5 COMMUNITYWIDE MEASURES, IMPLEMENTATION, AND MONITORING

This chapter presents the communitywide measures that the City of Vacaville will implement in order to increase energy independence; reduce spending on gas, electricity, and water and improve air quality by the year 2020. These communitywide measures were developed with community involvement, including a Community Workshop held on March 17, 2012 and a Steering Committee meeting held on March 22, 2012. Each measure is based on careful consideration of existing priorities and resources and the potential costs and benefits of various possible approaches.

Some of the communitywide measures are programs, such as the *Schoolpool* program, that are already underway. If such a program began after 2008, the baseline inventory year, then the program is included in this chapter so that the City can "take credit" for it in the future 2020 GHG emissions forecast. The measures that describe such existing programs include the words "continue to…," indicating that this is an existing program.

The measures are divided into the following nine sectors:

1. Transportation and Land Use
2. Green Building
3. Renewable Energy and Low Carbon Fuels
4. Energy Conservation
5. Water and Wastewater
6. Solid Waste
7. Parks, Open Space, and Agriculture
8. Purchasing
9. Community Action

The measures were simulated using the following simulation models; the assumptions from the modeling processes are summarized for each measure, below, and are documented in Appendix C. In general, to result in a conservative estimate of likely emissions, the model does not assume that every project will comply with every measure, particularly for voluntary measures where it is difficult to project future participation rates.

- Emissions Factors 2011 Model (EMFAC2011)
- Off-Road Emissions 2007 Model (OFFROAD2007)
- US Environmental Protection Agency's WARM tool
- California Air Resources Board's (CARB) Local Government Operations Protocol (LGOP)

This chapter presents the environmental benefits of each communitywide measure, as well as implementation information, including action items, responsible parties, cost effectiveness, and a schedule for implementation. In cases where an individual communitywide measure includes many different components, the information on how it will be implemented is provided separately for each component. The amount of GHG emissions reduction that each communitywide measure results in will serve as the standard that the City will use to evaluate whether the reduction target is being met.

The cost effectiveness evaluation makes a qualitative assessment rather than a measured or quantified assessment. The qualitative assessment takes into account both the cost to implement the communitywide measure and its benefits. Due to data constraints in some measures, it is not possible to estimate specific dollar costs for each measure and would likely be inaccurate or misleading to do so. For those measures, this chapter offers a qualitative assessment of the likely cost to implement the measure as compared to the likely benefits of the measure. Highly cost-effective measures may have only moderate benefits, but low implementation costs. Similarly, highly cost effective measures may be expensive to implement, but result in very high benefits.

The measure implementation schedule separates the measures into two main time periods for implementation: 2014 to 2015 and 2015 to 2020. The implementation phases indicate when implementation of the measure will begin. Overall maintenance of the measure will extend well beyond the allotted phase. The implementation schedule prioritizes measures based on their effectiveness at reducing GHG emissions, cost-effectiveness, and/or feasibility. Some measures are expected to be implemented on a later timeline due to obstacles of available data, technology, or finances.

As discussed in Chapter 3, the reductions from federal and State requirements that must be implemented by the City, such as complying with State requirements to reduce the amount of solid waste sent to landfills, are included with the communitywide measures identified in this chapter because they will be done by the City and not by the federal or State governments.

In total, implementation of the communitywide measures described in this chapter, plus local compliance with State and federal requirements, will decrease Vacaville's GHG emissions by 63,472 metric tons of carbon dioxide equivalent ($MTCO_2e$) by 2020. As discussed in Chapter 4, the GHG emissions reductions from federal and State actions (shown in the adjusted BAU forecast) would alone enable Vacaville to exceed its GHG

reduction target by 942 $MTCO_2e$, even without any local actions. **The communitywide measures discussed in this chapter would further reduce GHG emissions, and, in combination with the federal and State actions, would achieve the reduction target and surpass it by 64,414 $MTCO_2e$.**

By achieving even more reductions than the minimal necessary to meet its target, the City has some flexibility to allow for differences in the actual GHG emission reductions compared to the modeled reductions, while still meeting the target. In addition, adopting communitywide measures that exceed Vacaville's GHG emission reduction target demonstrates the City's commitment and responsiveness to the need to mitigate GHG emissions.

A summary of the reductions by sector is provided in Table 5-1. The technical documentation for the measure modeling is provided in Appendix C.

The communitywide measures discussed in this chapter are the backbone of this Energy and Conservation Action Strategy. The GHG emission reductions achieved by these measures will help to mitigate the GHG emissions generated by activities allowed by the City's General Plan, enabling the City to comply with State law and responding to community members who support energy and conservation planning. Adopting this strategy will position the City to be eligible for State and regional grants. Future development that is consistent with this Strategy will benefit from a streamlined CEQA process because it will not be required to do a costly and time-consuming project-specific GHG emissions analysis.

UNDERSTANDING NON-QUANTIFIED MEASURES

In the sections below, many communitywide measures are reported to have no measureable reduction in GHG emissions beyond the other measures that were simulated. However, these "non-quantified measures" could still reduce VMT or GHG emissions. A measure may not be quantified for a variety of reasons.

- The measure is simply not quantifiable because there are too many unknown variables affecting implementation, such as when the program will be established, how many people will use the program, or the range of projects that will qualify for the program. An example of this type of measure is measure EC-7, Financing for Energy Efficiency and Renewable Energy.

TABLE 5-1 **COMMUNITYWIDE GHG EMISSION AND VMT REDUCTIONS**

Sector	VMT Reduction	Total GHG Reduction in 2020 ($MTCO_2e$)	Percent of Total Reduction[a]
Transportation and Land Use[b]			
LU-1 Emphasis on Pedestrian Entrances	28		<1%
LU-2 Pedestrian or Bicycle Connections	1,037		1%
LU-3 Traditional Development Patterns	40		<1%
LU-4 Pedestrian Access	24		<1%
TR-1 Bikeway Plan	68		<1%
TR-2 Bike Parking in Commercial Development and Park-and-Ride Lots	1,707		2%
TR-3 Shared Parking and Infill Parking Reductions	21,000		26%
TR-4 Voluntary Trip Reduction Program	23,184		29%
TR-5 Commute Reduction Strategies	12,886		16%
TR-6 School Trip Reduction	13,643		17%
TR-7 Shuttle Service for Major Employment Centers	417		1%
TR-8 Parking Cash-Out	1,171		1%
TR-9 Transit Network Expansions	5,059		6%
Total	*80,264*	*53,682*	*85%*
Green Building	No measurable reductions		
Renewable Energy and Low Carbon Fuels			
RE-1 Renewable Energy Generation in Projects		20	<1%
Total		*20*	*<1%*
Energy Conservation			
EC-1 Energy-Efficient Appliances and Lighting		10	<1%
EC-2 Promotion of Energy Conservation		70	<1%

TABLE 5-1 **COMMUNITYWIDE GHG EMISSION AND VMT REDUCTIONS**

Sector	VMT Reduction	Total GHG Reduction in 2020 ($MTCO_2e$)	Percent of Total Reduction[a]
EC-3 Heat Gain Reduction		220	<1%
EC-4 Energy-Efficient Street Lights		250	<1%
Total		*550*	*1%*
Water and Wastewater			
WW-1 Water Conservation		1,450	2%
Total		*1,450*	*2%*
Solid Waste			
SW-1 Waste Reduction		7,770	12%
Total		*7,770*	*12%*
Parks, Open Space, and Agriculture	No measurable reductions		
Purchasing	No measurable reductions		
Community Action	No measurable reductions		
All Sectors Total		**63,472**	

[a] For each measure, the percent of the total GHG emissions reductions for that sector is provided. For each sector, the percent of the total GHG emissions reductions for the entire Energy and Conservation Action Strategy is provided.
[b] For transportation and land use measures, percent reductions correspond to VMT reductions rather than GHG reductions.
Source: Kittelson & Associates, LSA Associates, and The Planning Center | DC&E, 2013.

- The measure would result in no measureable benefit or the benefit is too small to be accurately simulated by modeling software. For example, measure OS-4 directs the City to support the Vacaville Farmers' Market, which supports the consumption of locally-grown food, thereby reducing GHGs related to the transportation of food. However, because food transportation-related GHG emissions make up a relatively small portion of the total GHG emissions generated by a typical person, and because this measure is strictly voluntary, the GHG emissions reduced by it are too small to be modeled.

- Another quantified measure achieves a similar purpose. For example, measure RE-1 requires that new large non-residential development incorporate on-site renewable energy generation, and there is a quantified GHG reduction associated with that measure. Measure RE-5 requires that new buildings be constructed for the easy, cost-effective installation of future solar energy systems, but this alone would not increase the GHG emissions reductions above what would result from measure RE-1, so no additional benefit is reported.

Although measures may not have a quantifiable reduction, they are still an important component to this Energy and Conservation Action Strategy because they support other measures and demonstrate the City's commitment to take action to increase energy independence, save money, and reflect Vacaville's citizens' values of environmental stewardship. In addition, for some of the non-quantified measures, data and modeling techniques may be available in the future that will allow the measure to be modeled for monitoring activities and for future plans.

TRANSPORTATION AND LAND USE

As shown in Table 5-1, the transportation and land use measures would decrease GHG emissions in Vacaville by a total of 53,682 $MTCO_2e$. A summary of the VMT reductions and implementation items for each transportation and land use measure is provided in Table 5-2. Because the transportation and land use measures are interrelated and support one another, it is not possible to calculate an independent GHG reduction value for a single individual measure. Therefore, this analysis presents only the total combined GHG reduction value for all of the measures in the transportation and land use sector. However, it is possible to estimate the vehicle miles traveled (VMT) that each measure would achieve, which gives a sense of approximate contribution of each measure to the total GHG reduction value for this sector.

In addition, because the individual GHG reductions from any one measure remain uncertain, there are many measures for which a cost-effectiveness determination is not possible. Nevertheless, the section below discusses the potential costs and savings of all transportation and land use measures, and, if possible, this information is used to determine cost effectiveness.

BENEFITS OF THESE MEASURES

Beyond reducing GHG emissions and VMT, the transportation and land use measures in the Energy and Conservation Action Strategy would yield other sustainability benefits. Offering people options besides riding alone in their cars will help reduce traffic congestion; improve mobility for seniors, who will be an increasing part of the population in the coming decades; improve air quality, which negatively affects children; enhance public health as more residents walk or bike; and reduce wear and tear on city streets. Additionally, by promoting more compact development, these measures would limit the loss of natural and farmland areas, preserving the hillside views, wildlife habitat, and local agriculture that form an important part of Vacaville's character and heritage.

In addition, the transportation and land use measures support the General Plan policies and actions that help the City to comply with the California Complete Streets Act (AB 1358), which directs the City plan for a balanced and multimodal transportation network that meets the needs of all transportation users, including bicyclists, children, persons with disabilities, motorists, pedestrians, users of public transportation, and seniors.

TABLE 5-2 **TRANSPORTATION AND LAND USE MEASURES**

Measure Number	Measure Text	GHG ($MTCO_2e$) and VMT Reduction (Per Year)	% of Total Reduction for this Sector	% of Total Reduction	Cost Effectiveness	Responsible Party	Implementation Schedule
TRANSPORTATION & LAND USE							
Because the transportation and land use measures are interrelated and support one another, an independent GHG reduction value cannot be calculated for a single individual measure. However, the approximate contribution of each measure to the total GHG reduction value for this sector can be estimated based on the reduction in VMT that was projected for each measure.		**53,682 GHG** **80,264 VMT**		**85%**			
LU-1	Encourage all new residential, commercial, and public buildings and places of assembly to include a principal functional entry that faces a public space such as a street, square, park, paseo, or plaza, in addition to any entrance from a parking lot. For other, less public buildings such as warehouses, manufacturing, and storage buildings, encourage entries to ancillary office, break room, or staff uses to face a public space.	28 VMT	<1%		Moderate to High	City/Development	2014–2015
LU-2	Require new residential projects to include a pedestrian or bicycle through-connection in any new cul-de-sacs, unless prohibited by topographical conditions or other site-specific constraints.	1,037 VMT	1%		High	City/Development	2014–2015
LU-3	Require that new neighborhoods be based on traditional residential development patterns (i.e. interconnected streets or a grid pattern) in a variety of densities with a pedestrian-friendly network of streets and parks, unless prohibited by topographical conditions or other site-specific constraints.	40 VMT	<1%		Moderate to High	City/Development	2015–2020
LU-4	Require adequate pedestrian access to or through all new commercial, residential, and mixed-used development. New pedestrian infrastructure shall incorporate amenities such as street trees to shade sidewalks, lighting, benches, signage, and pedestrian signalization at major transportation points to increase pedestrian convenience, comfort, and safety.	24 VMT	<1%		High	City/Development	2015–2020
LU-5	Encourage a variety of local-serving commercial uses and encourage mixed-use development in the Downtown and RUHD Overlay areas, reducing VMT.	--			High	City/Development	2014–2015
LU-6	During Design Review, encourage street and house orientation in new neighborhoods and roof types that maximize the south-facing exposure of new homes, unless prohibited by topographical conditions or other site-specific constraints.	--			High	City/Development	2015–2020
LU-7	Continue to promote the development of employment-generating uses.	--			High	City	Ongoing
LU-8	Discourage density reductions on infill sites within ¼-mile of retail and employment centers and transit routes.	--			High	City/Development	2014–2015
LU-9	Require development on infill sites within ¼-mile of retail and employment centers, transit routes, and recreation areas to provide pedestrian and bicycle connections to those destinations.	--			Moderate to High	City/Development	2014–2015
LU-10	As part of each Housing Element Update, continue to study the skills and education levels of Vacaville residents and the housing choices of Vacaville employees, and use the information as a guide for recruiting new firms and housing types to the city to reduce vehicle miles traveled (VMT).	--			Unknown	City	Ongoing
TR-1	Develop and implement a Bikeway Plan that provides connections to the existing bikeway network and improves access to schools, Downtown, and large employment sites in the northeast quadrant of the city, and include strategies to support bicycle use.	68 VMT	<1%		High	City	2014–2015
TR-2	Continue to require bike parking in new commercial developments and at park-and-ride lots. Long-term parking and areas that are protected from the elements should be provided at park-and-ride lots and for employees in commercial areas. Short-term parking, such as U-racks, should be provided for visitors in commercial areas in close proximity to store entrances.	1,707 VMT	2%		Unknown	City/Development	Ongoing

TABLE 5-2 **TRANSPORTATION AND LAND USE MEASURES**

Measure Number	Measure Text	GHG ($MTCO_2e$) and VMT Reduction (Per Year)	% of Total Reduction for this Sector	% of Total Reduction	Cost Effectiveness	Responsible Party	Implementation Schedule
TR-3	Revisit off-street parking ordinances to encourage shared parking and parking maximums. Reduce required parking as an incentive for infill development and the installation of bikeways and bicycle parking.	21,000 VMT	26%		High	City/Development	2014–2015
TR-4	Implement a voluntary employer-based trip reduction program for all existing and future employers. The program could include a resource page on the City's website for trip reduction information, a direct link to the Solano-Napa Commuter Information Program website, and promotional events. The City could also encourage employers, including State and County government employers in Vacaville (e.g. the California Medical Facility) to implement ride-sharing programs, such as a carpooling matching service and preferred parking for vanpools and carpools.	23,184 VMT	29%		High	City/Employers	2014–2015
TR-5	Encourage employers to allow telework (where employees work from home or other satellite locations close to home), institute flexible work schedules, and provide employer-sponsored vanpools.	12,886 VMT	16%		High	City/Employers/ Development	2014–2015
TR-6	Continue to support school districts and the Solano Transportation Authority in encouraging participation in *Schoolpools*, a ridesharing program for school children, and/or work with a private entity to establish a transportation service for children to schools, households, and other activities.	13,643 VMT	17%		High	City/Private Entity	Ongoing
TR-7	Encourage new, large employers, defined as having a minimum of 100 employees, to provide employer-sponsored shuttles or vanpools (operated by employees) that provide direct service between major employment centers and the Vacaville Transportation Center.	417 VMT	1%		Unknown	City/Employers/ Development	2015–2020
TR-8	Encourage new employers to offer employee parking cash-out. Parking cash out allows workers to receive a regular payment when they consistently forgo the use of a parking spot their vehicle would otherwise occupy.	1,171 VMT	1%		High	City/Employers/ Development	2014–2015
TR-9	Expand the transit network as demand warrants, funding allows, and State farebox recovery is achieved to include service to large employers and park-and-ride lots, and ensure that information about transit connections is added to the City Coach and City of Vacaville's websites.	5,059 VMT	6%		Unknown	City	2014–2015
TR-10	Develop a pedestrian plan and implement network improvements, especially where needed to fill in gaps in the existing network. Include baseline data with goals to increase the percent of walking for transportation purposes.	--			Moderate	City	2014–2015
TR-11	Require the provision of secure bike parking, protected from the elements, for multi-unit residential developments that lack individual garages.	--			Unknown	City/Development	2015–2020
TR-12	Require developments requiring specific plans to provide land for multi-use trails that connect to existing or future bikeways, according to the adopted bikeway plan.	--			Unknown	City/Development	2014–2015
TR-13	Encourage employers to provide end-of-trip facilities for bicyclists, such as secure parking and locker, shower, and changing room facilities.	--			Unknown	City/Development	2014–2015
TR-14	Support existing programs that provide incentives for developers and private business to install electric charging vehicle stations in residential and commercial developments.	--			Unknown	City	2014–2015
TR-15	Continue to install electric vehicle charging stations in high traffic areas. As charging stations are installed, continue to update the City's map of electric vehicle charging stations on its website and provide information to the Solano Transportation Authority for their public outreach.	--			Unknown	City/STA	Ongoing
TR-16	Continue to use solar panels to power or supplement electric vehicle charging stations where geographically possible, demand warrants, and funding allows.	--			High	City	Ongoing
TR-17	As new development occurs or parking lots are re-striped, evaluate the demand for designated preferred parking spaces for low-carbon, electric, and carpool vehicles in City-owned lots and Downtown.	--			High	City	2014–2015

