO_2/Tree)	
	500	= Number of Trees Planted	
GHG Emission Reduction	Annual GHG emissions reduced =	6	MT CO2e
Municipal Costs and Savings Calculations	Capital cost = (cost per tree x number of trees planted)		
	Where:		
	Cost per tree=	$79	Dollars/tree (McPherson, et al)
	Number of trees planted=	500	Trees/year
	Capital cost to City=	$39,500	Dollars
	Maintenance cost = maintenance cost per tree x number of trees planted		
	Where:		
	Maintenance cost=	$34	Dollars/tree (McPherson, et al)
	Maintenance costs =	$17,000	Dollars
	Staff time needed to develop policy/ordinance and apply for funding.		
	FTE =	0.04	Estimated staff time per year
	$/FTE =	$100,000	FTE cost per year
	Staff time cost =	$4,000	Dollars
Municipal Costs and Savings	Municipal Cost =	$60,500	Dollars
	Municipal Savings =	$0	Dollars

Notes

Carbon sequestration rate from CAPCOA Quantifying GHG Mitigation Measures Report. There is no reduction in GHG emissions associated with preservation of existing trees or mitigation of trees removed. Account for net new trees only.

References

1. California Air Pollution Control Officers Association (CAPCOA) Quantifying Greenhouse Gas Mitigation Measures (August 2010) - pg. 403
2. McPherson, et al as cited in Stockton Draft CAP - http://www.stocktongov.com/government/boardcom/clim.html

Draft GHG Toolbox Cost Estimate

GHG Toolbox Programs	Estimated Costs: City Cost Hours Per Year ("In-kind" staff time[1])	Estimated Costs: Community Cost (Hard costs[2])	Estimated Potential GHG Reduction for Combined Measures Selected
Total Estimated Cost for All Programs Selected	**(2,320 total hours) 335 per year[3]**	**Varies**	**20,509 MT CO2e**
Energy	140	See individual measures below	6,434
Transportation and Land Use	97		8,469
Off-Road Equipment / Vehicles	2		2,482
Water	23		41
Solid Waste	49		3,059
Trees and Open Space	24		24

[1]All City costs would be incurred as "in-kind" staff time. No direct use of GF funds would be required. No hiring of additional staff is proposed. Shift in workloads may need to occur with programs.
[2]Community costs are only applied if property owners/business elect to pursue programs voluntarily.
[3]Hours are spread over the 7 year planning period

Categories and Brief Program Descriptions	City Cost Hours Per Year (In-kind staff time - beyond doing business-as-usual)	Community Cost (Hard Costs Exceeding Business-as-Usual)	Estimated Potential GHG Reduction	Comments (Note: All measures and assumptions are to be implemented over a 7-year period.)
Energy				
1. Energy Efficiency Outreach and Incentive Programs - Expand participation in and the promotion of existing programs, such as Energy Upgrade California and SLO Co. Energy Watch, to increase community awareness fo existing energy efficiency rebates and financeial incentives, and no-and low-cost actions community members can take to increase energy efficiency.	40	0	426	No direct cost to community
2. **Energy Audit and Retrofit Program** - Collaborate with San Luis Obispo County Energy Watch, local utility providers, local businesses and organizations to develop and promote a residential and commercial educational energy audit program with direct installation options, leveraging existing rebates.	100	Cost of professional audit can range from $0-$100; cost of retrofit to be determined through individual improvements selected	1,475	Assumptions: Anticipate 700 homes and 600 businesses would participate in audit program; 40% would result in retrofits.
3. **Income Qualified Energy Efficient Weatherization Programs** - Facilitate energy efficient weatherization of low- and middle-income housing through promotion of existing programs, such as Community Action Partnership (CAPSLO).	80	0	130	Assumptions: 100 income-qualified homes upgraded

Categories and Brief Program Descriptions	City Cost Hours Per Year (In-kind staff time - beyond doing business-as-usual)	Community Cost (Hard Costs Exceeding Business-as-Usual)	Estimated Potential GHG Reduction	Comments (Note: All measures and assumptions are to be implemented over a 7-year period.)
4. **Energy Conservation Ordinance** (**Not Selected**) **-** Require through a new City ordinance that cost-effective energy efficiency upgrades in existing buildings be implemented at point of sale or during major renovation of residential units. A maximum cost ceiling would be established to protect owners from excessive fees.	280 (not selected)	To be determined through individual improvements selected	1,359	Not selected
5. **Incentives for Exceeding Title 24 Building Energy Efficiency Standards** - Provide incentives (e.g., priority permitting, deferred permit fees, etc.) for new development and/or major remodels that voluntarily exceed State energy efficiency standards by an identified percentage.	80	Residential unit $1,406; Commercial building $5,625	114	Assumptions: Anticipate 50 new dwelling units and 75 non-residential buildings would participate in program.
6. **Energy Efficient Public Realm Lighting Rquirements** - Require through a new City ordinance that new development utilize high efficiency lights in parking lots, streets, and other public areas.	80	$202 per light	34	Assumptions: Anticipate 100 LED streetlights and 400 other LED outdoor lights installed by 2020
7. **Small Solar Photovoltaic (PV) Incentive Program** - Facilitate the voluntary installation of small solar PV systems and solar hot water heaters in the community through expanded promotion of existing financial incentives, rebates, and financing programs, and by helping the average resident and business overcome common regulatory barriers and upfront capital costs.	160	Home $2,475 Business $148,408	2,732	Assumptions: 350 residential and 180 commercial PV systems; 167 residential solar hot water systems installed
8. **Income Qualified Solar PV Program** - Facilitate the installation of solar PV systems on and solar hot water heaters in income-qualified housing units by promoting existing programs offered through the California Solar Initiative and New Solar Homes Partnership and by collaborating with organizations, such as Grid Alternatives, on outreach and eligibility.	40	0	183	Assumptions: 120 homes installed with PV solar and 25 solar hot water heaters
9. **Community Choice Aggregation** (**Not Selected**) **-** Assembly Bill 117 (2002) enables California cities and counties, either individually or collectively, to supply electricity to customers within their jurisdiction by establishing a community choice aggregation (CCA) program. Unlike a municipal utility, a CCA does not own transmission and delivery systems, but is responsible for providing electricity to residents and businesses. The CCA may own electric generating facilities, but more often, it purchases electricity from private electricity generators. The City would either individually or through a regional partnership develop a CCA program and ensure that the energy generation portfolio of the electricity supplied has a higher percentage of clean energy than that mandated by the State Renewable Portfolio Standard (RPS).	3,140 (not selected)	0	2,710	**Not selected**
10. **Municipal Energy Efficiency Retrofits and Upgrades** - Establish a target to reduce municipal energy use by a certain percent by 2020 and implement cost-effective improvements and upgrades to achieve that target.	160	0	746	Assumptions: 50% energy savings

