

Appendix 3

Quantification of Costs and Reductions of Community-Wide Reduction Measures

Table A3-1. Detailed Reductions by Measure

Energy Use Reduction Measures

Appendix 3: Detailed Community Reductions by Measure												
Sector	Area	Measure	Title	Description	Metric Tons CO2e	% of Goal Reduction	% of Total Reductions	\$ City Cost	City Cost	\$ Private Cost	Private Cost	Annual Cost Savings
EU 1: Increase energy efficiency and conservation efforts.												
Community	Energy Use	EU 1.1	Voluntary Residential Energy Conservation	<i>Create a Residential Energy Conservation Program in partnership with the Contra Costa Realtors Association that leverages financial incentives, local partnerships, and education for voluntary home energy efficiency improvements, with a target of achieving an average 20% in energy savings for 6% of the existing housing stock by 2015, 13% of the existing housing stock by 2020, and 27% by 2030.</i>	-10,568	64%	10%	\$20,000	Low	\$13,400,000	Medium-High	\$2,300,000

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Sector	Area	Measure	Title	Description	Metric Tons CO2e	% of Goal Reduction	% of Total Reductions	\$ City Cost	City Cost	\$ Private Cost	Private Cost	Annual Cost Savings
Community	Energy Use	EU 1.2	Commercial Energy Conservation Program	<i>Work with the Downtown Business Association, Chamber of Commerce, Contra Costa Realtors Association, and PG&E to develop a voluntary Commercial Energy Conservation Program for highly collaborative, incentive-based energy efficiency efforts, with a target of achieving an average of 25% energy savings for 600 businesses by 2020 and 800 businesses by 2035.</i>	-5,807	35%	6%	\$0	Low	\$1,000,000	Medium	\$2,900,000
Community	Energy Use	EU 1.3	Public Outreach	<i>Continue to partner with PG&E and EBMUD to educate and inform the community about ways to improve energy efficiency, including behavioral changes, appliance purchases and rebates, maintenance practices, and more.</i>	-131	1%	0%	\$0	Low	\$4,000	Low	\$46,000
EU 2: Promote and support renewable energy generation and use.												

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Community	Energy Use	EU 2.1	Renewable Energy Strategy	<i>Develop a renewable energy strategy that encourages residential solar energy systems through streamlined permit procedures, adoption of incentives, fee waivers, and potential for a municipal finance district program that provides a low-risk option for property owners to invest in on-site renewable energy installations.</i>	-10,572	100%	10%	\$10,000	Low	\$68,500,000	High	\$6,000,000
EU 3: Facilitate green building and design.												
Community	Energy Use	EU 3.1	Green Building Ordinance	<i>Adopt CALGreen Tier 1 by 2014 to exceed Title 24 energy efficiency standards by 15%, and adopt CALGreen Tier 2 by 2017 to exceed Title 24 energy efficiency standards by 30%.</i>	-973	97%	1%	\$15,000	Low	\$2,000,000	Medium	\$300,000

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Community	Energy Use	EU 3.2	Urban Forestry	<i>Increase tree cover throughout the city, with special emphasis on shading east and west walls of structures.</i>	-28	3%	0%	\$0	Low	\$300,000	Low-Mid	\$16,000
EU 4: Reduce energy use through increased water conservation.												
Community	Energy Use	EU 4.1	Water Conservation	<i>Work with EBMUD and CCWD to ensure that the Walnut Creek community achieves regional and statewide water reduction targets, including a 20% reduction as established by the State's 20X2020 plan.</i>	-2,179	100%	2%	\$0	Low	\$0	Low	\$850,000
TLU 1: Reduce GHG emissions through use of alternative vehicles, trip reduction and consolidation, and efficient traffic flow.												