TABLE 5-2 **TRANSPORTATION AND LAND USE MEASURES**

Measure Number	Measure Text	GHG ($MTCO_2e$) and VMT Reduction (Per Year)	% of Total Reduction for this Sector	% of Total Reduction	Cost Effectiveness	Responsible Party	Implementation Schedule
TR-18	Continue to coordinate with STA on TDM planning, TDM activities, TDM requirements, and education and outreach programs through the Solano Napa Commuter Information (SNCI) website.	--			High	City/STA	Ongoing
TR-19	Provide a prominent link on the City's website to the Solano Transportation Authority's (STA) Commuter Info website, and work with STA to provide up-to-date commute information in Vacaville.	--			High	City/STA	2014–2015
TR-20	Support efforts by the school districts to improve transit options for students, which could include reinstatement of school busing or working with the Solano Transportation Authority to provide free or subsidized bus passes to students in Vacaville.	--			Unknown	City/School Districts/STA	2014–2015
TR-21	Continue to market, promote, and educate students and parents about the benefits of using public transit as a mode of travel to school, considering the comments and concerns of the Vacaville and Travis School Districts.	--			Unknown	City/School Districts	Ongoing
TR-22	Coordinate with local schools and the school district to improve walking and biking access to school by providing input and staff support for Safe Routes To School grant applications and implementation of projects.				High	City/School Districts	2014–2015
TR-23	Encourage the State of California to reinstate school busing.				High	City/State/ School Districts	2014–2015
TR-24	Implement improvements to transit stops, such as real-time transit information and shelters, where demand warrants and funding allows, and access for passengers arriving by foot, and require transit stop improvements as conditions of approval for nearby development as appropriate.	--			Unknown	City/Development	2014–2015
TR-25	Continue to implement strategies to improve signalization, incident responsiveness, traveler information systems (such as wayfinding and real-time traveler information), and active traffic management to smooth traffic flow as budget and staff levels allow.	--			Unknown	City	Ongoing
TR-26	Continue to include pedestrian, bicycle and transit facilities in projects funded by Vacaville's transportation impact fee program, and consider including specific improvements to pedestrian, bicyclist and transit facilities as part of the Transportation Impact Fee updates if a nexus between those improvements and new development can be demonstrated.	--			Unknown	City	2014–2015
TR-27	Require electric loading docks for large developments with 100 or more employees that receive deliveries by refrigerated trucks.	--			Unknown	City/Development	2014–2015

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QUANTIFIED LAND USE MEASURES

LU-1 EMPHASIS ON PEDESTRIAN ENTRANCES

Encourage all new residential, commercial, and public buildings and places of assembly to include a principal functional entry that faces a public space such as a street, square, park, paseo, or plaza, in addition to any entrance from a parking lot. For other, less public buildings such as warehouses, manufacturing, and storage buildings, encourage entries to ancillary office, break room, or staff uses to face a public space.

VMT REDUCTION: Approximately 28 miles per year

PERCENT OF TOTAL VMT REDUCTIONS: Less than 1 percent

REDUCES VMT BY:

- Increasing convenient access for pedestrians and cyclists.
- Encouraging alternative forms of transportation by placing the entrances near sidewalks.
- Reducing automobile use and associated fossil-fuel consumption.

VMT REDUCTION ASSUMES:

- A 0.5 percent reduction in vehicle use for trips generated by new development for trip distances of 0.5 miles or less.

COST EFFECTIVENESS: MODERATE TO HIGH

City costs would stem from staff time needed to draft, adopt, and implement policies supporting this measure. Developers/property owners would incorporate pedestrian-serving entrances during design phase. Possible cost savings from reduced parking needs or from increased commercial district vitality. Any increased costs to property owner would be minimal and voluntary.

ACTION ITEMS AND RESPONSIBLE PARTIES:

Community Development Department staff:

- Amend Land Use & Development Code and Residential Design Guidelines to encourage these entries in new buildings.
- Review architectural plans for consistency with measure LU-1.

Developers/Property Owners:

- Design and construct new buildings to have these entries.

IMPLEMENTATION SCHEDULE: 2014–2015

LU-2 Pedestrian or Bicycle Connections

Require new residential projects to include a pedestrian or bicycle through-connection in any new cul-de-sacs, unless prohibited by topographical conditions or other site-specific constraints.

VMT Reduction: Approximately 1,037 miles per year

Percent of Total VMT Reductions: 1 percent

Reduces VMT By:

- Increasing convenience, comfort and safety, and use of walking and bicycling.
- Decreasing conflicts between pedestrians and bicyclists, and other vehicles.
- Reducing automobile use and associated fossil-fuel consumption.

VMT Reduction Assumes:

- A 0.625 percent reduction in vehicle use for trips generated by new residential development for trip distances of 5 miles or less.

Cost Effectiveness: High

City costs would stem from staff time needed to draft, adopt, and implement ordinances to enact measure requirements. Costs to developers would be low because these connections can be incorporated in the design phase of the project.

Action Items and Responsible Parties:

Community Development Department staff:

- Amend Land Use and Development Code and Residential Design Guidelines to include this requirement.
- Review architectural plans and environmental documents for consistency with measure LU-2.

Developers/Property owners:

- Design projects to include bike and pedestrian connections through cul-de-sacs.

Implementation Schedule: 2014–2015

LU-3 TRADITIONAL DEVELOPMENT PATTERNS

Require that new neighborhoods be based on traditional residential development patterns (i.e. interconnected streets or a grid pattern) in a variety of densities with a pedestrian-friendly network of streets and parks, unless prohibited by topographical conditions or other site-specific constraints.

VMT REDUCTION: Approximately 40 miles per year

PERCENT OF TOTAL VMT REDUCTIONS: Less than 1 percent

REDUCES VMT BY:

- Increasing convenience, comfort and safety, and use of walking and bicycling.
- Reducing conflicts between pedestrians and bicyclists, and other vehicles.
- Making neighborhoods more easily navigable for all users.
- Reducing automobile use and associated fossil fuel consumption.

VMT REDUCTION ASSUMES:

- A 12.0 percent reduction in vehicle use for trips generated by new development for trip distances of 0.5 miles or less.

COST EFFECTIVENESS: MODERATE TO HIGH

City costs would stem from staff time needed to draft, adopt, and implement ordinances, design guidelines, and land-use regulations to support measure requirements. When incorporated at the design phase there should be no cost to developers to design traditional residential development patterns at new sites. Possible cost savings for drivers by from increasing the convenience of walking or biking and improving accessibility to transit.

ACTION ITEMS AND RESPONSIBLE PARTIES:

Community Development Department staff:

- Amend Land Use and Development Code to require traditional residential development patterns in new subdivisions.
- Review architectural plans and environmental documents for consistency with measure LU-3.

Developers/Property owners:

- Incorporate traditional residential development patterns in the design of new development.

IMPLEMENTATION SCHEDULE: 2015–2020

LU-4 Pedestrian Access

Require adequate pedestrian access to or through all new commercial, residential, and mixed-used development. New pedestrian infrastructure shall incorporate amenities such as street trees to shade sidewalks, lighting, benches, signage, and pedestrian signalization at major transportation points to increase pedestrian convenience, comfort, and safety.

VMT Reduction: Approximately 24 miles per year

Percent of Total VMT Reductions: Less than 1 percent

Reduces VMT By:

- Increasing convenience, comfort and safety, and use of walking and bicycling.
- Decreasing conflicts between pedestrians and bicyclists, and other vehicles.
- Making neighborhoods more easily navigable.
- Reducing automobile use and associated fossil-fuel consumption.

VMT Reduction Assumes:

- A 2.0 percent reduction in vehicle use for trips generated by new development for trip distances of 5 miles or less.

Cost Effectiveness: High

City costs would stem from staff time needed to draft, adopt, and implement ordinances to enact measure requirements. When space for pedestrian access is planned during the design phase, increases to development costs would be negligible.

Action Items and Responsible Parties:

Community Development Department staff:

- Amend Land Use and Development Code and Residential Design Guidelines.
- Review architectural plans and environmental documents for consistency with measure LU-4.

Developers/Property owners:

- Incorporate space for pedestrian access in the design of new development.

Implementation Schedule: 2015–2020

NON-QUANTIFIED LAND USE MEASURES

The following measures (LU-5 through LU-10) would not result in a measureable reduction in GHG emissions in Vacaville beyond the reductions already achieved by measures LU-1 through LU-4. Therefore, the matrix does not show a quantified percent of total VMT reductions for the non-quantified measures, and it does not list any assumptions. However, these measures do play an important role in supporting measures LU-1 through LU-4 and helping to reach the City's overall goal of reducing GHG emissions in Vacaville.

LU-5 LOCAL-SERVING AND MIXED USES IN DOWNTOWN

Encourage a variety of local-serving commercial uses and encourage mixed-use development in the Downtown and RUHD Overlay areas, reducing VMT.

VMT REDUCTION: Measure LU-5 would not result in direct VMT reductions; however, this measure supports measures LU-1 through LU-4.

REDUCES GHG BY:

- Increasing convenience of walking and bicycling in downtown and immediately surrounding areas.
- Promoting the use of alternative transportation.
- Reducing automobile use and associated fossil-fuel consumption.

COST EFFECTIVENESS: HIGH

City costs would stem from staff time needed to draft and adopt approaches to implement measure. Costs associated with increased provision of municipal infrastructure or services would likely be offset by increased property and sales tax receipts and/or covered by developers. Possible cost savings for City and developers by increasing service efficiency and economies of scale for new services, and increases in revenue.

ACTION ITEMS AND RESPONSIBLE PARTIES:

Community Development Department staff:

- Amend Land Use and Development Code to encourage local-serving commercial uses and encourage mixed-use development in the RUHD Overlay.
- Review architectural plans and environmental documents for consistency with measure LU-5.

Developers/Property owners:

- Incorporate local-serving commercial uses and mixed-use development when proposing development in the RUHD Overlay.

IMPLEMENTATION SCHEDULE: 2014–2015

LU-6 Solar Street and Roof Orientation

During Design Review, encourage street and house orientation in new neighborhoods and roof types that maximize the south-facing exposure of new homes, unless prohibited by topographical conditions or other site-specific constraints.

VMT Reduction: Measure LU-6 would not result in direct VMT reductions; however, this measure supports measures GB-2, RE-1, RE-2, RE-3, and RE-5.

Reduces GHG By:

- Supporting alternatives to non-renewable energy sources.
- Supporting the use of natural lighting and heat.
- Supporting reduced energy demand from fossil fuels.
- Supporting reduced overall energy use.

Cost Effectiveness: High

City costs would stem from staff time needed to draft and adopt implementing language. Cost savings would result from increasing solar power generation. Any costs to developers would be voluntary and minimal.

Action Items and Responsible Parties:

Community Development Department staff:

- Amend Land Use and Development Code to encourage appropriate street and house orientation for south-facing roof exposure in new residential subdivisions as part of the project design review.

Developers/Property owners:

- Design and construct projects to maximize the south-facing exposure of rooftops.

Implementation Schedule: 2015–2020

LU-7 EMPLOYMENT-GENERATING USES

Continue to promote the development of employment-generating uses.

VMT REDUCTION: Measure LU-7 would not result in direct VMT reductions; however, this measure supports measures LU-1 through LU-4.

REDUCES GHG BY:

- Bringing additional jobs into Vacaville.
- Reducing the number of Vacaville residents that commute long distances to work.
- Reducing automobile use and associated fossil-fuel consumption.

COST EFFECTIVENESS: HIGH

City costs would stem from staff time needed to continue the application of compatible existing City policies, and consideration for this measure's principles in preparing future City policies. Possible increased revenue would result from increased sales taxes from new businesses and the economic activity generated by the presence of additional employers.

ACTION ITEMS AND RESPONSIBLE PARTIES:

Community Development Department and City Manager's Office staff:

- Continue conducting outreach and marketing to bring employment-generating uses to Vacaville.

IMPLEMENTATION SCHEDULE: Ongoing

LU-8 Minimum Densities on Infill Sites

Discourage density reductions on infill sites within ¼-mile of retail and employment centers and transit routes.

VMT Reduction: Measure LU-8 would not result in direct VMT reductions; however, this measure supports measures LU-1 through LU-4.

Reduces GHG By:

- Placing high density development near employment and retail centers and transit routes, which allows residents to walk or take transit to work or shopping, and/or reduces the number of miles they have to drive.
- Reducing automobile use and associated fossil-fuel consumption

Cost Effectiveness: High

Possible cost savings associated with increased provision of municipal infrastructure or services. Reduced costs for City and developers by allowing increased overall efficiency of serving these properties and encouraging economies of scale for new services and infrastructure.

Action Items and Responsible Parties:

Community Development Department staff:

- Review architectural plans and environmental documents for consistency with measure LU-8.

Developers/Property owners:

- Incorporate minimum density requirements into design of new residential and mixed-use development when located within ¼-mile of retail and employment centers and transit routes.

Implementation Schedule: 2014–2015

LU-9 Pedestrian and Bicycle Connections for Infill Development

Require development on infill sites within ¼-mile of retail and employment centers, transit routes, and recreation areas to provide pedestrian and bicycle connections to those destinations.

VMT Reduction: Measure LU-9 would not result in direct VMT reductions; however, this measure supports measures LU-1 through LU-4.

Reduces GHG By:

- Placing high density development near employment and retail centers and transit routes, which allows residents to walk or take transit to work or shopping, and/or reduces the number of miles they have to drive.
- Increasing convenience, comfort, safety, and use of walking and bicycling.
- Increasing transit ridership.
- Reducing automobile use and associated fossil-fuel consumption.

Cost Effectiveness: Moderate to High

City costs would stem from staff time needed to draft and adopt development code design requirements consistent with the measure. Developer costs would be minimal when bicycle and pedestrian connections are planned and incorporated at the design phase.

Action Items and Responsible Parties:

Community Development Department staff:

- Amend the Land Use and Development Code to include measure LU-9.
- Review architectural plans and environmental documents for consistency with measure LU-9

Developers/Property owners:

- Design and construct pedestrian and bicycle connections to retail and employment centers, transit routes, and recreation areas for new residential and mixed-use development when located within ¼-mile of these areas.

Implementation Schedule: 2014–2015

LU-10 Education and Housing Studies

As part of each Housing Element Update, continue to study the skills and education levels of Vacaville residents and the housing choices of Vacaville employees, and use the information as a guide for recruiting new firms and housing types to the city to reduce vehicle miles traveled (VMT).

VMT Reduction: It would be speculative to estimate a specific VMT reduction from this measure, but it supports measure LU-7 and other economic development strategies the City is pursuing.

Reduces GHG By:

- Increasing employment opportunities convenient to housing.
- Reducing overall automobile use and associated fossil-fuel consumption.
- Decreasing trip distance.
- Shortening trips to increase convenience for pedestrians, bicyclists and transit riders.

Cost Effectiveness: Unknown

Costs from staff time needed to oversee surveys of education and skills. Possible cost savings in the future from applying this information to guide planning decisions.