Categories and Brief Program Descriptions	City Cost Hours Per Year (In-kind staff time - beyond doing business-as-usual)	Community Cost (Hard Costs Exceeding Business-as-Usual)	Estimated Potential GHG Reduction	Comments (Note: All measures and assumptions are to be implemented over a 7-year period.)
11. **Municipal Energy Efficient Puble Realm Lighting** - The City would continue to replace city-owned or -operated street, traffic signal, park, and parking lot lights with higher efficiency lamp technologies.	40	0	14	Assumptions: 50 LED street lights, 10 traffic signals, 35 airport, 50 other outdoor lights installed
12. **Energy Efficiency Requirements for New Municipal Buildings** - Adopt a policy to exceed minimum Title 24 Building Energy Efficiency Standards by a certain percentage for the construction or renovation of new City buildings and facilities.	0	0	17	Assumptions: 50k new s.f. muni bldgs., 20% energy savings above State standard
13. **Renewable Energy Systems on City Property** - The City would pursue municipally-owned renewable energy generation facilities.	160	0	563	Assumptions: 100 KW of muni PV solar installations, 4 solar hot water heaters
Transportation and Land Use				
14. **Bicycle Network** - Continue to improve and expand the City's bicycle network and infrastructure.	70	0	771	Assumptions: 20 miles of new bike lanes by 2020. To be grant funded & DIFs.
15. **Pedestrian Network** - Continue to improve and expand the City's pedestrian network.	70	0	544	Assumptions: 20 miles new sidewalk added by 2020. To be grant funded & DIFs
16. **Expand Transit Network** - Work with the Regional Transit Authority (RTA) and transit service providers to expand the local transit network (i.e., additional routes or stops, and/or expanded hours of operation) based on the greatest demand for service.	20	0	192	Assumptions: 30% increase in transit service
17. **Increase Transit Service Frequency/Speed** - Work with the Regional Transit Authority (RTA) and transit services providers to increase transit service frequency (i.e. reducing headways) by identifying routes where increased bus frequency would improve service.	20	0	35	Assumptions: 10% reduction in headways (increase in frequency)
18. **Employer-Based Transportation Demand Management (TDM) (Not Selected) -** Require through a new City ordinance that employers with 25 or more employees develop a TDM program that provides encouragement, incentives, and support for employees to reduce their single occupancy vehicle trips. Some examples of resources and incentives include telecommuting, alternative scheduling (e.g., 9/80 or 4/40 work schedules), rideshare matching, and walking, cycling and transit incentives.	100 (not selected)	0	1,585	Assumptions: Participation of 40% businesses with 25 employees or more. Options include employer participation voluntary incentives and encouragement programs only, and/or may include financial incentives. The specific structure of program could be selected by individual employers.
19. **Transportation Demand Management (TDM) Program Voluntary** - Work with San Luis Obispo Regional Ride Share and Ride-On to conduct additional outreach and marketing of existing TDM programs and incentives to discourage single-occupancy vehicle trips and encourage alternative modes of transportation, such as carpooling, taking transit, walking, and biking.	40	0	764	Assumptions: 60% of employees eligible to participate results in a 5.4% reduction in commute vehicle miles traveled