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Community	Transportation & Land Use	TLU 1.1	Low-Emission Vehicle Facilities	<i>Facilitate the use of low-emission vehicles by coordinating with regional and state agencies for region-wide low-emission vehicle infrastructure improvements and networks.</i>	-3,234	22%	3%	\$10,000	Low	\$3,000,000	Medium	\$200,000
Community	Transportation & Land Use	TLU 1.2	Transportation Demand Management (TDM)	<i>Continue to promote ridesharing and TDM programs with the CMA and 511.org to reduce use of traditional motor vehicles. Create a citywide car-sharing program to achieve further reductions in vehicle miles traveled.</i>	-1,759	12%	2%	\$0	Low	\$0	Low	\$900,000
Community	Transportation & Land Use	TLU 1.3	Traffic Calming	<i>Continue to install street design features such as landscaped medians and roundabouts in order to reduce vehicle speeds, volumes, and idling.</i>	-6,609	45%	6%	\$115,013	Medium	\$115,000	Low	\$3,400,000

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Community	Transportation & Land Use	TLU 1.4	Anti-Idling Efficient Traffic Signal Timing	<i>Reduce vehicle emissions through an effective traffic signal synchronization program.</i>	-2,953	20%	3%	\$550,000	High	\$0	Low	\$150,000
TLU 2: Reduce vehicle miles traveled through smart land use and design.												
Community	Transportation & Land Use	TLU 2.1	Smart Growth	<i>Provide incentives to encourage higher-density, mixed-use, infill development and continue to require such development through regulations.</i>	-1,789	5%	2%	\$50,000	Low-Medium	\$0	Low	\$900,000
Community	Transportation & Land Use	TLU 2.2	Jobs/Housing Balance	<i>Attract job-generating uses that will provide a variety of employment opportunities and improve the jobs/housing balance within Walnut Creek.</i>	-36,305	95%	35%	\$0	Low	\$0	Low	\$18,500,000

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Community	Transportation & Land Use	TLU 2.3	Affordable Housing	Continue to support affordable housing development through implementation of the City's Housing Element.	-182	0%	0%	\$0	Low	\$0	Low	\$93,000
TLU 3: Convert vehicular trips to non-vehicular or transit trips.												
Community	Transportation & Land Use	TLU 3.1	Bicycle Planning	Continue to implement the projects and recommendations contained in the City's Draft Bicycle Master Plan and incorporate bicycle lanes and routes into street systems, new subdivisions, and large developments.	-5,835	43%	6%	\$30,000,000	Medium-High	\$700,000	Low-Mid	\$3,000,000
Community	Transportation & Land Use	TLU 3.2	Multi-Modal Wayfinding	Develop and implement a comprehensive wayfinding system for the city's bicycle and pedestrian transportation networks.	-330	2%	0%	\$1,000	Low	\$0	Low	\$170,000

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Community	Transportation & Land Use	TLU 3.3	Bicycle Parking	<i>Increase the number and locations of bicycle parking by requiring new development or redevelopment to provide adequate short- and long-term bicycle parking facilities.</i>	-224	2%	0%	\$0	Low	\$6,200,000	Medium	\$115,000
Community	Transportation & Land Use	TLU 3.4	Transit Incentives	<i>Provide public transit incentives such as free or low-cost monthly transit passes to encourage the use of transportation alternatives, including provision of parking “cash-out” options.</i>	-1,674	12%	2%	\$5,000	Low	\$0	Low	\$4,000
Community	Transportation & Land Use	TLU 3.5	BART Shuttles	<i>Investigate ways to increase the frequency and range of BART shuttles.</i>	-632	5%	1%	\$6,000,000	High	\$515,000	Low-Mid	\$320,000

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Community	Transportation & Land Use	TLU 3.6	Safe Routes to School	<i>Work with local schools to expand Safe Routes to Schools (SR2S) programs.</i>	-2	0%	0%	Funded through TLU 1.3 and TLU 1.1	Low	\$0	Low	\$1,000
Community	Transportation & Land Use	TLU 3.7	Parking Management	<i>Implement and maintain a comprehensive Parking Management Plan with an emphasis on reducing the vehicle miles traveled due to unnecessary circulation.</i>	-4,845	36%	5%	\$0	Low	\$45,000	Low	\$2,500,000
WR 1: Implement a zero waste policy to reduce waste sent to the landfill.												
Community	Waste Reduction	WR 1.1	Zero Waste	<i>Reduce landfilled waste and increase promotion of recycling and composting through an expanded public education campaign, community-wide incentives, and continued partnership with the Bay Area's Green Business Program.</i>	-6,152	100%	6%	\$0	Low	\$2,000,000	Medium	\$9,100,000
EPP 1: Promote purchasing local goods and services.												