Action Items and Responsible Parties:

Community Development Department staff:

- Conduct education and housing studies as part of each Housing Element Update.
- Conduct marketing and outreach to recruit the desired employment and housing types to Vacaville.

Implementation Schedule: Ongoing

QUANTIFIED TRANSPORTATION MEASURES

TR-1 BIKEWAY PLAN

Develop and implement a Bikeway Plan that provides connections to the existing bikeway network and improves access to schools, Downtown, and large employment sites in the northeast quadrant of the city, and include strategies to support bicycle use.

VMT REDUCTION: Approximately 68 miles per year

PERCENT OF TOTAL VMT REDUCTIONS: Less than 1 percent

REDUCES VMT BY:

- Increasing bicycling as a viable mode of transportation.
- Reducing automobile use and associated fossil-fuel consumption.

VMT REDUCTION ASSUMES:

- A 0.1 percent reduction in vehicle use for trips of 5.0 miles or less.

COST EFFECTIVENESS: HIGH

Staff time would be needed to draft, adopt, and implement the plan, as well as any consultant costs to prepare the plan. The City and/or developers would incur costs associated with construction and maintenance expenses to implement the plan. Costs related to additional infrastructure such as bike signals, crossings, loop detectors, etc. would depend on the number and type of facilities installed. Costs could range from as high as $550,000 per mile for separated Class I bicycle trails, to $2,500 per mile for shared-lane Class III bike routes. Because bicycle routes are an important component of plans to reduce commute- and school-related trips, this measure supports the significant VMT reductions associated with measures TR-4, TR-5, and TR-6, and is therefore considered highly cost effective.

ACTION ITEMS AND RESPONSIBLE PARTIES:

Community Development and Public Works Department staff:

- Develop and implement a bikeway plan that meets the guidelines established in the measure.

IMPLEMENTATION SCHEDULE: 2014–2015

TR-2 Bike Parking in Commercial Development and Park-and-Ride Lots

Continue to require bike parking in new commercial developments and at park-and-ride lots. Long-term parking and areas that are protected from the elements should be provided at park-and-ride lots and for employees in commercial areas. Short-term parking, such as U-racks, should be provided for visitors in commercial areas in close proximity to store entrances.

VMT Reduction: Approximately 1,707 miles per year

Percent of Total VMT Reductions: 2 percent

Reduces VMT By:

- Increasing bicycling as a viable mode of transportation.
- Reducing automobile use and associated fossil-fuel consumption.

VMT Reduction Assumes:

- A 0.625 percent reduction in vehicle use for trips of 5.0 miles or less.

Cost Effectiveness: Unknown

Staff time would be needed to amend the Land Use and Development Code to incorporate these requirements. The City and property owners would fund the installation and maintenance of bicycle parking in new development. The costs of bicycle parking vary greatly depending on the number and type of installations, from $50 to $200 per space for a conventional bike rack up to $950 to $2500 for secure bicycle lockers.[1] Costs to business owners would decrease if bicycle parking is used in lieu of car parking. Improved health and productivity of residents and employees could yield indirect cost savings.

Action Items and Responsible Parties:

Community Development and Public Works Department staff:

- Amend the Land Use and Development Code to include the bicycle parking requirements in measure TR-2, including long-term parking facilities for employees in commercial areas.
- Work with Caltrans to ensure that bike parking is available at park and ride lots in Vacaville.
- Review project plans and environmental documents for consistency with measure TR-2.

Developers/Property owners:

- Design and construct short-term and long-term bike parking areas for new commercial developments and at park-and-ride lots.

Implementation Schedule: Ongoing

[1] Benjamin, Matthew T., 2003, *Bicycle Parking: A Plan for the Los Angeles County Metropolitan Transportation Authority*.

TR-3 Shared Parking and Infill Parking Reductions

Revisit off-street parking ordinances to encourage shared parking and parking maximums. Reduce required parking as an incentive for infill development and the installation of bikeways and bicycle parking.

VMT Reduction: Approximately 21,000 miles per year

Percent of Total VMT Reductions: 26 percent

Reduces VMT By:

- Reducing incentives to drive by reducing parking options.
- Increasing efficient land use by using less land for parking.
- Increasing bicycling and other forms of alternative transportation as viable mobility choices.
- Reducing automobile use and associated fossil-fuel consumption.

VMT Reduction Assumes:

- A 9.0 percent reduction in vehicle trips associated with new development.

Cost Effectiveness: High

Developers and landowners could save substantial money by increasing the amount of property that can be developed and reducing the amount of land that must be bought to provide parking. Potential indirect costs could result from increased demand for on-street parking, in the event that developments do not provide sufficient private parking to meet the needs of their users. Indirect cost savings would result from reduced traffic congestion and air pollution as VMT decreases. City costs would stem from staff time costs for the drafting and adoption of changes to development and parking standards.

Action Items and Responsible Parties:

Community Development and Public Works Department staff:

- Amend the parking requirements of the Land Use and Development Code to include measure TR-3.
- Review architectural plans and environmental documents for consistency with measure TR-3.

Developers/Property owners:

- Design and construct shared-parking features and apply parking standards for new development projects that are consistent with measure TR-3.

Implementation Schedule: 2014–2015

TR-4 Voluntary Trip Reduction Program

Implement a voluntary employer-based trip reduction program for all existing and future employers. The program could include a resource page on the City's website for trip reduction information, a direct link to the Solano-Napa Commuter Information Program website, and promotional events. The City could also encourage employers, including State and County government employers in Vacaville (e.g. the California Medical Facility) to implement ride-sharing programs, such as a carpooling matching service and preferred parking for vanpools and carpools.

VMT Reduction: Approximately 23,184 miles per year

Percent of Total VMT Reductions: 29 percent

Reduces VMT By:

- Increasing opportunities for employees to reduce their driving through transit use, bicycling, carpooling, vanpooling, and/or telecommuting.
- Reducing automobile use and associated fossil-fuel consumption.

VMT Reduction Assumes:

- A 5.2 percent reduction in vehicle use for work commute trips for all employment sites.

Cost Effectiveness: High

Costs from staff time needed to collect information and to conduct outreach and provide informational materials to businesses. See the cost effectiveness analysis for measure TR-5 for a detailed discussion of the possible costs and benefits of trip reduction programs. Any costs to employers would be voluntary.

Action Items and Responsible Parties:

Public Works Department staff:

- Conduct outreach and provide informational materials to existing and future employers.

Employers:

- Develop and offer trip reduction programs.

Implementation Schedule: 2014–2015

TR-5 Commute Reduction Strategies

Encourage employers to allow telework (where employees work from home or other satellite locations close to home), institute flexible work schedules, and provide employer-sponsored vanpools.

VMT Reduction: Approximately 12,886 miles per year

Percent of Total VMT Reductions: 16 percent

Reduces VMT By:

- Allowing employees to reduce driving.
- Reducing automobile use and associated fossil-fuel consumption.

VMT Reduction Assumes:

- A 2.8 percent reduction in work commute trips.

Cost Effectiveness: High

City costs would stem from staff time needed to craft and adopt city policies to encourage implementation of telecommuting and outreach to employers. The City could benefit from indirect long-term costs savings from decreased traffic congestion and air pollution. Vacaville employers would incur costs from implementing and administering telecommute programs, such as acquiring the technology and personnel needed to administer a telecommuting system. However, reduced need for parking spaces and office space could more than offset these costs, and employers could benefit from improved worker productivity and morale. Employees would save money on car maintenance and gas.

Action Items and Responsible Parties:

Public Works Department Staff:

- Contact employers to encourage commute reduction strategies.

Employers:

- Develop and offer commute reduction strategies.

Developers/Property owners:

- Include telework, flexible work schedules, and provide employer-sponsored vanpools as part of development application and implement upon project completion.

Implementation Schedule: 2014–2015

TR-6 School Trip Reduction

Continue to support school districts and the Solano Transportation Authority in encouraging participation in *Schoolpools*, a ridesharing program for school children, and/or work with a private entity to establish a transportation service for children to schools, households, and other activities.

VMT Reduction: Approximately 13,643 miles per year

Percent of Total VMT Reductions: 17 percent

Reduces VMT By:

- Increasing viable transportation opportunities for school-age children to get to and from school.
- Reducing automobile use and associated fossil-fuel consumption.

VMT Reduction Assumes:

- An 11.5 percent reduction in vehicle use for school trips.

Cost Effectiveness: High

Costs from staff time needed to coordinate with school districts, as well as STA and/or a private entity to promote *Schoolpool* programs. Residents will save money by decreasing the need to transport their children to and from school, thereby saving time, fuel, and other vehicle-related costs. The City could benefit from indirect long-term cost savings by reducing traffic congestion and air pollution.

Action Items and Responsible Parties:

Public Works Department staff, School Districts, and STA:

- Continue to support the *Schoolpool* program

Parents and caregivers:

- Continue to participate in the *Schoolpool* program.

Implementation Schedule: Ongoing

TR-7 Shuttle Service for Major Employment Centers

Encourage new, large employers, defined as having a minimum of 100 employees, to provide employer-sponsored shuttles or vanpools (operated by employees) that provide direct service between major employment centers and the Vacaville Transportation Center.

VMT Reduction: Approximately 417miles per year

Percent of Total VMT Reductions: 1 percent

Reduces VMT By:

- Allowing employees to reduce driving by taking shuttles to the Vacaville Transportation Center.
- Reducing automobile use and associated fossil-fuel consumption.

VMT Reduction Assumes:

- A 1.7 percent reduction in vehicle use for work trips generated by new development with 100 or more employees.

Cost Effectiveness: Unknown

The City would incur costs from staff time needed to craft and adopt City ordinances to implement the measure, but could potentially benefit from indirect long-term savings from decreased congestion and air pollution. New Vacaville employers that participate would incur costs from the initiation and ongoing operation of shuttle/vanpool services. Costs for such transport vary considerably depending on vehicle types, frequency, and other factors. If employers are able to decrease their overall parking needs through these programs, and can thus provide fewer parking spaces, cost savings have the potential to more than offset program costs. Employees would save money on car maintenance and gas.

Action Items and Responsible Parties:

Community Development Department and Public Works Department staff:

- Amend the Land Use and Development Code to encourage measure TR-7.
- Review proposed development applications for consistency with measure TR-7.

Large employers:

- Provide shuttle service to Vacaville Transit Center.

Developers/Property owners:

- Include employer-sponsored vanpools or shuttles that provide direct service between major employment centers and the Vacaville Transportation Center as part of development application and implement upon project completion.

Implementation Schedule: 2015–2020

TR-8 Parking Cash-Out

Encourage new employers to offer employee parking cash-out. Parking cash out allows workers to receive a regular payment when they consistently forgo the use of a parking spot their vehicle would otherwise occupy.

VMT Reduction: Approximately 1,171 miles per year

Percent of Total VMT Reductions: 1 percent

Reduces VMT By:

- Providing incentives for employees to use alternative modes of transportation.
- Reducing construction of parking spaces.
- Reducing automobile use and associated fossil-fuel consumption.

VMT Reduction Assumes:

- A 0.75 percent reduction in vehicle use for work trips.

Cost Effectiveness: High

The City would incur costs from staff time needed to craft and adopt city ordinances to implement measure TR-8, but would possibly realize indirect long-term savings from decreased congestion and air pollution. Vacaville employers would incur ongoing costs from parking cash-out programs, which could be offset by decreased costs to provide parking. Employees would save money on car maintenance and gas.

Action Items and Responsible Parties:

Community Development Department staff:

- Amend the Land Use and Development Code to encourage measure TR-8.
- Review proposed development applications and for consistency with measure TR-8.

Large employers:

- Offer parking cash-out programs.

Developers/Property owners:

- Design and implement employee parking cash-out program.

Implementation Schedule: 2014–2015

TR-9 Transit Network Expansions

Expand the transit network as demand warrants, funding allows, and State farebox recovery is achieved to include service to large employers and park-and-ride lots, and ensure that information about transit connections is added to the City Coach and City of Vacaville's websites.

VMT Reduction: Approximately 5,059 miles per year

Percent of Total VMT Reductions: 6 percent

Reduces VMT By:

- Increasing convenience of public transit and encouraging public transit use.
- Reducing automobile use and associated fossil-fuel consumption.

VMT Reduction Assumes:

- A 0.6 percent reduction in vehicle trips.

Cost Effectiveness: Unknown

The City would incur costs to pay for new transit vehicles, stops, and operators. However, total costs to the City will depend on the specific future expansions and the amount of future funding available from State and federal sources. Residents and businesses could experience indirect savings from decreased parking, fuel, and other vehicle-related costs.

Action Items and Responsible Parties:

Public Works Department staff:

- Monitor transit demands, funding, and State farebox recovery, and expand the transit network as appropriate and where demand warrants and funding allows.
- Maintain the City Coach and City of Vacaville websites to ensure that current transit information is provided.

Implementation Schedule: 2014–2015

NON-QUANTIFIED TRANSPORTATION MEASURES

The following measures (TR-10 through TR-27) would not result in a measureable reduction in GHG emissions in Vacaville beyond measures TR-1 through TR-9. Therefore, the matrix does not show a quantified percent of total VMT reductions for the non-quantified measures, and it does not list any assumptions. However, they support measures TR-1 through TR-9, and are important in helping to reach the City's overall goal of reducing GHG emissions in Vacaville. Some measures, such as TR-10, address concerns raised by the community as priorities for the General Plan Update.

TR-10 PEDESTRIAN PLAN AND IMPROVEMENTS

Develop a pedestrian plan and implement network improvements, especially where needed to fill in gaps in the existing network. Include baseline data with goals to increase the percent of walking for transportation purposes.

REDUCES GHG BY:

- Encouraging walking as a viable alternative mode of transportation.
- Increasing convenient trip distance, comfort, and safety for pedestrians.
- Decreasing conflicts between pedestrians and other vehicles.

COST EFFECTIVENESS: MODERATE

Costs from staff time needed to draft, adopt, and implement the pedestrian plan and associated third-party costs to assist the City if needed. The significant improvements to the pedestrian system would make them more viable and useful.

ACTION ITEMS AND RESPONSIBLE PARTIES:

Community Development and Public Works Department staff:

- Develop a pedestrian plan that meets the guidelines established in measure TR-10.
- Implement network improvements, especially where needed to fill in gaps in the existing network.

IMPLEMENTATION SCHEDULE: 2014–2015

TR-11 Bike Parking for Multi-Family Residential Uses

Require the provision of secure bike parking, protected from the elements, for multi-unit residential developments that lack individual garages.

Reduces GHG By:

- Improving and expanding bike parking facilities.
- Encouraging residents to bicycle as a viable mode of transportation.
- Reducing automobile use and associated fossil-fuel consumption.

Cost Effectiveness: Unknown

Staff time to draft and adopt ordinances to implement measure requirements. Costs to residents would be negligible, but developers would bear the costs of providing required bicycle parking. Potential cost-savings for developers if bicycle parking and facilities are used in lieu of or as a direct replacement for automobile parking.

Action Items and Responsible Parties:

Community Development Department staff:

- Amend the Land Use and Development Code to include measure TR-11.
- Review proposed development applications and environmental documents for consistency with measure TR-11.

Developers/Property owners:

- Design and construct bicycle parking and amenities for new development projects.

Implementation Schedule: 2015–2020

TR-12 Multi-Use Trails in Large Developments

Require developments requiring specific plans to provide land for multi-use trails that connect to existing or future bikeways, according to the adopted bikeway plan.

Reduces GHG By:

- Increasing convenient trip distance, comfort and safety for pedestrians and bicyclists.
- Encouraging walking and bicycling as viable alternative modes of transportation.
- Decreasing conflicts between pedestrians and other vehicles.
- Reducing automobile use and associated fossil-fuel consumption.

Cost Effectiveness: Unknown

Staff time to draft and adopt ordinances to implement measure requirements. Costs to City if and when it extends bicycle infrastructure to such dedicated land. Developers could bear negligible costs indirectly through loss of developable space.

Action Items and Responsible Parties:

Community Development and Public Works Department staff:

- Amend the Land Use and Development Code to include measure TR-12.
- Review proposed development applications and environmental documents for consistency with measure TR-12.

Developers/Property owners:

- Design and construct large developments to include land for multi-use trails that connect to existing or future bikeways, according to the adopted bikeway plan.

Implementation Schedule: 2014–2015

TR-13 End-of-Trip Bike Facilities

Encourage employers to provide end-of-trip facilities for bicyclists, such as secure parking and locker, shower, and changing room facilities.

Reduces GHG By:

- Improving and expanding bike parking facilities.
- Increasing convenience and comfort of bicycling.
- Encouraging residents to bicycle as a viable mode of transportation.
- Reducing automobile use and associated fossil-fuel consumption.