Categories and Brief Program Descriptions	City Cost Hours Per Year (In-kind staff time - beyond doing business-as-usual)	Community Cost (Hard Costs Exceeding Business-as-Usual)	Estimated Potential GHG Reduction	Comments (Note: All measures and assumptions are to be implemented over a 7-year period.)
20. **Parking Supply Management** - Amend the Municipal Code to reduce parking requirements in areas such as the downtown where a variety of uses and services are planned in close proximity to each other and transit	80	0	641	Under development per Storm Water Mgmt requirements
21. **Public Parking Pricing** (**Not Selected**) **-** Establish market-based pricing for public parking spaces, where appropriate.	120 (not selected)		343	Not selected $2,190 per new unbundled "paid" parking space, Pay to Park System in downtown 50 spaces $1 million, meter user fees
22. **Electric Vehicle Network and Alternative Fueling Stations** - Facilitate the expanded use of alternative fuel vehicles and fueling infrastructure by streamlining permitting processes and promoting existing financial incentives.	40	EV station user fee	2,271	Assumptions: 5% increase in EVs. Charging station user fee; Installation of EV station $8000, grant and/or pubic-private partnership
23. **Incentives for Infill and Transit Oriented Development** - The City would identify and implement additional incentives to encourage mixed-use, higher density, and infill development near transit routes, in existing community centers/downtowns, and in other designated areas. Incentives may include, but are not limited to, priority permitting, lower permit fees, density bonuses, or reduced parking requirements.	80	0	2,674	Assumptions: 500 new res located w/in .25 miles of transit by 2020. Specific incentives to be determined.
24. **Service Nodes** - Work with private developers to encourage the development of convenient commercial and shopping opportunities near existing employment and/or residential areas, through incentives or the removal of existing regulatory barriers, as a means of shortening the distance between origins and destinations, and increasing the potential for walking or biking to obtain services.	100	0	462	Continue with new development of Specific Plans.
25. **Transportation Demand Management (TDM) Program for Municipal Employees** - The City would implement a Transportation Demand Management (TDM) program for its own employees. Reduced single-occupant vehicle commuting would reduce GHG emissions.	80	0	49	Assumptions: 20% city employees participation. Specific incentives to be determined.
26. **Zero and Low Emission Municipal Fleet Vehicles** - Continue to replace official City vehicles and equipment with low-emission and zero-emission vehicles, including smaller, hybrid, electric, compressed natural gas, biodiesel, and neighborhood electric vehicles.	80	0	66	Assumptions: There are 40 vehicles in the existing Muni fleet; 20 to be replaced. Continue with implementation of vehicle replacement program as scheduled.
Off-Road Equipment / Vehicles				
27. **Construction Equipment Techniques** - Reduce GHG emissions from construction equipment by requiring various actions as appropriate to the construction project.	10	Varies	1,956	Assumptions: 20% replacement of construction equipment with electric powered equipment and 25% replacement with other alternative fuel, such as CNG. Cost undetermined, varies based on vehicle/equipment replacement of private sector. Limit idling to 3 minutes.

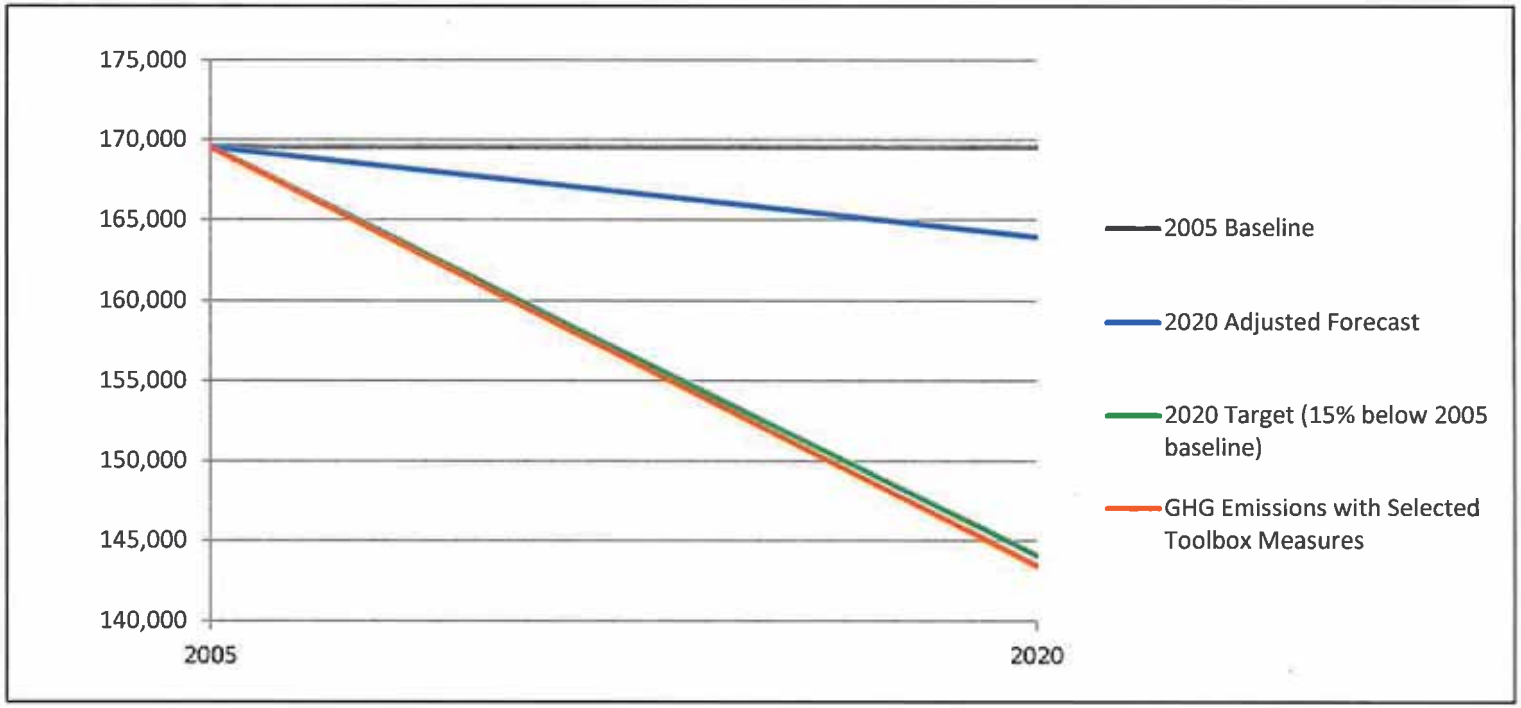
Categories and Brief Program Descriptions	City Cost Hours Per Year (In-kind staff time - beyond doing business-as-usual)	Community Cost (Hard Costs Exceeding Business-as-Usual)	Estimated Potential GHG Reduction	Comments (Note: All measures and assumptions are to be implemented over a 7-year period.)
28. **Equipment Upgrades, Retrofits, and Replacements** - Expand the promotion of existing incentive programs that fund off-road equipment and vehicle upgrades, retrofits, and replacement, such as the Carl Moyer heavy-duty vehicle and equipment program.	40	0	526	Assumptions: 15% of off-road equip replaced with electric, 10% replaced with alt fuel. Funded through existing incentive programs.
Water				
29. **Exceed SB X7-7 (Water Conservation Act of 2009), Water Conservation Target** - The City would adopt a water conservation target that exceeds the SB X7-7*, (Water Conservation Act of 2009), target and identify and implement additional water efficiency and conservation measures to meet that target by 2020.	160	Varies based on conservation measures applied	41	Assumptions: 10% water savings above State requirements
Solid Waste				
30. **Solid Waste Diversion Rate** - The City would adopt a specified solid waste diversion rate that exceeds the state-mandated rate of 50% and identify programs to meet the identified rate by 2020.	40	0	3,012	Assumptions: 25% additional diversion (consistent with State's target per AB 341)
31. **Organic Waste Diversion Program** - The City would develop a combined or separate organic waste (yard trimming, food scraps, and food-soiled paper) collection system and encourage residents and businesses to divert these materials from landfills. The City would develop a marketing campaign to educate the community and facilitate composting.	160	0	Included in GHG reduction for previous measure (Solid Waste Diversion Rate) 401	Assumptions: 75% organic waste diversion
32. **Construction and Demolition Debris Diversion Requirements** - Require the reuse or recycling of construction and demolition materials from development projects beyond the state-mandated 50% requirement.	120	0	Included in GHG reduction for previous measure (Solid Waste Diversion Rate) 257	Assumptions: 15% waste diversion above State mandate
33. **Recycling at Public Events (Not Selected) -** The City would adopt an ordinance requiring the provision of recycling receptacles at all events requiring a permit or held on City-owned or -operated property.	40 (not selected)	0	2	Assumptions: 90% recycling at events, 20 events per year, 200 visitors for year. The City already provides recycling recepacles at events, but does not require it of all events permitted on city proprty. Minimal GHG reduction for cost.
34. **Municipal Solid Waste Reduction** - Adopt a specified solid waste diversion rate and identify steps to meet that rate by 2020.	40	0	47	Assumptions: 25% additional muni diversion rate