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Community	Environmentally Preferable Purchasing	EPP 1.1	Green Businesses	<i>Investigate local partnerships or creation of a forum to promote and equip local green businesses (for example, through the Chamber of Commerce).</i>	0	0	0	\$0	Low	0	Low	0
EPP 2.1	Environmentally Preferable Purchasing	EPP 2.1	Going Green	<i>Continue and expand the efforts of the City's Going Green Initiatives.</i>	0	0	0	\$0	Low	0	Low	0
EPP 2.1	Environmentally Preferable Purchasing	EPP 2.2	Urban Agriculture	<i>Increase and encourage urban agriculture through incentives and streamlined application procedures.</i>								

EU 1: INCREASE ENERGY EFFICIENCY AND CONSERVATION EFFORTS.

Measure EU 1.1: Voluntary Residential Energy Conservation

Methodology:

Measure looks at overall reductions that will result from two types of energy efficiency improvements to approximately 4,000 homes by 2020 and 8,500 homes by 2030.

- Electricity reductions: Assumes average of 20% decrease in electricity per household.
- Natural gas reductions: Assumes average of 20% reduction for approximately 1,500 homes by 2020 and 3,700 homes by 2030; assumes reductions specific to water heater replacement for approximately 2,500 homes by 2020 and 4,500 homes by 2030.

For natural gas reductions that result from replaced water heaters, looks at greater efficiencies that would be generated by more efficient water heaters. (44% of therms for water heating X 19.5% therm savings in newer models X therm use in target year = therm savings in residential uses for water heater retrofits). Assumes that 44% of residential natural gas is used for water heating (CPUC) and that this rate will remain constant. Assumes that there is 19.5% in natural gas savings for improved efficiency water heaters (based on Energy Star findings) and that this percentage will remain constant.

Assumes that conversion to more efficient water heaters is merely an issue of turnover and easy for property owners to finance because of minimal price differences and existing subsidies (Fuller et al. 2009). Assumes half (50%) of water heaters in existing development will turn over before 2020 and 100% by 2030. The reductions for more efficient water heaters are assumed to be achieved in all new development in the target years, and so the reductions are applied to all therms that exceed levels of the baseline years. The use of therms for new development in the target years is assumed

to be all new therms generated since the target year or baseline year.

Please note that these estimates do not include energy reductions from new homes; these are included in the green building measure. Hence, the reductions to homes are only applied to the existing building stock, as established by the 2005 number of households.

Measure also looks at total energy reductions in the new and existing housing stock due to smart meters. At an individual scale, users will be able to rely on smart meters to monitor electricity consumption in real time and better understand the relationship between electricity usage and costs. Studies document that this new technology will result in behavioral changes that decrease electricity and natural gas consumption. Measure identifies a 95% in-home monitoring participation rate to achieve average of 7% in electricity savings per household and 1% in natural gas savings per household.

Fiscal Impact:

Cost to the City: Cost to the City would include staff time for preparation of the Energy Conservation Ordinance and public outreach. Additional building inspection staff would also be needed on an ongoing basis for program implementation.

Costs to households: On average, including rebates, costs for household retrofits range from \$2,000 to \$6,000 per home. Assumes an average cost of \$350 per home for an energy audit and average retrofit cost of \$3,000 per home.

Cost savings to the community: Represents energy bill savings.

Sources:

Association of Bay Area Governments. 2009. ABAG Projections 2009.

California Energy Commission (CEC). 2003. Impact Analysis 2005 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings.

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- . 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings.
- California Public Utilities Commission (CPUC). 2008. California Long Term Energy Efficiency Strategic Plan. <http://www.californiaenergyefficiency.com/docs/EEStrategicPlan.pdf>.
- City of Walnut Creek. 2004. Background Economic Conditions Report, Economic Development Plan. Table C-9. <http://www.walnut-creek.org/civica/filebank/blobload.asp?BlobID=2791>
- . 2009a. Business Licensing Listings. <http://www.walnut-creek.org/services/business/licenselist.asp??>.
- . 2009b. Draft Housing Element 2007–2014. <http://www.walnut-creek.org/civica/filebank/blobload.asp?BlobID=3753>.
- Climate Leadership Group – Clinton Foundation. 2009. Buildings: Berkeley, United States of America. http://www.c40cities.org/bestpractices/buildings/berkeley_standards.jsp.
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- Global Sustainability Initiative. 2008. 2020: Enabling the low carbon economy in the information age. United States report addendum. http://www.smart2020.org/_assets/files/Smart2020UnitedStatesReportAddendum.pdf.
- U.S. Environmental Protection Agency (EPA) and U.S. Department of Energy (DOE). n.d. High Efficiency Gas Storage Water Heaters. http://www.energystar.gov/index.cfm?c=gas_storage.pr_savings_benefits.
- . n.d. Whole-Home Gas Tankless Water Heaters. http://www.energystar.gov/index.cfm?c=gas_tankless.pr_savings_benefits.
- Yaeger, Liz. 2009. Office Manager of the Sonoma Energy Independence Program. SCEIP Weekly Report, E-mail communication, November 17.