Cost Effectiveness: Unknown

Costs from staff time needed to draft and adopt ordinances to implement measure. Potential costs to employers and potentially developers for providing bicycle parking and shower facilities. Possible cost savings to developers if bicycle parking and facilities are used in lieu of or as a direct replacement for automobile parking.

Action Items and Responsible Parties:

Community Development Department staff:

- Amend the Land Use and Development Code to include measure TR-13.
- Review proposed development applications and environmental documents for consistency with measure TR-13.

Developers/Property owners:

- Include end-of-trip facilities for bicyclists as part of development application and implement upon project completion.

Implementation Schedule: 2014–2015

TR-14 Incentives for Electric Vehicle Stations

Support existing programs that provide incentives for developers and private business to install electric charging vehicle stations in residential and commercial developments.

Reduces GHG By:

- Encouraging the use of electric vehicles as a viable mode of transportation.
- Increasing the use of renewable energy by decreasing fossil fuel demand.
- Reducing automobile use and associated fossil-fuel consumption.

Cost Effectiveness: Unknown

Costs from staff time needed to provide support for incentive programs. Possible cost savings to property owners and developers by decreasing the expenses associated with installation of electric vehicle charging stations.

Action Items and Responsible Parties:

Community Development Department staff:

- Provide support to existing incentive programs, such as providing information and links on the City's website and preparing brochures.

Implementation Schedule: 2014–2015

TR-15 Electric Vehicle Stations in High Traffic Areas

Continue to install electric vehicle charging stations in high traffic areas. As charging stations are installed, continue to update the City's map of electric vehicle charging stations on its website and provide information to the Solano Transportation Authority for their public outreach.

Reduces GHG By:

- Encouraging the use of electric vehicles as a viable mode of transportation.
- Increasing the use of renewable energy by decreasing fossil fuel demand.
- Reducing automobile use and associated fossil-fuel consumption.

Cost Effectiveness: Unknown

Costs to City from installation of charging stations, and costs from staff time needed to identify high traffic areas and maintain up-to-date information about charging stations.

Action Items and Responsible Parties:

Public Works Department staff:

- Identify high traffic areas and continue to install electric vehicle charging stations in these areas.
- Maintain up-to-date information about charging stations on the City's website and with the Solano Transportation Authority.

Implementation Schedule: Ongoing

TR-16 Solar Power for Electric Vehicle Charging Stations

Continue to use solar panels to power or supplement electric vehicle charging stations where geographically possible, demand warrants, and funding allows.

Reduces GHG By:

- Encouraging the use of electric vehicles as a viable mode of transportation.
- Increasing the use of renewable energy by decreasing fossil fuel demand.
- Reducing automobile use and associated fossil-fuel consumption.

Cost Effectiveness: High

Costs from staff time needed to continue ongoing policies relating to solar panel installation at charging stations. Potential cost and savings to City through the installation of these solar systems; however, solar powers systems typically offset their own costs over a relatively short timeframe.

Action Items and Responsible Parties:

Community Development and Public Works Department staff:

- Continue to use solar panels to power and supplement electric vehicle charging stations.

Implementation Schedule: Ongoing

TR-17 Preferred Parking for Low-Carbon Vehicles

As new development occurs or parking lots are re-striped, evaluate the demand for designated preferred parking spaces for low-carbon, electric, and carpool vehicles in City-owned lots and Downtown.

Reduces GHG By:

- Providing incentives for using low-carbon, electric, and carpool vehicles.
- Encouraging the use of low-carbon, electric vehicles, and carpooling as a viable modes of transportation.
- Increasing the use of renewable energy by decreasing fossil fuel demand.
- Reducing automobile use and associated fossil-fuel consumption.

Cost Effectiveness: High

Costs from staff time needed to administer the selection and creation of designated parking spaces and associated costs from signing, striping, or other means to demarcate such dedicated spots.

Action Items and Responsible Parties:

Community Development and Public Works Department staff:

- Designate preferred parking through the installation of appropriate signage and parking enforcement.

Implementation Schedule: 2014–2015

TR-18 Transportation Demand Management

Continue to coordinate with STA on TDM planning, TDM activities, TDM requirements, and education and outreach programs through the Solano Napa Commuter Information (SNCI) website.

Reduces GHG By:

- Promoting alternative modes of transportation as viable options for travel.
- Increasing the use of renewable energy by decreasing fossil fuel demand.
- Reducing automobile use and associated fossil-fuel consumption.

Cost Effectiveness: High

City costs would stem from staff time needed for ongoing coordination efforts with the Solano Transportation Authority.

Action Items and Responsible Parties:

Public Works Department staff:

- Continue to coordinate with STA on TDM planning, activities, and requirements and education and outreach.

Implementation Schedule: Ongoing

TR-19 Commuter Info Website

Provide a prominent link on the City's website to the Solano Transportation Authority's (STA) Commuter Info website, and work with STA to provide up-to-date commute information in Vacaville.

Reduces GHG By:

- Increasing convenience of public transit.
- Encouraging public transit as a viable alternative mode of transportation.
- Reducing automobile use and associated fossil-fuel consumption.

Cost Effectiveness: High

Costs from staff time needed to coordinate with STA and to provide a link to the relevant commute information.

Action Items and Responsible Parties:

Public Works Department staff:

- Add a prominent link on the City's website to the STA Commuter Info website.
- Coordinate with STA on commute information in Vacaville.

Implementation Schedule: 2014–2015

TR-20 School Transit Options

Support efforts by the school districts to improve transit options for students, which could include reinstatement of school busing or working with the Solano Transportation Authority to provide free or subsidized bus passes to students in Vacaville.

Reduces GHG By:

- Providing incentives for public transit use.
- Increasing convenience of public transit and creating new long-time users.
- Encouraging public transit as a viable alternative mode of transportation.
- Reducing automobile use and associated fossil-fuel consumption.

Cost Effectiveness: Unknown

City costs would stem from staff time needed to coordinate with school districts and the STA to improve transit options. Potential cost savings to residents from reduced fuel costs, and other vehicle-maintenance costs.

Action Items and Responsible Parties:

Public Works Department staff:

- Work with the school districts and STA to improve transit options.

Implementation Schedule: 2014–2015

TR-21 Public Transit for Schools

Continue to market, promote, and educate students and parents about the benefits of using public transit as a mode of travel to school, considering the comments and concerns of the Vacaville and Travis School Districts.

Reduces GHG By:

- Encouraging students to use transit as a viable mode of transportation.
- Creating new long-time users of public transit.
- Reducing automobile use and associated fossil-fuel consumption.

Cost Effectiveness: Unknown

City costs would stem from staff time needed to coordinate with school districts, as well as provide promotional materials and conduct student outreach. Potential cost savings to residents from reduced fuel costs, and other vehicle-maintenance costs.

Action Items and Responsible Parties:

Public Works Department staff:

- Continue coordinating with school districts on outreach activities to promote transit use by students.

Implementation Schedule: Ongoing

TR-22 Safe Routes to School

Coordinate with local schools and the school district to improve walking and biking access to school by providing input and staff support for Safe Routes To School grant applications and implementation of projects.

Reduces GHG By:

- Increasing safe walking and biking opportunities for school-age children to get to and from school.
- Reducing automobile use and associated fossil-fuel consumption.

Cost Effectiveness: High

Costs from staff time needed to coordinate with local schools and school districts to apply for grants and implement projects. Residents will save money by decreasing the need to drive their children to and from school, thereby saving time, fuel, and other vehicle-related costs. The City could benefit from indirect long-term cost savings by reducing traffic congestion and air pollution.

Action Items and Responsible Parties:

Public Works Department staff, Local Schools, and School Districts:

- Apply for Safe Routes To School grants.
- Implement Safe Routes To School projects.

Implementation Schedule: 2014–2015

TR-23 SCHOOL BUSING

Encourage the State of California to reinstate school busing.

REDUCES GHG BY:

- Encouraging alternative transportation options for school-age children to get to and from school.
- Reducing automobile use and associated fossil-fuel consumption.

COST EFFECTIVENESS: HIGH

According to the National Center for Education Statistics, the average annual cost of school busing is $941 per student,[2,3] which includes labor and vehicle expenses. However, such costs vary widely and are highly dependent on the geography of individual school districts. Rural districts and some urban districts with higher costs of living and wages would tend to have higher school busing costs than suburban school districts, such as Vacaville's. Vacaville's traffic model estimates that median trip lengths for school-related trips range from 1 to 3 miles, depending on the school type. Using a 2-mile one-way trip distance estimate, the total trip distance per day would be 8 miles. Multiplied by the 2013 IRS mileage reimbursement rate of 56.5 cents per mile, this equates to approximately $4.50 per school day for vehicle costs.[4] Assuming the driver travels about ½ mile per minute plus time to walk to and from the car, the total driver time per school day is about 20 minutes. With an average time value of $11 per hour,[5] the time costs per school day are about $3.67. The State of California requires a minimum of 175 school days per year for public schools;[6] therefore, the total annual vehicle and time costs for transporting a single student to school by a privately operated vehicle is approximately $1,430. Therefore, school buses represent, on average, a more cost-effective method of transporting students to school than privately operated vehicles.

ACTION ITEMS AND RESPONSIBLE PARTIES:

City Manager's Office and City Council:

- Lobby the State to require school districts to provide busing to school for all students.

School Districts:

- Reinstitute busing programs that provide service to all students.

IMPLEMENTATION SCHEDULE: 2014–2015

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[2] National Center for Education Statistics, Fast Facts, http://nces.ed.gov/fastfacts/display.asp?id=67, accessed on August 12, 2013.

[3] Bureau of Labor Statistics – CPI Inflation Calculator, http://www.bls.gov/data/inflation_calculator.htm, accessed on August 12, 2013.

[4] CalChamber – IRS Announces 2013 Mileage Reimbursement Rates, http://www.calchamber.com/headlines/pages/11272012-irsannounces2013mileagereimbursementrates.aspx, accessed on August 12, 2013.

[5] The median household income in Solano County is $70,000. There are 2,080 work hour per year, so the median household income equates to $33.65 per hour. When using hourly income as a measure of people's value of travel time, typically 1/3 to ½ of the hourly income is used, which equates to $11 per hour.

[6] California Watch – Districts consider an even shorter school year, http://californiawatch.org/daily report/districts-consider-even-shorter-school-year-10023, accessed on August 12, 2013.

TR-24 Transit Stop Amenities

Implement improvements to transit stops, such as real-time transit information and shelters, where demand warrants and funding allows, and access for passengers arriving by foot, and require transit stop improvements as conditions of approval for nearby development as appropriate.

Reduces GHG By:

- Increasing comfort and convenience of public transit.
- Encouraging the use of transit as a viable mode of transportation.
- Reducing automobile use and associated fossil-fuel consumption.

Cost Effectiveness: Unknown

Costs from staff time needed from efforts to initiate and oversee transit stop improvements, as well as the need to craft and adopt development standards to implement measure requirements.

Action Items and Responsible Parties:

Public Works Department staff:

- Implement transit stop improvements and pedestrian access where demand warrants and funding allows.
- Amend the Land Use and Development Code to include measure TR-24.
- Review proposed development applications and environmental documents for consistency with measure TR-24.

Developers/Property owners:

- Design and construct transit stop improvements as part of new development.

Implementation Schedule: 2014–2015

TR-25 Traffic Flow Improvements

Continue to implement strategies to improve signalization, incident responsiveness, traveler information systems (such as wayfinding and real-time traveler information), and active traffic management to smooth traffic flow as budget and staff levels allow.

Reduces GHG By:

- Improving traffic management and reducing congestion.
- Increasing automobile efficiency and reducing associated fossil-fuel consumption.

Cost Effectiveness: Unknown

Costs from staff time needed to implement strategies and costs of materials associated with measure TR-25.

Action Items and Responsible Parties:

Public Works Department staff:

- Continue to implement strategies from measure TR-25 that will smooth traffic flow.

Implementation Schedule: Ongoing

TR-26 Impact Fees for Alternative Transportation

Continue to include pedestrian, bicycle and transit facilities in projects funded by Vacaville's transportation impact fee program, and consider including specific improvements to pedestrian, bicyclist and transit facilities as part of the Transportation Impact Fee updates if a nexus between those improvements and new development can be demonstrated.

Reduces GHG By:

- Providing financial support for the implementation of other transportation measures.
- Promoting alternative modes of transportation as viable choices within Vacaville.

Cost Effectiveness: Unknown

City costs would stem from staff time needed to draft and adopt implementing ordinances to allow transportation impact fees to be used for pedestrian, bicyclist, and transit facilities. Residents could potentially realize indirect benefits through improved convenience and safety for transit riders, pedestrians, and bicyclists.

Action Items and Responsible Parties:

Public Works Department staff:

- Conduct a nexus study and revise the transportation impact fee program to cover alternative transportation.

Implementation Schedule: 2014–2015

TR-27 Electric Loading Docks

Require electric loading docks for large developments with 100 or more employees that receive deliveries by refrigerated trucks.

Reduces GHG By:

- Decreasing the delivery truck engine use and reducing diesel use.
- Increasing the opportunity for renewable energy source use.

Cost Effectiveness: Unknown

City costs would stem from staff time needed to craft and adopt City ordinances to implement measure requirements. Businesses that receive refrigerated stock would incur costs for electrical system installation under the measure.

Action Items and Responsible Parties:

Community Development Department staff:

- Amend the Land Use and Development Code to include measure TR-27.
- Review proposed development applications and environmental documents for consistency with measure TR-27.

Developers/Property owners:

- Design and construct electric loading docks for large developments that receive deliveries by refrigerated trucks.

Implementation Schedule: 2014–2015

GREEN BUILDING

The green building measures would not result in measureable reductions in GHG emissions in Vacaville beyond the reductions accounted for in the adjusted BAU forecast described in Chapter 3 (e.g. Title 24 standards) and the measures in other sectors of this Energy and Conservation Action Strategy. Therefore, the matrix does not show a quantified percent of total GHG reductions for these non-quantified measures, and it does not list any assumptions. However, they are important in helping to reach the City's overall goal of reducing GHG emissions in Vacaville. A summary of the implementation items for each green building measure is provided in Table 5-3.

How Green Building Measures Reduce GHGs

Green building measures would reduce GHG emissions because they would decrease the energy and water used in buildings, resulting in lower demand for both electricity and natural gas. Similarly, storing, treating, and conveying the water used in buildings requires energy for both construction and operation of water-system infrastructure. (For additional discussion of water-related energy use, see the introduction to the section on water and wastewater.) Because much of our energy—whether for construction, electricity, heating, water, or cars and trucks—currently comes from GHG-producing fossil fuels, direct and indirect decreases in energy use lead to reduced GHG emissions.

Other Benefits of Green Building Measures

Green building includes a diverse range of practices that offer different ways to achieve the same goal of energy conservation. The reduced energy and water use associated with green building practices reduces other environmental impacts from using up these important resources and improves the long-term reliability of water and energy sources. Additionally, some green building practices alleviate both urban heat-island effects and stormwater runoff, making communities more livable and resilient in the face of both typical and extreme weather. Green building practices can also contribute directly to human health and wellbeing by reducing indoor air pollution and increasing access to natural light. Certain green building practices such as green roofs, bioswales, and living walls can even provide habitat and foraging opportunities for urban wildlife. Finally, through this array of benefits, green building provides an opportunity to create connections between the natural and built environments and residents.

TABLE 5-3 **GREEN BUILDING MEASURES**

Measure Number	Measure Text	GHG ($MTCO_2e$) and VMT Reduction (Per Year)	% of Total Reduction for this Sector	% of Total Reduction	Cost Effectiveness	Responsible Party	Implementation Schedule
GB-1	Allow greater permitting-related development flexibility and other incentives for LEED-Silver, Build It Green, GreenPoint or equivalent rating; for example, by giving green projects priority in plan review, processing, and field inspection services.	--			High	City/Development	2014–2015
GB-2	Require measures that reduce energy use through solar orientation by taking advantage of shade, prevailing winds, landscaping, and sun screens, unless prohibited by topographical conditions or other site-specific constraints.	--			Moderate	City/Development	2015–2020
GB-3	Provide links to programs and information about green building, including training and technical assistance, on the City's website.	--			Unknown	City	2015–2020
GB-4	Coordinate with other local governments, special districts, nonprofits, and other public organizations to share resources, achieve economies of scale, and develop green building policies and programs that are optimized on a regional scale.	--			High	City/Other Agencies	2014–2015
GB-5	Develop a "heat island" mitigation plan that includes guidelines for cool roofs, cool pavements, and strategically placed shade trees.	--			High	City/Development	2014–2015

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GB-1 Incentives for Green Building Certification

Allow greater permitting-related development flexibility and other incentives for LEED-Silver, Build It Green, GreenPoint, or equivalent rating; for example, by giving green projects priority in plan review, processing, and field inspection services.