Categories and Brief Program Descriptions	City Cost Hours Per Year (In-kind staff time - beyond doing business-as-usual)	Community Cost (Hard Costs Exceeding Business-as-Usual)	Estimated Potential GHG Reduction	Comments (Note: All measures and assumptions are to be implemented over a 7-year period.)
Trees and Open Space				
35. **Tree Planting Program** - Develop a program to facilitate voluntary tree planting within the community, working with local non-profit organizations and community partners. Develop and adopt tree planting guidelines that address tree and site selection.	80	$79 per tree	18	Assumptions: 1,500 trees planted, city may subsidy 10% per tree for non=profits (approx. $8/tree)
36. **Municipal Tree Planting Program** - Establish a tree planting program to increase the number of native, drought-tolerant trees on City-owned property, parks and streetscapes.	80	0	6	Assumptions: 500 trees planted on city property

SUMMARY OF GHG TARGET AND MEASURE REDUCTIONS

	MT CO2e
2005 Baseline	169,557
2020 Adjusted Forecast	163,975
2020 Target (15% below 2005 baseline)	144,123
Targeted Reduction from CAP Measures	**19,852**

Total Reduction from Selected Toolbox Measures	**20,508**



Rincon Consultants, Inc.
Environmental Scientists Planners Engineers

MEMORANDUM

Date: March 1, 2013
To: Susan DeCarli
Organization: City of Paso Robles
From: Shauna Callery, Richard Daulton
Re: Inventory Baseline Year

INVENTORY BASELINE YEAR

The City of Paso Robles Greenhouse Gas (GHG) Emissions Inventory was prepared to help the City develop a GHG reduction strategy, or Climate Action Plan (CAP), consistent with the goals of Assembly Bill (AB) 32. The first step in preparing a GHG emissions inventory is to select a baseline year for the focus of the analysis. This memorandum provides a description regarding the establishment of 2005 as the baseline year for the City of Paso Robles' GHG Emissions Inventory.

According to standard industry protocols for GHG emissions inventorying, the baseline year for a GHG emissions analysis is intended to provide a "performance datum" against which a community can compare current and future emissions, tracking progress. As stated in the California Air Resources Board's (CARB) *Local Government Operations Protocol* (2010), it is best practice to compile an emissions inventory "for the earliest year for which complete and accurate data can be gathered." The baseline year for AB 32 is calendar year 1990. However, required data from 1990 is often prohibitively difficult or impossible to collect (Local Government Operations Protocol 2010). Given that the priority for a CAP should be on practical and accurate results, the Local Government Operations Protocol states that it is more important that the baseline year be documented with enough detail to provide a good basis for local action planning than it is that all local governments produce an inventory with the same, stipulated base year (i.e., 1990).