Measure EU 1.2: Commercial Energy Conservation Program

Methodology & Assumptions:

For voluntary commercial retrofits, assumes average energy reductions of 20% for electricity and 5% for natural gas. The target participation rate for this measure is 10% of businesses by 2020 and 15% by 2030.

Measure also captures total anticipated reductions to be realized through smart meter installation. PG&E is in the process of installing smart meters, assuming 95% in-building monitoring participation to achieve an average of 5% of electricity savings and 1% in overall natural gas savings due to PG&E's enhanced ability to track and repair leaks.

Total commercial businesses calculated using the actual number of licensed businesses with commercial locations in the city in November 2009 and job growth rates projected by Contra Costa County. Job growth rates were assumed to equal business growth rates. It was assumed that one-third of all licensed businesses are home occupations, so one-third of all licensed businesses were excluded as a conservative estimate to avoid double-counting for home conversions (two-thirds of 8,007 total licensed businesses = 5,338 licensed businesses

counted for this measure in 2005). In 2000, 28.5% of all residents worked from home (City of Walnut Creek 2004). It was assumed that this percentage increased to one-third (33%) by 2005.

Assumes that as a result of promotion efforts, 7% of businesses will initiate energy efficiency actions by 2020 through energy efficiency financing programs, and 15% by 2020.

Fiscal Impact:

Assumes energy cost savings and minimal public cost investment based on the City's existing outreach and partnerships. Cost average of \$2,000 per commercial building retrofit was assumed.

Sources:

California Energy Commission (CEC). 2003. Impact Analysis 2005 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings.

California Public Utilities Commission (CPUC). 2008. California Long Term Energy Efficiency Strategic Plan. <http://www.californiaenergyefficiency.com/docs/EEStrategicPlan.pdf>.

Global Sustainability Initiative. 2008. 2020: Enabling the low carbon economy in the information age. United States report addendum. http://www.smart2020.org/_assets/files/Smart2020UnitedStatesReportAddendum.pdf.

Measure EU 1.3: Public Outreach

Methodology & Assumptions:

This measure is based on empirical data from a public education campaign designed to reduce emissions of criteria air pollutants in the Sacramento region (i.e., the Spare the Air program). This is one of the few public outreach campaigns that conducted an analysis of the effectiveness of the program as it relates to emission reductions. We use its findings for market penetration. The analysis confirmed that approximately

1% of people changed their behavior (e.g., took fewer vehicle trips on Spare the Air days) as a result of the Spare the Air campaign. For the City's public education campaign, it was assumed that approximately 1% of people would reduce their consumption of kWh of energy and therms by 10%. Hence, a 10% reduction was applied to projected residential energy consumption of kWh and therms for 1% of all residents.

For this measure, it was assumed that existing City activities have already achieved this 10% reduction for residential energy use in 2010. Existing activities include the City's "Going Green Together" bimonthly publications, "Going Green Together" web pages sponsored by the City, and workshops held in 2007 by the City Manager's Office. This is a conservative estimate for 2010 reductions. The City has estimated that its Going Green Together initiatives have led to over 862,000 kWh in reductions per year, but this includes reductions resulting from green building practices. This measure quantifies only reductions resulting from changed residential behavior and its effect on kWh and therms.

Fiscal Impact:

Cost to the City: Cost of outreach would be covered by existing programs through PG&E, the City, and the County including the City's continuation of the Going Green program.

Private cost: Average private cost of \$100/household was assumed to account for purchase of small-scale products to facilitate optimal energy efficiency behaviors (e.g., purchase of LED light bulbs).

Annual cost savings to the community: Represents energy bill savings.