Reduces GHG By:

- Providing incentives that promote the use of clean energy and reduced energy demand.
- Supporting increased use of clean energy/carbon-neutral energy sources.
- Supporting reduced energy demand from fossil fuels.
- Supporting reduced overall energy use.

Cost Effectiveness: High

Costs from staff time needed to draft and adopt implementing language and for processing permitting or other ministerial incentives. Developers/property owners would potentially save money on permitting costs and faster approval/construction times.

Action Items and Responsible Parties:

Community Development Department staff:

- Establish incentives for LEED-Silver, Build-It-Green, or GreenPoint or equivalent rating.
- Review development project applications to consider whether projects meet the incentives' certification/rating requirements, and then follow through with the incentives (e.g. by prioritizing the project above others that do not meet the incentive's requirements).

Implementation Schedule: 2014–2015

GB-2 Solar Orientation

Require measures that reduce energy use through solar orientation by taking advantage of shade, prevailing winds, landscaping, and sun screens, unless prohibited by topographical conditions or other site-specific constraints.

Reduces GHG By:

- Supporting increased use of clean energy/carbon-neutral energy sources.
- Supporting reduced energy demand from fossil fuels.
- Supporting reduced overall energy use.
- Supporting increased use of carbon-storing biomass (trees and plants).

Cost Effectiveness: Moderate

Costs to the City from staff time needed to craft and adopt implementing ordinances for solar orientation requirements. Developers/property owners would potentially incur higher costs during development design, or for construction or materials; however, these costs could be partially or entirely offset by future energy savings.

Action Items and Responsible Parties:

Community Development Department staff:

- Amend the Land Use and Development Code to include measure GB-2.
- Review development plans and environmental documents for consistency with measure GB-2.

Developers/Property owners:

- Design and construct new projects to take advantage of shade, prevailing winds, landscaping, and sun screens.

Implementation Schedule: 2015–2020

GB-3 Green Building Information and Technical Assistance

Provide links to programs and information about green building, including training and technical assistance, on the City's website.

Reduces GHG By:

- Providing information to property owners, development professionals, schools, and special districts that enable the viable use of alternative energy sources.
- Supporting increased use of clean energy/carbon-neutral energy sources.
- Supporting reduced energy demand from fossil fuels.
- Supporting reduced overall energy use.

Cost Effectiveness: Unknown

Costs to the City from staff time needed for updates to the City's website. Potential cost savings for residents and businesses through the expertise and information offered by the green building programs. Long term savings for the City, residents, and businesses from reduced energy costs.

Action Items and Responsible Parties:

Community Development Department and Public Works Department staff:

- Provide links to programs and information about green building on the City's website.

Implementation Schedule: 2015–2020

GB-4 Regional Green Building Programs

Coordinate with other local governments, special districts, nonprofits, and other public organizations to share resources, achieve economies of scale, and develop green building policies and programs that are optimized on a regional scale.

Reduces GHG By:

- Supporting increased use of clean energy/carbon-neutral energy sources.
- Supporting reduced energy demand from fossil fuels.
- Supporting reduced overall energy use.

Cost Effectiveness: High

Costs of measure GB-4 would stem from additional staff-time for coordination activities and could range from high to low, depending on the approach taken. Successfully achieving regionally coordinated policies and economies of scale could offer significant cost-savings to the City and to property owners or businesses who must navigate multiple public processes.

Action Items and Responsible Parties:

Community Development Department staff:

- Coordinate, as applicable, with other agencies for regional green building initiatives.

Implementation Schedule: 2014–2015

GB-5 Heat Island Mitigation Plan

Develop a "heat island" mitigation plan that includes guidelines for cool roofs, cool pavements, and strategically placed shade trees.

Reduces GHG By:

- Supporting reduced energy demand from fossil fuels.
- Supporting reduced overall energy use.
- Supporting increased use of carbon-storing biomass (trees and plants).

Cost Effectiveness: High

Since the adopted plan would offer guidelines rather than establish requirements, this measure would impose no new costs. Due to the voluntary nature of the program and geographical variation in tree-planting benefits, it is not possible to precisely quantify potential costs or savings. However, studies have found that every dollar invested in urban trees can result in returns of $1.37 to $3.09 (2005 dollars). Additionally, urban tree planting has been found to reduce GHG emissions.

Action Items and Responsible Parties:

Community Development Department staff:

- Develop and adopt a heat island mitigation plan.

Developers/Property owners:

- Incorporate heat island mitigation guidelines into site and building designs.

Implementation Schedule: 2014–2015

RENEWABLE ENERGY AND LOW CARBON FUELS

As shown in Table 5-1, the renewable energy and low carbon fuels measures would reduce GHG emissions in Vacaville by 20 $MTCO_2e$. Table 5-4 provides a summary of the GHG emission reductions and implementation items for each renewable energy and low carbon fuels measure.

How Renewable Energy and Low Carbon Fuels Measures Reduce GHGs

Renewable energy and low carbon fuels measures are intended to limit and eventually eliminate the use of fossil fuels as energy sources. Carbon in fossil fuels largely remains bonded to other substances and isolated deep within the earth's crust. Burning fossil fuels to produce energy releases the carbon stored within the fossil fuel, mainly as carbon dioxide, the most common greenhouse gas. Low-carbon fuels are those which incorporate or are entirely composed of fuels whose production is carbon-neutral. Carbon-neutral fuels are created by processes which absorb as much carbon as will be released when the fuels are later burned. Fossil fuels, on the other hand, are carbon-intense because the process of extracting these fuels does not absorb any of the carbon that will be released when those fuels are burned. Increasing the use of renewable and carbon-neutral energy sources, such as solar, wind, and biomass (trees and plants) would reduce GHG emissions.

Other Benefits of Energy and Low Carbon Fuels Measures

Reduced energy use and alternative fuels serve to reduce other pollutants alongside GHGs. The extraction of conventional fossil fuels such as oil, coal, and natural gas also has impacts on the environment, including pollution and habitat disruption, which can be lessened through the increased use of renewable energy. Additionally, and perhaps most importantly, fossil fuels are a finite resource, subject to long-term shortages and short-term price volatility. Renewable energy, while not unlimited, will be continually replenished very long into the future; using renewable energy can thus insulate communities from volatile energy costs. Finally, by creating jobs and allowing energy needs to be met on a more local level, renewable energy and low carbon fuels add to the resilience and economic vitality of communities.

TABLE 5-4 **RENEWABLE ENERGY AND LOW CARBON FUELS MEASURES**

Measure Number	Measure Text	GHG ($MTCO_2e$) and VMT Reduction (Per Year)	% of Total Reduction for this Sector	% of Total Reduction	Cost Effectiveness	Responsible Party	Implementation Schedule
RE-1	Require that new or major rehabilitations of commercial, office, or industrial development greater than or equal to 10,000 square feet in size incorporate solar or other renewable energy generation to provide 15 percent or more of the project's energy needs unless prohibited by topographical conditions or other site-specific constraints. Major rehabilitations are defined as additions of 25,000 square feet of office/retail commercial or 100,000 square feet of industrial floor area. Remove regulatory barriers to incorporating renewable energy generation.	20 GHG	100%	<1%	High	City/Development	2014–2015
RE-2	Encourage residential projects of ten units or more to participate in the California Energy Commission's New Solar Homes Partnership, which provides rebates to developers of six units or more who offer solar power in 50 percent of new units and is a component of the California Solar Initiative, or a similar program with solar power requirements equal to or greater than those of the California Energy Commission's New Solar Homes Partnership.	--			High	City/Development	2014–2015
RE-3	Work with PG&E to develop an Alternative Energy Development Plan that: ➤ Establishes citywide measurable goals. ➤ Identifies the allowable and appropriate alternative energy facility types within the city, such as solar photovoltaic (PV) on residential and commercial roofs and wind turbines for home use. ➤ Proposes phasing and timing of alternative energy facility and infrastructure development. ➤ Establishes development review protocol for new alternative energy projects. ➤ Reviews City policies and ordinances to address alternative energy production. ➤ Identifies optimal locations and the best means to avoid noise, aesthetic, and other potential land use compatibility conflicts (e.g., installing tracking solar PV or angling fixed solar PV in a manner that reduces glare to surrounding land uses).	--			Unknown	City/PG&E	2015–2020
RE-4	Coordinate with other local governments, special districts, nonprofits, and other public organizations to share resources, achieve economies of scale, and develop alternative energy policies and programs that are optimized on a regional scale. As part of this measure, explore creation of a community choice aggregation program with the County of Solano.	--			High	City/Other Agencies	2014–2015
RE-5	Require that all new buildings be constructed to allow for the easy, cost-effective installation of future solar energy systems, unless prohibited by topographical conditions or other site-specific constraints. "Solar ready" features should include: proper solar orientation (i.e. south-facing roof area sloped at 20° to 55° from the horizontal); clear access on the south sloped roof (i.e. no chimneys, heating vents, plumbing vents, etc.); electrical conduit installed for solar electric system wiring; plumbing installed for solar hot water system; and space provided for a solar hot water storage tank.	--			High	City/Development	2014–2015
RE-6	Encourage the installation of solar photovoltaic arrays in new parking lots and replacement in existing parking lots.	--			High	City/Development	2014–2015

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QUANTIFIED MEASURES

RE-1 RENEWABLE ENERGY GENERATION IN PROJECTS

Require that new or major rehabilitations of commercial, office, or industrial development greater than or equal to 10,000 square feet in size incorporate solar or other renewable energy generation to provide 15 percent or more of the project's energy needs unless prohibited by topographical conditions or other site-specific constraints. Major rehabilitations are defined as additions of 25,000 square feet of office/retail commercial or 100,000 square feet of industrial floor area. Remove regulatory barriers to incorporating renewable energy generation.

GHG EMISSIONS REDUCTION: 20 $MTCO_2e$ per year

PERCENT OF TOTAL GHG REDUCTION: Less than 1 percent

REDUCES GHG BY:

- Increasing use of clean energy/carbon-neutral energy sources.
- Reducing demand of energy from fossil fuels.
- Decreasing overall energy use.

GHG REDUCTION ASSUMES:

- 4.5 non-residential buildings will be constructed/remodeled over the next eight years (0.6 per year) that will include PV, increasing to 20 by 2035.

COST EFFECTIVENESS: HIGH

City costs would stem from staff time needed to draft and implement new or major rehabilitations requirements consistent with measure RE-1. Total materials and labor costs would vary by site, system characteristics and size. Energy savings from photovoltaic systems in Vacaville currently recover installation costs after about 15 years of operation.[7] Anticipated system lifetimes of 20 years or more and low maintenance costs enhance the long-term savings from photovoltaic systems.[8]

ACTION ITEMS AND RESPONSIBLE PARTIES:

Community Development Department staff:

- Amend the Land Use and Development Code to incorporate measure RE-1.
- Review architectural plans and environmental documents for consistency with measure RE-1.

Developers/Property owners:

- Design and construct applicable projects to incorporate solar or other renewable energy generation to provide 15 percent or more of the project's energy needs.

IMPLEMENTATION SCHEDULE: 2014–2015

[7] FindSolar Solar Calculator, http://www.findsolar.com/, accessed on May 21, 2012.

[8] Barbose, Galen, et al., 2011, Report: *Tracking the Sun IV: An Historical Summary of the Installed Cost of Photovoltaics in the United States from 1998 to 2010*, Lawrence Berkeley National Laboratory.

NON-QUANTIFIED MEASURES

The following measures (RE-2 through RE-6) would not result in a measureable reduction in GHG emissions in Vacaville beyond the other measures modeled for this sector. Therefore, the matrix does not show a quantified percent of total GHG reductions for the non-quantified measures, and it does not list any assumptions. However, they support measure RE-1 and are important in helping to reach the City's overall goal of reducing GHG emissions in Vacaville.

RE-2 New Solar Homes Partnership

Encourage residential projects of ten units or more to participate in the California Energy Commission's New Solar Homes Partnership, which provides rebates to developers of six units or more who offer solar power in 50 percent of new units and is a component of the California Solar Initiative, or a similar program with solar power requirements equal to or greater than those of the California Energy Commission's New Solar Homes Partnership.

Reduces GHG By:

- Increasing use of clean energy/carbon-neutral energy sources.
- Reducing demand of fossil fuels.
- Decreasing overall energy use.

Cost Effectiveness: High

Costs from staff time needed to draft and adopt the enabling ordinance for measure RE-2. Costs to developers and potentially homeowners to install solar panels, and PG&E to provide rebates for solar installations. Savings on energy costs for homeowners.

Action Items and Responsible Parties:

Community Development Department staff:

- Amend the Land Use and Development Code to incorporate measure RE-2.

Developers/Property owners:

- Design and construct residential projects to have solar power in 50 percent of new units.

Implementation Schedule: 2014–2015

RE-3 Alternative Energy Development Plan

Work with PG&E to develop an Alternative Energy Development Plan that:

- Establishes citywide measurable goals.
- Identifies the allowable and appropriate alternative energy facility types within the city, such as solar photovoltaic (PV) on residential and commercial roofs and wind turbines for home use.
- Proposes phasing and timing of alternative energy facility and infrastructure development.
- Establishes development review protocol for new alternative energy projects.
- Reviews City policies and ordinances to address alternative energy production.
- Identifies optimal locations and the best means to avoid noise, aesthetic, and other potential land use compatibility conflicts (e.g. installing tracking solar PV or angling fixed solar PV in a manner that reduces glare to surrounding land uses).

GHG Emissions Reduction: This measure would not in and of itself result in measurable GHG emissions reductions, but would support measure RE-1, which reduces GHG emissions by 20 $MTCO_2e$.

Reduces GHG By:

- Providing tools to the City that enable the viable use of alternative energy sources.
- Supporting increased use of clean energy/carbon-neutral energy sources.
- Supporting reduced energy demand from fossil fuels.
- Supporting reduced overall energy use.

Cost Effectiveness: Unknown

Costs from staff time needed to coordinate with PG&E to draft and adopt the Alternative Energy Development Plan consistent with measure RE-3. Potential reduced costs to the City and developers associated with the approval of alternative energy installations.

Action Items and Responsible Parties:

Community Development Department staff:

- Work with PG&E to develop the Alternative Energy Development Plan. As part of this process, the City will identify which types of alternative energy facilities are appropriate in Vacaville and where, identify means to address potential land use compatibility conflicts, and establish a development review process for new alternative energy projects.
- Review and update existing City policies and ordinances to address alternative energy production and the findings of the Alternative Energy Development Plan.

Implementation Schedule: 2015–2020

RE-4 Regional Alternative Energy Programs

Coordinate with other local governments, special districts, nonprofits, and other public organizations to share resources, achieve economies of scale, and develop alternative energy policies and programs that are optimized on a regional scale. As part of this measure, explore creation of a community choice aggregation program with the County of Solano.

GHG Emissions Reduction: This measure would not in and of itself result in measurable GHG emissions reductions, but would rather serve to support measure RE-1, which reduces GHG emissions by 20 $MTCO_2e$.

Reduces GHG By:

- Supporting increased use of clean energy/carbon-neutral energy sources.
- Supporting reduced energy demand from fossil fuels.
- Supporting reduced overall energy use.

Cost Effectiveness: High

Costs from staff time needed for coordination activities consistent with measure RE-4. Potential cost savings to the City and regional businesses who must navigate multiple public processes.

Action Items and Responsible Parties:

Community Development Department staff:

- Coordinate, as applicable, with other agencies for regional alternative energy initiatives.

Implementation Schedule: 2014–2015

RE-5 Solar Ready Features

Require that all new buildings be constructed to allow for the easy, cost-effective installation of future solar energy systems, unless prohibited by topographical conditions or other site-specific constraints. "Solar ready" features should include: proper solar orientation (i.e. south-facing roof area sloped at 20° to 55° from the horizontal); clear access on the south sloped roof (i.e. no chimneys, heating vents, plumbing vents, etc.); electrical conduit installed for solar electric system wiring; plumbing installed for solar hot water system; and space provided for a solar hot water storage tank.

GHG Emissions Reduction: This measure would not in and of itself result in measurable GHG emissions reductions, but supports measure RE-1, which reduces GHG emissions by 20 $MTCO_2e$.