Recognizing that a 1990 baseline inventory may be difficult or impossible for many local governments, CARB encourages local governments to adopt emissions reduction goals that parallel the State commitment to reduce greenhouse gas emissions by approximately 15 percent from current (2005) levels or 30 percent from business-as-usual emission levels projected for 2020 (AB 32 Scoping Plan, p. ES-1 and 27). For the State, 15 percent below 2005 levels or 30 percent below projected 2020 levels is approximately equivalent to 1990 levels (AB 32 Scoping Plan *Id.* at p. ES-1). [1]

Many California local governments have chosen to use 2005 as the baseline year (which has increasingly become the standard for inventories in the state) in order to align their inventories with the GHG reduction targets of AB 32 and due to the availability of electronic records. Additionally, it is often preferable to establish a base year several years in the past so as to be able to account for the emissions benefits of recent actions (Local Government Operations Protocol 2010).

[1] CARB prepared a 1990 and 2020 GHG inventory and identified that the State will need to reduce GHG emissions by approximately 30 percent from business-as-usual by 2020 to achieve the 2020 target of AB 32, which correlates to approximately a 15 percent reduction from existing conditions (based on the 2002–2004 emissions inventory) at the time the AB 32 Scoping Plan was adopted in 2008.

The year 2005 was similarly selected as the baseline year for the City of Paso Robles GHG Emissions Inventory because it aligns with AB 32 and was the earliest year for which complete and accurate data was available. While the City experienced economic slowing from 2005 to 2010, use of a 2005 baseline does not penalize the City. The reason for this is that the amount of GHG reductions required to meet the target depends on the anticipated level of growth (i.e., the projected emissions) in the year 2020. The City's GHG emissions projections account for the economic slowing that has occurred in recent years and is based on recent market conditions and patterns of growth analyzed and reported in the San Luis Obispo Council of Government's (SLOCOG) 2040 Population, Housing & Employment Forecast, which was adopted in August 2011.

Furthermore, if a later baseline year, such as 2010, were used for the City's GHG Emissions Inventory, the City may need to establish a greater reduction target for 2020 in order to align with the targeted GHG emissions reduction trajectory set forth in the AB 32 Scoping Plan.[2]

[2] According to the AB 32 Scoping Plan and mentioned in the footnote on page 1 of this memorandum, 1990 emissions levels are roughly equivalent to a 15 percent reduction from 2005 levels, and a 30% reduction from 2020 levels (equivalent to an increase of 1% per year between 1990 and 2020). Following this reduction target trajectory, a city that establishes a 2010 baseline should adopt a reduction target of 20% below 2010 levels by 2020.

Climate Change, the California Environmental Quality Act, and General Plan Updates: Straightforward Answers to Some Frequently Asked Questions
California Attorney General's Office

At any given time in this State, well over one hundred California cities and counties are updating their general plans. These are complex, comprehensive, long-term planning documents that can be years in the making. Their preparation requires local governments to balance diverse and sometimes competing interests and, at the same time, comply with the Planning and Zoning Law and the California Environmental Quality Act (CEQA).

Local governments have decades of experience in applying state planning law and excellent resources to assist them – such as the "General Plan Guidelines" issued by The Governor's Office of Planning and Research (OPR).[1] They are also practiced in assessing whether general plans may have significant localized environmental effects, such as degradation of air quality, reductions in the water supply, or growth inducing impacts. The impact of climate change, however, has only fairly recently shown up on the CEQA radar.

The fact that climate change presents a new challenge under CEQA has not stopped local governments from taking action. A substantial number of cities and counties already are addressing climate change in their general plan updates and accompanying CEQA documents. These agencies understand the substantial environmental and administrative benefits of a programmatic approach to climate change. Addressing the problem at the programmatic level allows local governments to consider the "big picture" and – provided it's done right – allows for the streamlined review of individual projects.[2]

Guidance addressing CEQA, climate change, and general planning is emerging, for example, in the pending CEQA Guideline amendments,[3] comments and settlements by the Attorney General, and in the public discourse, for example, the 2008 series on CEQA and Global Warming organized by the Local Government Commission and sponsored by the Attorney General. In addition, the Attorney General's staff has met informally with officials and planners from numerous jurisdictions to discuss CEQA requirements and to learn from those who are leading the fight against global warming at the local level.

Still, local governments and their planners have questions. In this document, we attempt to answer some of the most frequently asked of those questions. We hope this document will be useful, and we encourage cities and counties to contact us with any additional questions, concerns, or comments.

- **Can a lead agency find that a general plan update's climate change-related impacts are too speculative, and therefore avoid determining whether the project's impacts are significant?**

  No. There is nothing speculative about climate change. It's well understood that (1) greenhouse gas (GHG) emissions increase atmospheric concentrations of GHGs; (2) increased GHG concentrations in the atmosphere exacerbate global warming; (3) a project that adds to the atmospheric load of GHGs adds to the problem.

  Making the significance determination plays a critical role in the CEQA process.[4] Where a project may have a significant effect on the environment, the lead agency must prepare an Environmental Impact Report (EIR).[5] Moreover, a finding of significance triggers the obligation to consider alternatives and to impose feasible mitigation.[6] For any project under CEQA, including a general plan update, a lead agency therefore has a fundamental obligation to determine whether the environmental effects of the project, including the project's contribution to global warming, are significant.

- **In determining the significance of a general plan's climate change-related effects, must a lead agency estimate GHG emissions?**

  Yes. As OPR's Technical Advisory states:

  > Lead agencies should make a good-faith effort, based on available information, to calculate, model, or estimate the amount of CO2 and other GHG emissions from a project, including the emissions associated with vehicular traffic, energy consumption, water usage and construction activities.[7]

  In the context of a general plan update, relevant emissions include those from government operations, as well as from the local community as a whole. Emissions sources include, for example, transportation, industrial facilities and equipment, residential and commercial development, agriculture, and land conversion.