Sources:

Sacramento Metropolitan Air Quality Management District (SMAQMD). 2009. Spare the Air Control Measure Program; Revision to State Implementation Plan Staff Report. <http://www.airquality.org/notices/CAPUpdate/STA-revisiontoSIP-StaffRpt23April2009.pdf>

EU 2: PROMOTE AND SUPPORT RENEWABLE ENERGY GENERATION AND USE

Measure EU 2.1: Renewable Energy Strategy

Methodology:

Reductions in kWh from renewable energy facilities:

Calculation takes 15% of kWh energy use for new and existing residential and commercial development, as depicted in the kWh used in 2020, phased in with only 8% applied in 2020.

The projected amount of energy use excludes the percentage of energy use attributed to municipal facilities, which is accounted for in municipal actions (percentage phased in for target year x [total kWh in baseline year - total kWh for municipal uses in baseline year]). The estimate of PV installed is restricted to installations on existing homes and commercial properties. It excludes renewable installations to power new developments that come as a result of green building efforts and the State's Zero Net Energy Homes effort in Measure EU 3.2 (represented by the difference of projected kWh between 2020 and 2030).

Therms for residential uses: Reductions for greater efficiencies in hot water heaters is applied only to new residential development in 2020 (excluding therms for hot water heating in existing development accounted for in Measure EU 1.3, and reductions resulting from the State's Zero Net Energy Homes effort that will result by 2030). It accounts for all possible savings that would be generated by more efficient water heaters (44% of therms for water heating X 19.5% therm savings in newer models X new therm use in target year = therm savings in residential uses for water heater retrofits).

Assumptions:

Assumes a 15% market penetration of renewable energy facilities and water heaters in the target years phased in with only 8% penetration achieved by 2020 and that this penetration rate will apply to new and existing development in 2020 [excluding reductions that will be attributed to green building efforts and the State's Zero Net Energy Homes effort (represented by new kWhs in 2030)].

Excludes renewable energy facilities for new development projected to occur between 2020 and 2030, which will be captured under Measure EU 3.2. This avoids double-counting.

Assumes that 44% of residential natural gas is used for water heating (CPUC 2008) and that this rate will remain constant.

Assumes that there is 19.5% in natural gas savings for improved efficiency water heaters (the average of tankless and efficient gas storage models according to the Energystar.gov savings and benefits web pages) and that this will remain constant.

Assumes that conversion to more efficient water heaters is merely an issue of turnover and easy for property owners to finance because of minimal price differences and existing subsidies (Fuller et al. 2009). The reductions for more efficient water heaters is assumed to be achieved in all new development in 2020, and so the reductions are applied to all therms that exceed levels of the baseline years. The use of therms for new development in the target years is assumed to be all new therms generated since the target year or baseline year before, cumulatively (i.e., 2020 therm use from new residential development is assumed to exclude all therms generated by residential development existing in 2005). This measure excludes all therm use attributed to new residential development between 2020 and 2030, which is captured under Measure EU 3.2, the State's Zero Net Energy Homes effort.

Fiscal Impact:

Cost to the City:

Looks at an assumed cost of \$10,000 for zoning code updates and revisions to permit procedures..

Private costs: Assumes an average cost of \$5,200 per solar installation (accounting for \$2,800 in average rebates per residential or commercial installation).

Through Cost savings to the community: Represents energy bill savings.

Sources:

- American Council for an Energy-Efficient Economy. n.d. Consumer Guide to Home Energy Savings: Condensed Online Version. Water Heating. <http://www.aceee.org/consumerguide/waterheating.htm>.
- California Public Utilities Commission (CPUC). 2008. California Long Term Energy Efficiency Strategic Plan. <http://www.californiaenergyefficiency.com/docs/EEStrategicPlan.pdf>.
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- Yaeger, Liz. 2009. Office Manager of the Sonoma Energy Independence Program. SCEIP Weekly Report, E-mail communication, November 17.

EU 3: FACILITATE GREEN BUILDING AND DESIGN**Measure EU 3.1: Green Building Ordinance****Methodology:**

Assumes adoption of Tier by 2014 to impact 30% of total new development between 2010 and 2020, and adoptions of Tier 2 by 2017 affects 30% of new development between 2010 and 2020. Assumes all growth in natural gas and electricity sectors is from new construction. Captures the reduction from complying with Tier 1 and 2, as amended, assuming historical average increases in efficiency requirements. Assumes energy reductions representative of Walnut Creek's Climate Zone (12).