Reduces GHG By:

- Supporting increased use of clean energy/carbon-neutral energy sources.
- Supporting reduced energy demand from fossil fuels.
- Supporting reduced overall energy use.

Cost Effectiveness: High

Costs from staff time needed to draft and adopt implementing ordinances for "solar ready" requirements consistent with measure RE-5. Varying estimates are available for per-home costs of solar-readiness, ranging from $280–$380 to $500–$1,000. These would be offset by energy savings.

Action Items and Responsible Parties:

Community Development Department staff:

- Amend the Land Use and Development Code to include measure RE-5.
- Review architectural plans and environmental documents for consistency with measure RE-5.

Developers/Property owners:

- Design and construct new buildings to allow for the easy, cost-effective installation of future solar energy systems.

Implementation Schedule: 2014–2015

RE-6 Solar Arrays in Parking Lots

Encourage the installation of solar photovoltaic arrays in new parking lots and replacement in existing parking lots.

GHG Emissions Reduction: This measure would not in and of itself result in measurable GHG emissions reductions, but supports measure RE-1, which reduces GHG emissions by 20 $MTCO_2e$.

Reduces GHG By:

- Supporting increased use of clean energy/carbon-neutral energy sources.
- Supporting reduced energy demand from fossil fuels.
- Supporting less overall energy use.

Cost Effectiveness: High

Costs from staff time needed to draft and adopt supportive policies relating to parking lot solar arrays consistent with measure RE-6. Costs to businesses or developers would be voluntary if they elect to replace existing diesel generators or install new solar generators.

Action Items and Responsible Parties:

Community Development Department staff:

- Amend the Land Use and Development Code to include measure RE-6.
- Review proposed development applications and environmental documents for consistency with measure RE-6.

Developers/Property owners:

- Design and construct new projects with solar photovoltaic arrays in new parking lots.
- Update existing parking lots with solar photovoltaic arrays.

Implementation Schedule: 2014–2015

ENERGY CONSERVATION

As shown in Table 5-1, the energy conservation measures would reduce GHG emissions in Vacaville by 550 $MTCO_2e$. A summary of the GHG emission reductions and implementation items for each energy conservation measure is provided in Table 5-5.

How Energy Conservation Measures Reduce GHGs

As discussed in introductions to the sections on the green building and renewable energy and low carbon fuels sectors, current energy sources tend to be carbon-intense fossil fuels. Therefore, until all energy is derived from renewable or carbon-neutral sources, limiting energy use through conservation and efficiency will remain a key approach to limiting GHG emissions.

Other Benefits of Energy Conservation Measures

In addition to reducing GHGs, energy conservation measures offer much the same sustainability benefits as those for renewable energy and low-carbon fuels. Reduced energy use reduces other pollutants alongside GHGs, while also saving on energy costs and lowering overall energy demand. The extraction of conventional fossil fuels such as oil, coal, and natural gas also has impacts on the environment, including pollution and habitat disruption. By cutting demand for fossil fuels, energy conservation helps reduce these impacts. Additionally, doing more with less energy improves overall efficiency, and can serve to strengthen local economies.

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TABLE 5-5 **ENERGY CONSERVATION MEASURES**

Measure Number	Measure Text	GHG ($MTCO_2e$) and VMT Reduction (Per Year)	% of Total Reduction for this Sector	% of Total Reduction	Cost Effectiveness	Responsible Party	Implementation Schedule
EC-1	Mandate the use of energy-efficient appliances in new development that meet Energy Star standards and the use of energy-efficient lighting technologies that meet or exceed Title 24 standards.	10 GHG	2%	<1%	High	City/Development	2014–2015
EC-2	Partner with Pacific Gas & Electric and other appropriate energy providers to promote energy conservation, including the following: ➤ Conduct outreach to educate the public about available rebates and other incentives from energy providers. ➤ Promote the purchase of ENERGY STAR appliances. ➤ Inform the public about where to find low-cost compact fluorescent light (CFL) bulbs and/or fixtures. ➤ Offer a halogen torchiere lamp exchange to community members. ➤ Promote energy efficiency audits of existing buildings to check, repair, and readjust heating, ventilation, air conditioning, lighting, water heating equipment, insulation and weatherization. ➤ Encourage energy audits to be performed when residential and commercial buildings are sold. Energy audits would include information regarding the opportunities for energy efficiency improvements, and would be presented to the buyer. Commercial buildings are encouraged to be "benchmarked" using EPA's ENERGY STAR Portfolio Manager Tool. Consider requiring energy audits if future evaluations of ECAS performance demonstrate that City is not meeting its target. ➤ Promote individualized energy management planning and related services for large energy users. ➤ Fund and schedule energy efficiency retrofits or "tune-ups" of existing buildings.	70 GHG	13%	<1%	Unknown	City/PG&E	2015–2020
EC-3	Require all new development and major rehabilitation (i.e. additions of 25,000 square feet of office/retail commercial or 100,000 square feet of industrial floor area) projects to incorporate any combination of the following strategies to reduce heat gain for 50 percent of the non-roof impervious site landscape, which includes roads, sidewalks, courtyards, parking lots, and driveways: shaded within five years of occupancy; paving materials with a Solar Reflectance Index (SRI) of at least 29; open grid pavement system; and parking spaces underground, under deck, under roof, or under a building. Any roof used to shade or cover parking must have an SRI of at least 29.	220 GHG	40%	<1%	Unknown	City/Development	2015–2020
EC-4	Continue to replace City street lights with LED, induction, or other energy-efficient lighting, and require similar energy-efficient street lights in new development.	250 GHG	45%	<1%	High	City/Development	Ongoing
EC-5	Continue to support the Yolo Solano Air Quality Management District's lawnmower exchange program for residents to exchange conventional gas-powered lawnmowers for electric and rechargeable battery-powered lawnmowers.	--			Unknown	City	Ongoing
EC-6	Seek partnerships with local utilities and private entities to share resources and promote energy conservation.	--			Unknown	City	2014–2015
EC-7	Continue to offer innovative, low-interest financing for energy efficiency and renewable energy projects for existing and new development through the PACE program.	--			Unknown	City	Ongoing

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QUANTIFIED MEASURES

EC-1 ENERGY-EFFICIENT APPLIANCES AND LIGHTING

Mandate the use of energy-efficient appliances in new development that meet Energy Star standards and the use of energy-efficient lighting technologies that meet or exceed Title 24 standards.

GHG EMISSIONS REDUCTION: 10 MTC02e per year

PERCENT OF TOTAL GHG REDUCTION: Less than 1 percent

REDUCES GHG BY:

- Decreasing overall energy use.
- Conserving energy.

GHG REDUCTION ASSUMES:

- Developers would provide energy-efficient appliances or residents would purchase new appliances that meet the Title 25 Energy Code.

COST EFFECTIVENESS: HIGH

Costs from staff time needed to draft, adopt, and implement ordinances to enact measure EC-1. Requirements for EnergyStar appliances and fixtures are expected to potentially add an estimated $1,280 to the base cost of outfitting a typical home with conventional appliances and fixtures.[9] However, over the lifetime of these items, the total value of energy savings would likely more than repay additional purchase costs.[10]

ACTION ITEMS AND RESPONSIBLE PARTIES:

Community Development Department staff:

- Amend the Land Use and Development Code to include measure EC-1.
- Review proposed development applications and environmental documents for consistency with measure EC-1.

Developers/Property owners:

- Include energy efficient appliances that meet Energy Star standards and the use of energy-efficient lighting technologies that meet or exceed Title 24 standards in new development construction.

IMPLEMENTATION SCHEDULE: 2014–2015

[9] Each house is assumed to have the following appliances, with the attendant extra costs from EnergyStar compliance: AC unit, $556; washer/dryer, $258; refrigerator, $30; dishwasher, $12; ten indoor light fixtures, $32 each; two outdoor light fixtures, $17 each; 25 total light bulbs, $2.80 apiece. This results in a total added cost of $1280 per house. These estimates are all based on appliance cost estimates provided by the EnergyStar program (see following footnote).

[10] EnergyStar Potential Savings Calculation Spreadsheets, 2009–2011, http://www.energystar.gov/index.cfm?c=bulk_purchasing.bus_purchasing, accessed April 10, 2012.

EC-2 PROMOTION OF ENERGY CONSERVATION

Partner with Pacific Gas & Electric and other appropriate energy providers to promote energy conservation, including the following:

- Conduct outreach to educate the public about available rebates and other incentives from energy providers.
- Promote the purchase of ENERGY STAR appliances.
- Inform the public about where to find low-cost compact fluorescent light (CFL) bulbs and/or fixtures.
- Offer a halogen torchiere lamp exchange to community members.
- Promote energy efficiency audits of existing buildings to check, repair, and readjust heating, ventilation, air conditioning, lighting, water heating equipment, insulation and weatherization.
- Encourage energy audits to be performed when residential and commercial buildings are sold. Energy audits would include information regarding the opportunities for energy efficiency improvements, and would be presented to the buyer. Commercial buildings are encouraged to be "benchmarked" using EPA's ENERGY STAR *Portfolio Manager Tool*. Consider requiring energy audits if future evaluations of ECAS performance demonstrate that City is not meeting its target.
- Promote individualized energy management planning and related services for large energy users.
- Fund and schedule energy efficiency retrofits or "tune-ups" of existing buildings.

GHG EMISSIONS REDUCTION: 70 MTC02e per year

PERCENT OF TOTAL GHG REDUCTION: Less than 1 percent

REDUCES GHG BY:

- Providing tools to the City that enables the viable use of alternative energy sources.
- Providing tools to the City that directly reduces energy demand.
- Providing incentives and education to the community that promotes efficient energy use.
- Supporting increased use of clean energy/carbon-neutral energy sources.
- Supporting reduced energy demand from fossil fuels.
- Supporting less overall energy use.

GHG REDUCTION ASSUMES:

- A portion of the existing residential uses would purchase new energy-efficient appliances which meet the Title 25 Energy Code.

COST EFFECTIVENESS: UNKNOWN
Costs to the City could result from staff time to create promotional materials and conduct public outreach.

ACTION ITEMS AND RESPONSIBLE PARTIES:
Community Development Department staff:

- Coordinate with PG&E to promote various existing PG&E programs that conserve energy, as well as to develop new PG&E programs.

IMPLEMENTATION SCHEDULE: 2015–2020

EC-3 Heat Gain Reduction

Require all new development and major rehabilitation (i.e. additions of 25,000 square feet of office/retail commercial or 100,000 square feet of industrial floor area) projects to incorporate any combination of the following strategies to reduce heat gain for 50 percent of the non-roof impervious site landscape, which includes roads, sidewalks, courtyards, parking lots, and driveways: shaded within five years of occupancy; paving materials with a Solar Reflectance Index (SRI) of at least 29; open grid pavement system; and parking spaces underground, under deck, under roof, or under a building. Any roof used to shade or cover parking must have an SRI of at least 29.

GHG Emissions Reduction: 220 MTC02e per year

Percent of Total GHG Reduction: Less than 1 percent

Reduces GHG By:

- Decreasing overall energy use.
- Conserving energy.
- Increasing carbon-storing biomass (trees and plants).

GHG Reduction Assumes:

- 15 percent increase in energy efficiency.
- 3.4 percent of energy use from existing jobs would be affected by 2020.
- 6.4 percent of energy use from existing non-residential buildings would be affected by 2035.

Cost Effectiveness: Unknown

No additional costs to City as the requirements of measure EC-3 are met through compliance with Title 24.

Action Items and Responsible Parties:

Community Development Department staff:

- Amend the Land Use and Development Code to include measure EC-3.
- Review proposed development applications and environmental documents for consistency with measure EC-3.

Developers/Property owners:

- Design and construct applicable new development and major rehabilitation with approved strategies to reduce heat gain for 50 percent of the non-roof impervious site landscape.

Implementation Schedule: 2015–2020

EC-4 Energy-Efficient Street Lights

Continue to replace City street lights with LED, induction, or other energy-efficient lighting, and require similar energy-efficient street lights in new development.

GHG Emissions Reduction: 250 $MTCO_2e$ per year.

Percent of Total GHG Reduction: Less than 1 percent

Reduces GHG By:

- Decreasing overall energy use.
- Conserving energy.
- Reducing energy demand from fossil fuels.

GHG Reduction Assumes:

- 36 percent decrease in per-fixture energy use.
- 7.3 year lighting turnover.
- 100 percent replacement in ten years.

Cost Effectiveness: High

Costs from staff time needed to draft, adopt, and implement ordinances to enact measure EC-4. Costs to City and developers to install LED lighting; however, the LED streetlights costs continue to fall precipitously and life-cycle costs are now less than those of conventional lighting technology.

Action Items and Responsible Parties:

Public Works Department staff:

- Amend the Land Use and Development Code to include measure EC-4.
- Review proposed development applications and environmental documents for consistency with measure EC-4.

Developers/Property owners:

- Design and construct new projects to include LED, induction, or other energy-efficient lighting for City street lights.

Implementation Schedule: Ongoing

NON-QUANTIFIED MEASURES

The following measures (EC-5 through EC-7) would not result in a measureable reduction in GHG emissions in Vacaville beyond the other measures modeled in this sector. Therefore, the matrix does not show a quantified percent of total GHG reductions for the non-quantified measures, and it does not list any assumptions. However, they support measures EC-1 through EC-4 and are important in helping to reach the City's overall goal of reducing GHG emissions in Vacaville.

EC-5 LAWNMOWER EXCHANGE PROGRAM

Continue to support the Yolo Solano Air Quality Management District's lawnmower exchange program for residents to exchange conventional gas-powered lawnmowers for electric and rechargeable battery-powered lawnmowers.

GHG EMISSIONS REDUCTION: Measure EC-5 would result in indirect GHG emissions reductions that support measures EC-1 through EC-4, which reduce GHG emissions by 550 $MTCO_2e$.

REDUCES GHG BY:

- Supporting increased use of clean energy/carbon-neutral energy sources.
- Supporting reduced energy demand from fossil fuels.
- Supporting reduced overall energy use.
- Promoting incentives that enable the viable use of alternative energy sources.

COST EFFECTIVENESS: UNKNOWN

Costs from staff time needed for programmatic support provided to the Yolo Solano Air Quality Management District consistent with measure EC-5. Potential costs to participating residents from home upgrades to if exterior or garage electrical outlets are required to be installed; however, this cost is voluntary and energy expense savings could off-set this cost over time.

ACTION ITEMS AND RESPONSIBLE PARTIES:

Community Development Department staff:

- Support YSAQMD's program consistent with measure EC-5, for example by promoting it on the City's website.

IMPLEMENTATION SCHEDULE: Ongoing

EC-6 Partnerships for Energy Conservation

Seek partnerships with local utilities and private entities to share resources and promote energy conservation.

GHG Emissions Reduction: Measure EC-6 would result in indirect GHG emissions reductions that support measures EC-1 through EC-4, which reduce GHG emissions by 550 $MTCO_2e$.

Reduces GHG By:

- Supporting increased use of clean energy/carbon-neutral energy sources.
- Supporting reduced energy demand from fossil fuels.
- Supporting reduced overall energy use.
- Promoting partnerships that enable the viable use of alternative energy sources.

Cost Effectiveness: Unknown

Staff time costs to make contacts and coordinate with local utilities and private entities consistent with measure EC-6.

Action Items and Responsible Parties:

Community Development Department staff:

- Seek partnerships, as appropriate, to share resources and promote energy conservation.

Implementation Schedule: 2014–2015

EC-7 Financing for Energy Efficiency and Renewable Energy

Continue to offer innovative, low-interest financing for energy efficiency and renewable energy projects for existing and new development through the PACE program.

GHG Emissions Reduction: Measure EC-7 would result in indirect GHG emissions reductions that support measures EC-1 through EC-4, which reduce GHG emissions by 550 $MTCO_2e$.

Reduces GHG By:

- Supporting increased use of clean energy/carbon-neutral energy sources.
- Supporting reduced energy demand from fossil fuels.
- Supporting reduced overall energy use.
- Promoting incentives that enable the viable use of alternative energy sources.

Cost Effectiveness: Unknown

Administrative costs to the City resulting from staff time needed to continue to implement the PACE program. Any costs to property owner would be minimal and voluntary.

Action Items and Responsible Parties:

Community Development Department staff:

- Continue to implement the PACE program.
- Continue to conduct outreach to promote and implement the PACE program.

Implementation Schedule: Ongoing

WATER AND WASTEWATER

As shown in Table 5-1, the water and wastewater measures would reduce GHG emissions in Vacaville by 1,450 $MTCO_2e$. A summary of the GHG emission reductions and implementation items for each water and wastewater measure is provided in Table 5-6.