  There are a number of resources available to assist local agencies in estimating their current and projected GHG emissions. For example, the California Air Resources Board (ARB) recently issued protocols for estimating emissions from local government operations, and the agency's protocol for estimating community-wide emissions is forthcoming.[8] OPR's Technical Advisory contains a list of modeling tools to estimate GHG emissions. Other sources of helpful information include the white paper issued by the California Air Pollution Control Officers Association (CAPCOA), "CEQA and Climate Change"[9] and OPR's Technical Advisory,[10] both of which provide information on currently available models for calculating emissions. In addition, many cities and counties are working with the International Council for Local Environmental Initiatives

(ICLEI)[11] and tapping into the expertise of this State's many colleges and universities.[12]

- **For climate change, what are the relevant "existing environmental conditions"?**

  The CEQA Guidelines define a significant effect on the environment as "a substantial adverse change in the physical conditions which exist in the area affected by the proposed project."[13]

  For local or regional air pollutants, existing physical conditions are often described in terms of air quality (how much pollutant is in the ambient air averaged over a given period of time), which is fairly directly tied to current emission levels in the relevant "area affected." The "area affected," in turn, often is defined by natural features that hold or trap the pollutant until it escapes or breaks down. So, for example, for particulate matter, a lead agency may describe existing physical conditions by discussing annual average PM10 levels, and high PM10 levels averaged over a 24-hour period, detected at various points in the air basin in the preceding years.

  With GHGs, we're dealing with a global pollutant. The "area affected" is both the atmosphere and every place that is affected by climate change, including not just the area immediately around the project, but the region and the State (and indeed the planet). The existing "physical conditions" that we care about are the current atmospheric concentrations of GHGs and the existing climate that reflects those concentrations.

  Unlike more localized, ambient air pollutants which dissipate or break down over a relatively short period of time (hours, days or weeks), GHGs accumulate in the atmosphere, persisting for decades and in some cases millennia. The overwhelming scientific consensus is that in order to avoid disruptive and potentially catastrophic climate change, then it's not enough simply to stabilize our annual GHG emissions. The science tells us that we must <u>immediately and substantially reduce</u> these emissions.

- **If a lead agency agrees to comply with AB 32 regulations when they become operative (in 2012), can the agency determine that the GHG-related impacts of its general plan will be less than significant?**

  <u>No.</u> CEQA is not a mechanism merely to ensure compliance with other laws, and, in addition, it does not allow agencies to defer mitigation to a later date. CEQA requires lead agencies to consider the significant environmental effects of their actions and to mitigate them today, if feasible.

  The decisions that we make today do matter. Putting off the problem will only increase the costs of any solution. Moreover, delay may put a solution out of reach at any price. The experts tell us that the later we put off taking real action

to reduce our GHG emissions, the less likely we will be able to stabilize atmospheric concentrations at a level that will avoid dangerous climate change.

- **Since climate change is a global phenomenon, how can a lead agency determine whether the GHG emissions associated with its general plan are significant?**

  The question for the lead agency is whether the GHG emissions from the project – the general plan update – are considerable when viewed in connection with the GHG emissions from past projects, other current projects, and probable future projects.[14] The effects of GHG emissions from past projects and from current projects to date are reflected in current atmospheric concentrations of GHGs and current climate, and the effects of future emissions of GHGs, whether from current projects or existing projects, can be predicted based on models showing future atmospheric GHG concentrations under different emissions scenarios, and different resulting climate effects.

  A single local agency can't, of course, solve the climate problem. But that agency can do its fair share, making sure that the GHG emissions from projects in its jurisdiction and subject to its general plan are on an emissions trajectory that, if adopted on a larger scale, is consistent with avoiding dangerous climate change.

  Governor Schwarzenegger's Executive Order S-3-05, which commits California to reducing its GHG emissions to 1990 levels by 2020 and to eighty percent below 1990 levels by 2050, is grounded in the science that tells us what we must do to achieve our long-term climate stabilization objective. The Global Warming Solutions Act of 2006 (AB 32), which codifies the 2020 target and tasks ARB with developing a plan to achieve this target, is a necessary step toward stabilization.[15] Accordingly, the targets set in AB 32 and Executive Order S-3-05 can inform the CEQA analysis .

  One reasonable option for the lead agency is to create community-wide GHG emissions targets for the years governed by the general plan. The community-wide targets should align with an emissions trajectory that reflects aggressive GHG mitigation in the near term and California's interim (2020) [16] and long-term (2050) GHG emissions limits set forth in AB 32 and the Executive Order.

  To illustrate, we can imagine a hypothetical city that has grown in a manner roughly proportional to the state and is updating its general plan through 2035. The city had emissions of 1,000,000 million metric tons (MMT) in 1990 and 1,150,000 MMT in 2008. The city could set an emission reduction target for 2014 of 1,075,000 MMT, for 2020 of 1,000,000 MMT, and for 2035 of 600,000 MMT, with appropriate emission benchmarks in between. Under these circumstances, the city could in its discretion determine that an alternative that achieves these targets would have less than significant climate change impacts.

- **Is a lead agency required to disclose and analyze the full development allowed under the general plan?**

  Yes. The lead agency must disclose and analyze the full extent of the development allowed by the proposed amended general plan,[17] including associated GHG emissions.

  This doesn't mean that the lead agency shouldn't discuss the range of development that is likely to occur as a practical matter, noting, for example, the probable effect of market forces. But the lead agency can't rely on the fact that full build out may not occur, or that its timing is uncertain, to avoid its obligation to disclose the impacts of the development that the general plan would permit. Any other approach would seriously underestimate the potential impact of the general plan update and is inconsistent with CEQA's purposes.