Fiscal Impact:

Cost to the City: Assumes costs for training staff to implement the new Tier 1 and Tier 2 requirements.

Private cost: Assumes an average cost of \$1/square foot for nonresidential compliance, and average cost of \$1,500 per home.

Annual cost savings to the community: Results from reduced electricity and natural gas utility bills.

Sources:

- California Energy Commission (CEC). 2003. Impact Analysis 2005 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings.
- Cascadia Region Green Building Council. 2008. RFP - Living Building Study. <http://www.cascadiagbc.org/resources/rfps/rfp-lbcfinancialstudy.pdf>.
- City of Los Angeles. 2009. RFP: Green Building Compliance Audit. <http://cityplanning.lacity.org/PressRelease/RFP/GreenBuilding/RFP%20-%20Green%20Building%20Program%20Compliance%20Audit.pdf>.

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<http://www.walnut-creek.org/services/business/licenselist.asp>.

———. 2009b. Housing Element 2007–2014.

<http://www.walnut-creek.org/civica/filebank/blobdload.asp?BlobID=3753>.

Kats, G. et al. 2003. The Costs and Financial Benefits of Green Buildings: A Report to California’s Sustainable Building Task Force.

<http://www.ciwmb.ca.gov/GreenBuilding/Design/CostBenefit/Report.pdf>.

Measure EU 3.3: Urban Forestry

Methodology:

Urban Heat Island Reduction: According to the United States Department of Agriculture, planting shade trees within 40 feet of the south side or within 60 feet of the west side of properties can reduce summertime energy consumption associated with air conditioning by approximately 30%.

If trees are planted strategically to shade east and west walls of residential buildings, they would reduce air conditioning energy use by 6,408 GWh, equivalent to an average annual CO₂ equivalent emission reduction of 1.8 MT.

If 50,000,000 trees would reduce energy use by 6,408 GWh (6,408,000,000 kWh), then 1 tree reduces energy use by 128.16 kWh per year.

Assumed that approximately 3.5% of properties in Walnut Creek would receive an additional tree that would reach maturity (5–10 years) by 2020 and 10% by 2030.

Assumptions:

Distance from and orientation to buildings, building vintage, and type of air conditioning/heating: A relatively conservative assumption of 30,000 tree cover within the city and in proper

relationship to buildings was made. A conservative estimate of 500 trees planted annually was also utilized.

Fiscal Impact:

Cost to the City: Minimal. Updates to zoning regulations can be accomplished in conjunction with other required updates and will create only a marginal incremental cost.

Private cost: Private costs will be incurred through planting new trees, as required through the entitlement process established by the Zoning Code (once amended). Based on a survey of tree plantings throughout the United States, McPherson et al. (2003) estimated that the cost of tree plantings can vary from \$100 to \$1,000, based on the size of the tree, with a \$300 to \$1,000 range for a large tree (2- to 5-inch caliper). It is assumed that trees will cost \$300 for a medium to large tree. Cost is assumed to remain constant. By partnering with a local nonprofit or tree-planting advocate, the City could work to offset this private cost and provide trees at a subsidized rate.

Annual cost savings to the community: Represents savings in reduced energy bills.

Sources:

McPherson, G., J. Simpson, P. Peper, Q. Xiao, S. Maco, and P. Hoefler. 2003. Northern Mountain and Prairie Community Tree Guide: Benefits, Costs and Strategic Planting; Center for Urban Forest Research, USDA Forest Service, Pacific Southwest Research Station. http://www.fs.fed.us/psw/programs/cufr/products/cufr_258.pdf.

U.S. Forest Service, Pacific Northwest Research Station. 2009. Science Daily: California Study Shows Shade Trees Reduce Summertime Electricity Use. <http://www.sciencedaily.com/releases/2009/01/090105150831.htm>.

U.S. Forest Service. n.d. Climate Change Resource Center. Urban Forest and Climate Change. www.fs.fed.us/ccrc/topics/urban-forests.