For many of the water and wastewater measures, the cost effectiveness cannot be reasonably determined. However, it should be noted that the content of these measures may be viewed as a potentially necessary individual component of a broader strategy for water-use reduction.

How Water and Wastewater Measures Reduce GHGs

Water and wastewater measures serve to decrease GHG emissions primarily through reduced energy needs for water storage, pumping, and treatment, as well as through reduced fugitive GHG emissions from wastewater and sewage. The provision of water through a municipal supply requires elaborate and extensive infrastructure. Beyond the energy needed for the everyday operations of this infrastructure, its construction and ongoing maintenance also generates energy demand. Thus, by reducing water usage, these measures serve to decrease both these routine demands for energy and the long-term demand for energy related to the upkeep, replacement, and expansion of water-system infrastructure. As discussed above, much of this energy is currently derived from carbon-intense fossil fuel sources. Therefore, lessening the water use which currently relies on carbon-intense energy sources is the main mechanism by which these measures would serve to reduce GHG emissions. Additionally, decreased water use means subsequent decreases in quantities of wastewater. Since wastewater requires additional energy to treat and can itself release GHGs through natural degradation processes, decreased generation of wastewater also serves to reduce GHG emissions.

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TABLE 5-6 **WATER AND WASTEWATER MEASURES**

Measure Number	Measure Text	GHG ($MTCO_2e$) and VMT Reduction (Per Year)	% of Total Reduction for this Sector	% of Total Reduction	Cost Effectiveness	Responsible Party	Implementation Schedule
WW-1	Support the conservation measures outlined in the City's Urban Water Management Plan and implement the City's Water Efficient Landscape requirements through the following sub-measures:	1,450 GHG	100%	2%			
	A. For all new development, require all water use and efficiency measures to comply with City Codes.				Unknown	City/Development	Ongoing
	B. At least every five years, review and update the City's Water Efficient Landscape requirements with improved conservation programs and incentives for non-residential customers.				Unknown	City/Development	2015–2020
	C. Continue to offer conservation programs and incentives to large landscape customers per the Urban Water Management Plan.				Unknown	City/Developers/ Water Customers	Ongoing
	D. Implement water efficient residential programs identified in the current Urban Water Management Plan. Continue to coordinate with local water purveyors to achieve consistent standards and review and approval processes for implementation.				Unknown	City/Water Providers	2014–2015
	E. Expand the public information and school education program to promote water conservation and its benefits in coordination with efforts of local water purveyors. Conduct public education and outreach to reduce watering of non-vegetated surfaces and promote the use of pervious paving materials.				Unknown	City	2014–2015
	F. Encourage the use of non-potable water and recovered residential rainwater for irrigation purposes.				Unknown	City	2015–2020
	G. Continue to meter with commodity rates all new connections and retrofits of existing connections. Continue to provide information to customers about their water use.				Unknown	City	Ongoing

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OTHER BENEFITS OF WATER AND WASTEWATER MEASURES

Beyond the energy savings discussed above, these measures yield other sustainability benefits as well. Though fresh water is a renewable resource, the amount available at a particular time and place is finite. Wiser use of water makes communities more resilient in the face of drought or other water shortages, and can reduce or delay the need for infrastructure improvements or expansions. Reduced urban water use also allows more water to be left in natural waterways, offering benefits for wildlife, agriculture, and recreation. Finally, some of the measures which help to reduce water use and wastewater generation, such as green roofs, xeriscaping, and bioswales, also serve to provide habitat to urban wildlife.

WW-1 WATER CONSERVATION

Support the conservation measures outlined in the City's Urban Water Management Plan and implement the City's Water Efficient Landscape requirements through the following sub-measures.

Water and wastewater sub-measures WW-1A through WW-1G support measure WW-1 and when combined reduce GHG emissions in Vacaville by 1,450 $MTCO_2e$ or 2 percent of the total GHG emission reductions. Therefore, the matrix does not show a quantified percent of total GHG reductions for each sub-measure, and it does not list any assumptions.

WW-1A WATER USE AND EFFICIENCY REQUIREMENTS

For all new development, require all water use and efficiency measures to comply with City Codes.

GHG EMISSIONS REDUCTION: Sub-measure WW-1A is a component of the overall measure WW-1, which reduces GHG emissions by 1,450 $MTCO_2e$.

REDUCES GHG BY:

- Supporting the City's ongoing efforts to manage water sustainably.
- Decreasing overall energy demand related to water use.
- Conserving energy and water.
- Reducing energy demand from fossil fuels related to water use.

COST EFFECTIVENESS: UNKNOWN
Staff time to reconcile water use and efficiency measures with City codes.

ACTION ITEMS AND RESPONSIBLE PARTIES:
Community Development Department staff:

- Review landscape plans and environmental documents for consistency with sub-measure WW-1A.

IMPLEMENTATION SCHEDULE: Ongoing

WW-1B Water Efficient Landscape Requirements Update

At least every five years, review and update the City's Water Efficient Landscape requirements with improved conservation programs and incentives for non-residential customers.

GHG Emissions Reduction: Sub-measure WW-1B is a component of the overall measure WW-1, which reduces GHG emissions by 1,450 $MTCO_2e$.

Reduces GHG By:

- Ensuring the City has up-to-date tools that support its ongoing efforts to conserve water, reduce water use, and subsequently reduce overall energy demand related to water use and energy demand from fossil fuels related to water use.

Cost Effectiveness: Unknown
Costs from staff time needed to draft, adopt, and implement ordinance updates.

Action Items and Responsible Parties:
Community Development Department staff:

- Periodically review the existing Water Efficient Landscape requirements, and update it to include improved conservation programs and incentives consistent with sub-measure WW-1B.

Developers/Property owners:

- Illustrate compliance with the City's Urban Water Management Plan and Water Efficient Landscape requirements in development applications and implement applicable features upon project approval.

Implementation Schedule: 2015–2020

WW-1C Water Conservation Programs and Incentives

Continue to offer conservation programs and incentives to large landscape customers per the Urban Water Management Plan.

GHG Emissions Reduction: Sub-measure WW-1C is a component of the overall measure WW-1, which reduces GHG emissions by 1,450 $MTCO_2e$.

Reduces GHG By:

- Supporting the City's ongoing efforts to manage water sustainably.
- Providing incentives that promote the conservation of water and subsequently reduce overall energy demand related to water use and energy demand from fossil fuels related to water use.

Cost Effectiveness: Unknown

No new costs to City to support and continue the ongoing implementation of the current Urban Water Management Plan.

Action Items and Responsible Parties:

Community Development Department staff:

- Continue the conservation and incentive programs outlined in the Urban Water Management Plan.

Developers/Property owners:

- Illustrate compliance with the City's Urban Water Management Plan and Water Efficient Landscape requirements in development applications and implement applicable features upon project approval.

Implementation Schedule: Ongoing

WW-1D Water Efficient Programs and Standards

Implement water efficient residential programs identified in the current Urban Water Management Plan. Continue to coordinate with local water purveyors to achieve consistent standards and review and approval processes for implementation.

GHG Emissions Reduction: Sub-measure WW-1D is a component of the overall measure WW-1, which reduces GHG emissions by 1,450 $MTCO_2e$.

Reduces GHG By:

- Supporting the City's ongoing efforts to manage water sustainably.
- Increasing convenient compliance procedures through consistent standards and review and approval processes that support water conservation and subsequently reduce overall energy demand related to water use and energy demand from fossil fuels related to water use.

Cost Effectiveness: Unknown

No new costs to City to support and continue the ongoing implementation of the current Urban Water Management Plan.

Action Items and Responsible Parties:

Community Development Department staff:

- Implement the residential programs outlined in the Urban Water Management Plan and continue coordination with local water purveyors.

Implementation Schedule: 2014–2015

WW-1E Water Conservation Outreach

Expand the public information program to promote water conservation and its benefits in coordination with efforts of local water purveyors. Conduct public education and outreach to reduce watering of non-vegetated surfaces and promote the use of pervious paving materials.

GHG Emissions Reduction: Sub-measure WW-1E is a component of the overall measure WW-1, which reduces GHG emissions by 1,450 $MTCO_2e$.

Reduces GHG By:

- Providing training and education to ensure efficient water use.
- Conserving water and subsequently reducing overall energy demand related to water use and energy demand from fossil fuels related to water use.

Cost Effectiveness: Unknown

Staff time and materials needed to coordinate with local water purveyors and conduct public education and outreach campaigns.

Action Items and Responsible Parties:

Community Development Department staff:

- Expand its public information program to promote water conservation, and conduct outreach, such as through information on the City's website or inserts with the water bill, to reduce watering of non-vegetated surfaces and promote pervious paving.

Implementation Schedule: 2014–2015

WW-1F Non-Potable Water for Irrigation

Encourage the use of non-potable water for irrigation purposes.

GHG Emissions Reduction: Sub-measure WW-1F is a component of the overall measure WW-1, which reduces GHG emissions by 1,450 $MTCO_2e$.

Reduces GHG By:

- Supporting the use of alternative water sources for irrigation, subsequently reducing overall energy demand related to water treatment.
- Decreasing overall energy use.
- Conserving energy.

Cost Effectiveness: Unknown

Staff time and materials needed to promote the use of recycled water for irrigation. Any costs or savings to developers/homeowners would be voluntary and variant.

Action Items and Responsible Parties:

Community Development Department staff:

- Amend the Land Use and Development Code to include sub-measure WW-1F.

Implementation Schedule: 2015–2020

WW-1G Water Service

Continue to meter all new connections and retrofits of existing connections with commodity rates. Continue to provide information to customers about their water use.

GHG Emissions Reduction: Sub-measure WW-1G is a component of the overall measure WW-1, which reduces GHG emissions by 1,450 $MTCO_2e$.

Reduces GHG By:

- Providing data for the City to measure water use and subsequently target areas where water conservation can be improved.

Cost Effectiveness: Unknown

Costs from staff time needed to coordinate with water purveyors to achieve conservation pricing goals. Potential costs and savings for homeowners related to adopted rate structures or other conservation methods and what actions individual homeowners choose.

Action Items and Responsible Parties:

Community Development and Public Works Department staff:

- Continue its current metering practices and continue to provide information about water use to water customers.

Implementation Schedule: Ongoing

SOLID WASTE

As shown in Table 5-1, the solid waste measures would reduce GHG emissions in Vacaville by 7,770 $MTCO_2e$. A summary of the GHG emission reductions and implementation items for each solid waste measure is provided in Table 5-7.

For many of the solid waste measures, the cost effectiveness cannot be reasonably determined. However, the content of these individual measures may be viewed as a potentially necessary individual component of a broader strategy to reduce the waste stream.

How Solid Waste Measures Reduce GHGs

Solid waste measures serve to reduce GHG emissions primarily by the lessening the need for energy-using processes surrounding the fabrication and disposal of consumer products, as well as by serving to limit or recapture the GHGs given off when such materials degrade in landfills. The production of consumer goods involves resource extraction, refinement, manufacturing, transportation, and other processes, all of which consume energy. As discussed above, current methods of energy generation tend to produce GHG emissions. By seeking to promote more limited purchasing and greater reuse and recycling of materials and goods, the solid waste measures serve to decrease the need for energy-consuming production and disposal processes, and thus reduce GHG emissions. Additionally, the breakdown of certain materials in landfill can release even more powerful GHG emissions, such as methane. By seeking to limit or recapture such gasses, the solid waste measures serve to further reduce GHG emissions.

Other Benefits of Solid Waste Measures

Similar to the variety of ways in which measures to reduce solid waste serve to reduce GHG emissions, these measures offer other broad sustainability benefits as well. Perhaps most importantly, by encouraging recycling, solid waste measures serve to decrease demand for virgin materials and other inputs to production. This decreases resource extraction and related environmental impacts, such as pollution and habitat disruption. Similarly, composting—an essential approach to waste reduction—recycles nutrients within the waste stream, thus further conserving resources and supporting local agriculture. Other key sustainability benefits come from reductions in demand for the processing and storage of solid waste. Some solid waste may contain toxic or harmful compounds, and nearly all waste requires certain handling techniques to ensure its safe disposal; encouraging greater reuse and more conscientious disposal techniques reduces risks to people and the environment from hazardous materials. Finally, decreasing solid waste reduces the space needed for landfills, conserving land and prolonging the lifetime of existing facilities.

TABLE 5-7 **SOLID WASTE MEASURES**

Measure Number	Measure Text	GHG ($MTCO_2e$) and VMT Reduction (Per Year)	% of Total Reduction for this Sector	% of Total Reduction	Cost Effectiveness	Responsible Party	Implementation Schedule
SW-1	Support waste reduction through the following sub-measures:	7,770 GHG	100%	12%			
	A. Continue to require at least 50 percent diversion (i.e. reuse or recycling) of non-hazardous construction waste from disposal, consistent with CALGreen - the Statewide Green Building code.				High	City/Development	Ongoing
	B. Require all new and existing multi-family developments that are redeveloping or remodeling to provide recycling areas for their residents. Allow a reduction in the parking requirement if necessary to allow adequate space for the recycling area.				High	City/Development	2014–2015
	C. Continue to promote recycling and waste diversion in Vacaville through marketing efforts to increase participation by residents and businesses. As part of this program, continue to conduct through the City's Recycling Coordinator public education and outreach about reuse and recycling, including existing programs for appliance disposal, yard debris and kitchen waste collection and composting, waste to energy, and zero waste programs. Where applicable, coordinate recycling outreach efforts with the City's contracted solid waste hauler Recology Vacaville Solano (RVS).				Unknown	City	Ongoing
	D. Encourage the use of salvaged and recycled-content materials and other materials that have low production energy costs for building materials, hard surfaces, and non-plant landscaping. Require sourcing of construction materials locally, as feasible.				Unknown	City/Development	2015–2020
	E. Investigate the provision of recycling containers Downtown and in City-owned parks.				Moderate to High	City	2015–2020

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SW-1 WASTE REDUCTION

Support waste reduction through the following sub-measures.

Solid waste sub-measures SW-1A through SW-1E support measure SW-1 and when combined reduce GHG emissions in Vacaville by 7,770 MTC02e, or 12 percent of the total GHG emission reductions. The modeling conservatively assumes a 66 percent waste diversion rate (approximately 12 percent increase) based on historic trends in waste disposal in the city. Therefore, the matrix does not show a quantified percent of total GHG reductions for each sub-measure, and it does not list any assumptions.

SW-1A Construction Waste Diversion

Continue to require at least 50 percent diversion (i.e. reuse or recycling) of non-hazardous construction waste from disposal, consistent with CALGreen - the Statewide Green Building code.

GHG Emissions Reduction: Sub-measure SW-1A is a component of the overall measure SW-1, which reduces GHG emissions by 7,770 MTC02e.

Reduces GHG By:

- Supporting alternatives to solid waste disposal in landfills, such as reuse and recycling.
- Supporting greater reuse and alternative solid waste disposal.
- Supporting reduced solid waste in landfills.
- Supporting energy conservation and reduced energy use related to solid waste disposal.

Cost Effectiveness: High

No new costs to the City. Potential savings to developers through recycling various construction materials.

Action Items and Responsible Parties:

Community Development Department staff:

- Review proposed construction and demolition permit applications for consistency with measure SW-1A.

Developers/Property owners:

- Illustrate compliance with at least 50 percent diversion of non-hazardous construction waste from disposal in development applications and implement applicable features upon project approval.

Implementation Schedule: Ongoing

SW-1B Recycling Areas in Multi-Family Developments

Require all new and existing multi-family developments that are redeveloping or remodeling to provide recycling areas for their residents. Allow a reduction in the parking requirement if necessary to allow adequate space for the recycling area.

GHG Emissions Reduction: Sub-measure SW-1B is a component of the overall measure SW-1, which reduces GHG emissions by 7,770 MTC02e.

Reduces GHG By:

- Supporting alternatives to solid waste disposal in landfills through recycling.
- Supporting reduced solid waste in landfills.
- Supporting energy conservation and reduced energy use related to solid waste disposal.
- Supporting convenient disposal for recyclable items.
- Providing incentives that support alternatives to solid waste disposal in landfills.

Cost Effectiveness: High

Costs from staff time needed to draft, adopt, and implement enabling ordinances for the sub-measure SW-1B's requirements. Potential costs to property owners/developers from the need for increased space, management, or number of receptacles to accommodate recycling.

Action Items and Responsible Parties:

Community Development Department staff:

- Amend the Land Use and Development Code to include sub-measure SW-1B.
- Review proposed development applications and environmental documents for consistency with sub-measure SW-1B.