- **What types of alternatives should the lead agency consider?**

  A city or county should, if feasible, evaluate at least one alternative that would ensure that the community contributes to a lower-carbon future. Such an alternative might include one or more of the following options:

  - higher density development that focuses growth within existing urban areas;
  - policies and programs to facilitate and increase biking, walking, and public transportation and reduce vehicle miles traveled;
  - the creation of "complete neighborhoods" where local services, schools, and parks are within walking distance of residences;
  - incentives for mixed-use development;
  - in rural communities, creation of regional service centers to reduce vehicle miles traveled;
  - energy efficiency and renewable energy financing (see, e.g., AB 811)[18]
  - policies for preservation of agricultural and forested land serving as carbon sinks;
  - requirements and ordinances that mandate energy and water conservation and green building practices; and
  - requirements for carbon and nitrogen-efficient agricultural practices.

  Each local government must use its own good judgment to select the suite of measures that best serves that community.

- **Can a lead agency rely on policies and measures that simply "encourage" GHG efficiency and emissions reductions?**

  No. Mitigation measures must be "fully enforceable."[19] Adequate mitigation does not, for example, merely "encourage" or "support" carpools and transit options, green building practices, and development in urban centers. While a menu of hortatory GHG policies is positive, it does not count as adequate mitigation because there is no certainty that the policies will be implemented.

There are many concrete mitigation measures appropriate for inclusion in a general plan and EIR that can be enforced as conditions of approval or through ordinances. Examples are described in a variety of sources, including the CAPCOA's white paper,[20] OPR's Technical Advisory,[21] and the mitigation list on the Attorney General's website.[22] Lead agencies should also consider consulting with other cities and counties that have recently completed general plan updates or are working on Climate Action Plans.[23]

- **Is a "Climate Action Plan" reasonable mitigation?**

  Yes. To allow for streamlined review of subsequent individual projects, we recommend that the Climate Action Plan include the following elements: an emissions inventory (to assist in developing appropriate emission targets and mitigation measures); emission targets that apply at reasonable intervals through the life of the plan; enforceable GHG control measures; monitoring and reporting (to ensure that targets are met); and mechanisms to allow for the revision of the plan, if necessary, to stay on target.[24]

  If a city or county intends to rely on a Climate Action Plan as a centerpiece of its mitigation strategy, it should prepare the Climate Action Plan at the same time as its general plan update and EIR. This is consistent with CEQA's mandate that a lead agency must conduct environmental review at the earliest stages in the planning process and that it not defer mitigation. In addition, we strongly urge agencies to incorporate any Climate Action Plans into their general plans to ensure that their provisions are applied to every relevant project.

- **Is a lead agency also required to analyze how future climate change may affect development under the general plan?**

  Yes. CEQA requires a lead agency to consider the effects of bringing people and development into an area that may present hazards. The CEQA Guidelines note the very relevant example that "an EIR on a subdivision astride an active fault line should identify as a significant effect the seismic hazard to future occupants of the subdivision."[25]

  Lead agencies should disclose any areas governed by the general plan that may be particularly affected by global warming, e.g.: coastal areas that may be subject to increased erosion, sea level rise, or flooding; areas adjacent to forested lands that may be at increased risk from wildfire; or communities that may suffer public health impacts caused or exacerbated by projected extreme heat events and increased temperatures. General plan policies should reflect these risks and minimize the hazards for current and future development.

Endnotes

[1]For a discussion of requirements under general planning law, see OPR's General Plan Guidelines (2003). OPR is in the process of updating these Guidelines. For more information, visit OPR's website at http://www.opr.ca.gov/index.php?a=planning/gpg.html.

[2]The Resources Agency has noted the environmental and administrative advantages of addressing GHG emissions at the programmatic level. See Draft Initial Statement of Reasons for Regulatory Action at pp. 17 and 46, available at http://ceres.ca.gov/ceqa/docs/Initial_Statement_of_Reasons.pdf.

[3] Pursuant to Health and Safety Code section 21083.05 (SB 97), OPR issued its Preliminary Draft CEQA Guidelines Amendments on January 8, 2009 and tranferred recommended amendments to the Natural Resources Agency on April 13, 2009. On July 3, 2009, the Natural Resources Agency (Resources) commenced the Administrative Procedure Act rulemaking process for certifying and adopting these amendments pursuant to Public Resources Code section 21083.05. Resources must certify and adopt guideline amendments by January 1, 2010. For the current status of this process, visit the Natural Resources Agency's website at http://ceres.ca.gov/ceqa/guidelines/.

[4]Cal. Code Regs., tit. 14 (hereinafter "CEQA Guidelines"), § 15064, subd. (a).

[5]CEQA Guidelines, § 15064, subd. (f)(1).

[6]CEQA Guidelines, § 15021, subd. (a).

[7]OPR, CEQA and Climate Change: Addressing Climate Change Through California Environmental Quality Act (CEQA) Review (June 2008), available at http://opr.ca.gov/ceqa/pdfs/june08-ceqa.pdf.

[8] ARB's protocols for estimating the emissions from local government operations are available at http://www.arb.ca.gov/cc/protocols/localgov/localgov.htm.

[9] CAPCOA, CEQA and Climate Change, Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act (January 2008) (hereinafter, "CAPCOA white paper"), available at http://www.capcoa.org/CEQA/CAPCOA%20White%20Paper.pdf#page=83.

[10] http://opr.ca.gov/ceqa/pdfs/june08-ceqa.pdf#page=15.

[11] http://www.iclei-usa.org

[12] For example, U.C. Davis has made its modeling tool, UPlan, available at http://ice.ucdavis.edu/doc/uplan; San Diego School of Law's Energy Policy Initiatives Center has prepared a GHG emissions inventory report for San Diego County http://www.sandiego.edu/EPIC/news/frontnews.php?id=31; and Cal Poly, San Luis Obispo City and Regional Planning Department is in the process of preparing a Climate Action Plan for the City of Benicia, see http://www.beniciaclimateactionplan.com/files/about.html.

[13]CEQA Guidelines, § 15002, subd. (g).

[14] CEQA Guidelines, § 15064(h)(1).

[15]See ARB, Scoping Plan at pp. 117-120, available at http://www.arb.ca.gov/cc/scopingplan/document/psp.pdf. (ARB approved the Proposed Scoping Plan on December 11, 2008.)

[16]In the Scoping Plan, ARB encourages local governments to adopt emissions reduction goals for 2020 "that parallel the State commitment to reduce greenhouse gas emissions by approximately 15 percent from current levels . . . ." Scoping Plan at p. 27; see *id.* at Appendix C, p. C-50. For the State, 15 percent below current levels is approximately equivalent to 1990 levels. *Id.* at p. ES-1. Where a city or county has grown roughly at the same rate as the State, its own 1990 emissions may be an appropriate 2020 benchmark. Moreover, since AB 32's 2020 target represents the State's *maximum* GHG emissions for 2020 (see Health & Safety Code, § 38505, subd. (n)), and since the 2050 target will require substantial changes in our carbon efficiency, local governments may consider whether they can set an even more aggressive target for 2020. See Scoping Plan, Appendix C, p. C-50 [noting that local governments that "meet or exceed" the equivalent of a 15 percent reduction in GHG emissions by 2020 should be recognized].

[17] *Christward Ministry v. Superior Court* (1986) 184 Cal.App.3d 180, 194 [EIR must consider future development permitted by general plan amendment]; see also CEQA Guidelines, §§ 15126 [impact from all phases of the project], 15358, subd. (a) [direct and indirect impacts].

[18] See the City of Palm Desert's Energy Independence Loan Program at http://www.ab811.org.

[19] Pub. Res. Code, § 21081.6, subd. (b); CEQA Guidelines, § 15091, subd. (d); see also *Federation of Hillside and Canyon Assocs.* (2000) 83 Cal.App.4th 1252, 1261 [general plan EIR defective where there was no substantial evidence that mitigation measures would "actually be implemented"].

[20]CAPCOA white paper at pp. 79-87 and Appendix B-1.

[21]OPR Technical Advisory, Attachment 3.

[22]See http://ag.ca.gov/globalwarming/pdf/GW_mitigation_measures.pdf [list of potential mitigation for projects]; http://ag.ca.gov/globalwarming/pdf/GP_policies.pdf [list of example policies and measures for general plans]; http://ag.ca.gov/globalwarming/pdf/green_building.pdf [list of local green building ordinances].

[23]See http://opr.ca.gov/ceqa/pdfs/City_and_County_Plans_Addressing_Climate_Change.pdf.

[24]See Scoping Plan, Appendix C, at p. C-49.

[25]CEQA Guidelines, § 15126.2, subd. (a).

PROOF OF PUBLICATION

LEGAL NEWSPAPER NOTICES

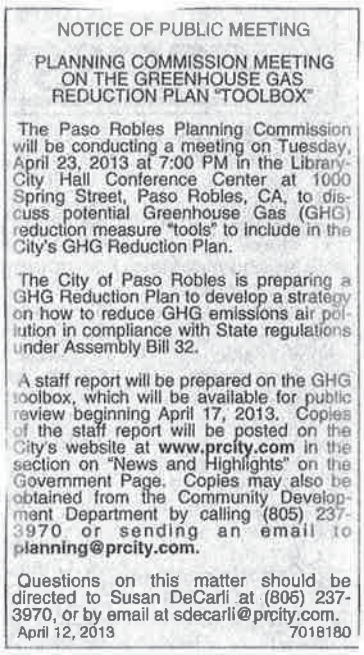
PLANNING COMMISSION/CITY COUNCIL PROJECT NOTICING

Newspaper: Tribune

Date of Publication: April 12, 2013

Hearing Date: April 23, 2013 (Planning Commission)

Project: Greenhouse Gas Reduction Plan "Toolbox"



NOTICE OF PUBLIC MEETING

PLANNING COMMISSION MEETING ON THE GREENHOUSE GAS REDUCTION PLAN "TOOLBOX"

The Paso Robles Planning Commission will be conducting a meeting on Tuesday, April 23, 2013 at 7:00 PM in the Library-City Hall Conference Center at 1000 Spring Street, Paso Robles, CA, to discuss potential Greenhouse Gas (GHG) reduction measure "tools" to include in the City's GHG Reduction Plan.

The City of Paso Robles is preparing a GHG Reduction Plan to develop a strategy on how to reduce GHG emissions air pollution in compliance with State regulations under Assembly Bill 32.

A staff report will be prepared on the GHG toolbox, which will be available for public review beginning April 17, 2013. Copies of the staff report will be posted on the City's website at **www.prcity.com** in the section on "News and Highlights" on the Government Page. Copies may also be obtained from the Community Development Department by calling (805) 237-3970 or sending an email to **planning@prcity.com.**

Questions on this matter should be directed to Susan DeCarli at (805) 237-3970, or by email at sdecarli@prcity.com.

April 12, 2013 7016180

I, Theresa Variano, employee of the Community Development Department, Planning Division, of the City of El Paso de Robles, do hereby certify that this notice is a true copy of a published legal newspaper notice for the above named project.

Signed: _____
Theresa Variano

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