Developers/Property owners:

- Design and construct redeveloping, remodeling, and existing multi-family developments projects to provide recycling areas for their residents.

Implementation Schedule: 2014–2015

SW-1C Waste Reduction Outreach

Continue to promote recycling and waste diversion in Vacaville through marketing efforts to increase participation by residents and businesses. As part of this program, continue to conduct through the City's Recycling Coordinator public education and outreach about reuse and recycling, including existing programs for appliance disposal, yard debris and kitchen waste collection and composting, waste to energy, and zero waste programs. Where applicable, coordinate recycling outreach efforts with the City's contracted solid waste hauler Recology Vacaville Solano (RVS).

GHG Emissions Reduction: Sub-measure SW-1C is a component of the overall measure SW-1, which reduces GHG emissions by 7,770 MTC02e.

Reduces GHG By:

- Providing educational tools to community members and business owners that enable recycling as a viable alternative to solid waste disposal.
- Supporting alternatives to solid waste disposal in landfills through reuse and recycling.
- Supporting reduced solid waste disposal in landfills.
- Supporting energy conservation and reduced energy use related to solid waste disposal.

Cost Effectiveness: Unknown

Costs from staff time needed to create promotional materials and conduct public outreach regarding waste diversion. Any costs or savings to developers/homeowners would be voluntary and variant.

Action Items and Responsible Parties:

Community Development and Public Works Department staff:

- Continue the City's educational and outreach programs about waste reduction consistent with sub-measure SW-1C.

Implementation Schedule: Ongoing

SW-1D Salvaged, Recycled-Content, and Local Construction Materials

Encourage the use of salvaged and recycled-content materials and other materials that have low production energy costs for building materials, hard surfaces, and non-plant landscaping. Require sourcing of construction materials locally, as feasible.

GHG Emissions Reduction: Sub-measure SW-1D is a component of the overall measure SW-1, which reduces GHG emissions by 7,770 MTC02e.

Reduces GHG By:

- Conserving energy and reducing energy use related to solid waste disposal and production and transport of new materials.
- Increasing alternatives to solid waste disposal in landfills through reuse and recycling.
- Reducing solid waste in landfills.
- Reducing heavy-duty vehicle use and associated fossil-fuel consumption.

Cost Effectiveness: Unknown

Costs from staff time needed to creating promotional materials and conducting public outreach regarding the use of salvaged, recycled, and locally-produced materials. Any costs to property owners/developers from use of locally sourced building materials would be voluntary. Potential increased revenue to local business and the tax base.

Action Items and Responsible Parties:

Community Development Department staff:

- Develop informational materials and outreach to encourage the use of salvaged and recycled materials.
- Amend the Land Use and Development Code to require the sourcing of construction materials locally as feasible consistent with sub-measure SW-1D.
- Review proposed development applications and environmental documents for consistency with measure SW-1D.

Developers/Property owners:

- Design and construct new and remodeling projects to use salvaged and recycled-content materials and other materials that have low production energy costs for building materials, hard surfaces, and non-plant landscaping, and use local construction materials, as feasible.

Implementation Schedule: 2015–2020

SW-1E Downtown Recycling Containers

Investigate the provision of recycling containers Downtown and in City-owned parks.

GHG Emissions Reduction: Sub-measure SW-1E is a component of the overall measure SW-1, which reduces GHG emissions by 7,770 MTC02e.

Reduces GHG By:

- Providing the opportunity to community members and visitors to recycle while in the Downtown and City parks.
- Increasing alternatives to solid waste disposal in landfills through recycling.
- Decreasing solid waste disposal in landfills.
- Conserving energy and reducing energy use related to solid waste disposal.
- Increasing convenient disposal for recyclable items.

Cost Effectiveness: Moderate to High

Costs to the City include administration of municipal waste collection from public receptacles, as well as from the provision and ongoing maintenance of those receptacles. Potential cost savings as need for landfill decreases over time.

Action Items and Responsible Parties:

Public Works Department staff:

- Install recycling containers in the Downtown and parks, as needed and deemed appropriate.

Implementation Schedule: 2015–2020

PARKS, OPEN SPACE, AND AGRICULTURE

The parks, open space, and agriculture measures would not result in measureable reductions in GHG emissions in Vacaville. Therefore, the matrix does not show a quantified percent of total GHG reductions for these non-quantified measures, and it does not list any assumptions. However, they are important in helping to reach the City's overall goal of reducing GHG emissions in Vacaville. A summary of the implementation items for each parks, open space, and agriculture measure is provided in Table 5-8.

Since projected GHG emissions reductions from individual parks, open space, and agriculture measures are not available, it is not practical to provide estimates of cost-effectiveness for those measures.

How Parks, Open Space, and Agriculture Measures Reduce GHGs

The primary mechanism through which parks, open space, and agriculture measures serve to reduce GHGs is through the sequestration (long-term storage) of carbon in biomass such as trees and soil. For parks, open space, and agriculture measures, GHG emissions reductions are largely incidental to the other sustainability benefits they offer and would be relatively minor.

Other Benefits of Parks, Open Space, and Agriculture Measures

In addition to providing opportunities for recreation and improved public health, regional and urban parks and open spaces create wildlife habitat and help mitigate urban heat-island effects. Community gardens similarly make multiple contributions to overall sustainability by helping to improve public health, increasing local food production and thus reducing the distance food must travel, and providing additional habitat and foraging opportunities for wildlife.

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TABLE 5-8 **PARKS, OPEN SPACE, AND AGRICULTURE MEASURES**

Measure Number	Measure Text	GHG ($MTCO_2e$) and VMT Reduction (Per Year)	% of Total Reduction for this Sector	% of Total Reduction	Cost Effectiveness	Responsible Party	Implementation Schedule
OS-1	Continue to identify and inventory potential community garden and urban farm sites in existing parks, public easements, right-of-ways, and schoolyards, and develop a program to establish pesticide-free community gardens in appropriate locations.	--			Unknown	City	2015–2020
OS-2	Encourage significant new residential developments over 50 units to include space that can be used to grow food.	--			Unknown	City	2015–2020
OS-3	Establish a process through which a neighborhood can propose and adopt a site as a community garden.	--			Unknown	City/ Neighborhoods	2015–2020
OS-4	Continue to support the Vacaville Farmers' Market as a source for locally-grown food.	--			Unknown	City	Ongoing
OS-5	Review the City's existing open space development impact fee, and consider incorporating trail requirements into the fee program.	--			Unknown	City	2014–2015

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OS-1 Community Garden and Urban Farm Sites Inventory

Continue to identify and inventory potential community garden and urban farm sites in existing parks, public easements, right-of-ways, and schoolyards, and develop a program to establish pesticide-free community gardens in appropriate locations.

Reduces GHG By:

- Increasing locations for carbon-storing biomass (trees and plants).
- Supporting the provision of areas that naturally reduce the urban heat-island effects, thus conserving energy and reducing energy demand.
- Supporting opportunities for convenient pesticide-free food.
- Supporting reduced farm equipment use required for mechanized farming methods.
- Supporting reduced automobile and long-haul truck use for the transport of food, and associated fossil–fuel consumption.

Cost Effectiveness: Unknown

Costs from staff time needed to continue identifying and inventorying potential sites consistent with measure OS-1. Potential savings to participating residents.

Action Items and Responsible Parties:

Community Services and Public Works Department staff:

- Continue to inventory potential community garden sites and develop the associated community garden programs consistent with measure OS-1.

Implementation Schedule: 2015–2020

OS-2 Garden Areas in New Development

Encourage significant new residential developments over 250 units to include space that can be used to grow food.

Reduces GHG By:

- Supporting more locations for carbon-storing biomass (trees and plants).
- Supporting the provision of areas that naturally reduce the urban heat-island effects, thus conserving energy and reducing energy demand.
- Supporting opportunities for convenient pesticide-free food.
- Supporting reduced farm equipment use required for mechanized farming methods.
- Supporting reduced automobile and long-haul truck use for the transport of food, and associated fossil–fuel consumption.

Cost Effectiveness: Unknown

City costs would result from staff time to develop informational materials and conduct outreach during the project review process.

Action Items and Responsible Parties:

Community Development Department staff:

- Develop informational materials and conduct outreach during the project review process to encourage development applicants to include garden areas in large residential projects.

Implementation Schedule: 2015–2020

OS-3 Community Garden Process

Establish a process through which a neighborhood can propose and adopt a site as a community garden.

Reduces GHG By:

- Supporting more locations for carbon-storing biomass (trees and plants).
- Supporting the provision of areas that naturally reduce the urban heat-island effects, thus conserving energy and reducing energy demand.
- Supporting opportunities for convenient pesticide-free food.
- Supporting reduced farm equipment use required for mechanized farming methods.
- Supporting reduced automobile and long-haul truck use for the transport of food, and associated fossil–fuel consumption.

Cost Effectiveness: Unknown

Staff time to draft and adopt a process for the establishment of new community garden sites. Potential costs for residents who voluntarily choose to take advantage of this new program to create new community garden sites.

Action Items and Responsible Parties:

Community Development Department staff:

- Develop a process for the establishment of new community garden sites consistent with measure OS-3.

Implementation Schedule: 2015–2020

OS-4 VACAVILLE FARMERS' MARKET

Continue to support the Vacaville Farmers' Market as a source for locally-grown food.

REDUCES GHG BY:

- Supporting opportunities for convenient pesticide-free food.
- Supporting reduced automobile and long-haul truck use for the transport of food, and associated fossil–fuel consumption.

COST EFFECTIVENESS: UNKNOWN

City costs would include materials and staff time needed to support the Farmers' Market through outreach and institutional support.

ACTION ITEMS AND RESPONSIBLE PARTIES:

Community Development Department staff:

- Continue to support the Farmers' Market through outreach and institutional support.

IMPLEMENTATION SCHEDULE: Ongoing

OS-5 Development Impact Fee for Trails

Review the City's existing open space development impact fee, and consider incorporating trail requirements into the fee program.

Reduces GHG By:

- Supporting reduced automobile use and associated fossil-fuel consumption.
- Supporting convenient walking and bicycling opportunities.
- Supporting walking and bicycling as viable alternative modes of transportation.

Cost Effectiveness: Unknown

Costs from staff time needed to review the City's existing open space development impact fee, and draft additional language consistent with measure on OS-5.

Action Items and Responsible Parties:

Community Development Department staff:

- Review the existing fee program, conduct a nexus study, and incorporate trail requirements into the open space fee as appropriate.

Implementation Schedule: 2014–2015

PURCHASING

The purchasing measure would not result in measureable reductions in GHG emissions in Vacaville. Therefore, the matrix does not show a quantified percent of total GHG reductions for this non-quantified measure, and it does not list any assumptions. However, it is important in helping to reach the City's overall goal of reducing GHG emissions. A summary of the implementation items for the purchasing measure is provided in Table 5-9.

Since a projected GHG emissions reduction from this measure is not available, it is not practical to provide an estimate of cost-effectiveness for this measure.

How Purchasing Measures Reduce GHGs

The GHG reduction mechanism of the purchasing measures is similar to, and in some ways an extension of, that of the solid waste measures. Careful purchasing decisions can help ensure that the acquired products are less likely to become and/or generate waste and were produced using fewer resources, more efficient processes, and thus less energy. As discussed above, actions which limit energy use, most notably energy use from fossil fuels, serve to reduce GHG emissions.

GHG emission reductions from this measure cannot be readily quantified because such reductions relate to what are known as lifecycle emissions, which are the emissions generated by the activities and processes associated with materials extraction and manufacturing for consumer products. Such emissions are extremely difficult to quantify due to the complexity of the systems which produce these goods. The production of consumer goods has far-reaching impacts in regard to energy, resources, and the natural environment. In this way, the purchasing measure touches on all of these issues. By promoting reduced or more conscientious purchasing of consumer products, it is able to broadly increase sustainability.

TABLE 5-9 **PURCHASING MEASURE**

Measure Number	Measure Text	GHG ($MTCO_2e$) and VMT Reduction (Per Year)	% of Total Reduction for this Sector	% of Total Reduction	Cost Effectiveness	Responsible Party	Implementation Schedule
P-1	Develop policies, incentives, and design guidelines that encourage the public and private purchase and use of durable and nondurable items, including building materials, made from recycled materials or renewable resources.	--			Unknown	City	2015–2020

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P-1 Purchasing of Recycled Materials

Develop policies, incentives, and design guidelines that encourage the public and private purchase and use of durable and nondurable items, including building materials, made from recycled materials or renewable resources.

Reduces GHG By:

- Providing tools and incentives that promote the best practices for purchasing goods.
- Supporting reduced energy related to solid waste disposal.
- Supporting reduced solid waste in landfills.
- Supporting reused and recycled goods as an alternative to new goods.
- Supporting energy conservation related to solid waste disposal and production and transport of new materials.

Cost Effectiveness: Unknown

City costs would stem from staff time and materials needed to develop policies, incentives, and design guidelines consistent with measure P-1.

Action Items and Responsible Parties:

Community Development Department staff:

- Develop policies, incentives, and guidelines to encourage the purchase of items made from recycled or renewable resources.

Implementation Schedule: 2015–2020

COMMUNITY ACTION

The community action measures would not result in measureable reductions in GHG emissions in Vacaville. Therefore, the matrix does not show a quantified percent of total GHG reductions for the non-quantified measures, and it does not list any assumptions. However, they are important in helping to reach the City's overall goal of reducing GHG emissions in Vacaville. A summary of the implementation items for each community action measure is provided in Table 5-10.

Since projected GHG emissions reductions from individual community action measures are not available, it is not practical to provide estimates of cost-effectiveness for those measures.

How Community Action Measures Reduce GHGs

The infeasibility of quantifying the emissions reductions from community action measures stems directly from the broad ways in which they contribute to sustainability. While community action measures in and of themselves would not direct contribute to decreased GHGs or improved sustainability, these measures would serve to facilitate the other measures in this Energy and Conservation Action Strategy by informing the public about actions they can take to improve sustainability, and by encouraging residents and businesses to take those actions.

TABLE 5-10 **COMMUNITY ACTION MEASURES**

Measure Number	Measure Text	GHG ($MTCO_2e$) and VMT Reduction (Per Year)	% of Total Reduction for this Sector	% of Total Reduction	Cost Effectiveness	Responsible Party	Implementation Schedule
CA-1	Develop and implement an outreach plan to engage local businesses in GHG emissions reduction programs.	--			Unknown	City/Local Businesses	2015–2020
CA-2	Establish and maintain a "sustainability information center" at City Hall to inform the public and distribute available brochures, and provide information on sustainability on the City's website.	--			Unknown	City	2015–2020
CA-3	Continue to conduct outreach to encourage residents to shop locally and support local business.	--			Unknown	City	Ongoing

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CA-1 Local Business Participation

Develop and implement an outreach plan to engage local businesses in GHG emissions reduction programs.

Reduces GHG By:

- Providing relevant data to local businesses to implement strategies that reduce GHG emissions.
- Encouraging local businesses to implement strategies that reduce GHG emissions.

Cost Effectiveness: Unknown

City costs would stem from staff time and materials needed to develop and implement an outreach plan consistent with measure CA-1.

Action Items and Responsible Parties:

Community Development Department staff:

- Develop and implement an outreach plan for local businesses consistent with measure CA-1.

Implementation Schedule: 2015–2020

CA-2 Sustainability Information Center

Establish and maintain a "sustainability information center" at City Hall to inform the public and distribute available brochures, and provide information on sustainability on the City's website.

Reduces GHG By:

- Providing relevant data to the public that supports the implementation of strategies that reduce GHG emissions.
- Encouraging the public to apply best practices that reduce GHG emissions.

Cost Effectiveness: Unknown

City costs would stem from the staff time and materials needed to establish and maintain a "sustainability information center" at City Hall consistent with measure CA-2.

Action Items and Responsible Parties:

Community Development Department staff:

- Develop outreach materials, establish and maintain the sustainability information center, and regularly update the City's website with sustainability information.

Implementation Schedule: 2015–2020

CA-3 Support for Local Businesses

Continue to conduct outreach to encourage residents to shop locally and support local business.

Reduces GHG By:

- Encouraging the public to apply best practices that reduce GHG emissions.
- Supporting reduced automobile and long-haul truck use for the transport of goods.

Cost Effectiveness: Unknown

City costs would stem from the staff time and materials needed to continue outreach efforts to support local businesses consistent with measure CA-3 and no additional costs would occur. Potential increased revenue to local business and the tax base.

Action Items and Responsible Parties:

Community Development Department staff:

- Continue conducting outreach to support local businesses consistent with measure CA-3.

Implementation Schedule: Ongoing

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