EU 4: REDUCE ENERGY USE THROUGH INCREASED WATER CONSERVATION

Measure EU 4.1: Water Conservation

Methodology:

Assumes the baseline water-energy intensity, and quantifies the impact of achieving a 20% reduction in new development per the requirements of CALGreen and an overall 20% reduction in water consumption for existing development.

Fiscal Impact:

Cost to the City: None. Drought rationing is mandated by utility companies. The City will conduct minimal additional outreach and publication and be available to answer questions of the public.

Private cost: None.

Annual cost savings to the community: Results from reductions in energy bills and water bills, based on lower water use projected in this measure.

Sources:

California Energy Commission (CEC). 2005. Final Staff Report: California's Water-Energy Relationship, page 154-155. <http://www.energy.ca.gov/2005publications/CEC-700-2005-011/CEC-700-2005-011-SF.PDF>.

Contra Costa Water District (CCWD). 2008. Municipal Service Reviews. http://www.contracostalafco.org/municipal_service_reviews/central_county_water_wastewater/4.0%20CCWD%20Water%20Wastewater%20Final.pdf

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RAFT%20PEIR/WSMP%202040%20Draft%20PEIR%20-%20Main%20Document.pdf.

Marin Clean Energy Partnership tool.

TLU 1: REDUCE GHG EMISSIONS THROUGH USE OF ALTERNATIVE VEHICLES, TRIP REDUCTION AND CONSOLIDATION, AND EFFICIENT TRAFFIC FLOW

Measure TLU 1.1: Low-Emission Vehicle Facilities

Methodology:

Electric vehicles (EV) are much more efficient than standard internal combustion engine vehicles. The performance of this measure is related to the replacement of standard vehicles with EVs once the necessary infrastructure is available. The literature supports the fuel use reduction equivalent to one 10-mile trip for every charging station available. The energy use needed to service the charging stations was then calculated to discount the emissions reductions.

Assumptions:

Assumes that stations will be installed through civic and private development at the rate of 20 per year.

Fiscal Impact:

Costs to the City: The cost of updates to the Zoning Code, including staff time. Assumed to be approximately \$10,000 for a one-time update. Costs for review will be offset through entitlement fees as part of the normal review process.

Private costs: To determine the cost of Level 3 commercial charging spaces, the cost of Level 2 commercial charging spaces was manipulated based on the price difference of Level 1 Residential and Level 2 Residential charging spaces (the only category for which cost comparisons were available). The cost of Level 2 Residential spaces are \$1,268 more than the cost of Level 1 Residential spaces (the difference between \$2,146 and \$878, which includes costs for the charge cord, circuit installation, and administration costs);

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a conservative estimate, which is higher than the price difference between Level 1 and 2 Apartment charging spaces.

This difference was applied to the cost of Level 2 Commercial spaces. The total charger cost per charging space is \$1,852, when installed in groups of 10 (including ten wall boxes; ten charge cords; and ten 40A branch circuits, 240VAC/1-Phase with separate meter and breaker panel; and administration costs). Adding this per space cost to the assumed price difference between each level of charging station, the assumed cost of Level 3 Commercial spaces is \$3,120 (\$1,628 + \$1,852). Additional costs may be incurred for batteries, based on type used (Morrow, Karner, and Frankfort 2008).

Annual cost savings to the community: Results from reduced VMT (accounting for the increased use of electricity for vehicle charging). Conversion from VMT to equivalent gallons completed using Contra Costa County miles per gallon (mpg) from EMFAC2007 (11.06 mpg for gasoline). Used for the purposes of consistency with other measures. Assumes that all fuel use offset by this measure will be gasoline (rather than diesel).

Sources:

Calculated assuming parking spaces were used for commuting: 5 days per week, 48 weeks/year, 9.8 miles each way. Source for trip length: National Household Travel Survey, 2001. 2,298 billion miles/235 billion trips = 9.8 miles/trip.

Kwh used = 11.1*gallons of gasoline saved. Based on a comparison of miles/gallon and Kwh/mile of 1999 Ford Ranger, 1998 Chevy S-10, and 1998 Toyota RAV. Gas mpg from www.fueleconomy.gov/feg.findacar.html. Electric Kwh/mile from Idaho National Laboratory. 2006. Full Size Electric Vehicles. Advanced Vehicle Testing Reports. avt.inel.gov.

Morrow, K., D. Karner, and J. Frankfort. 2008. Plug-in Hybrid Electric Vehicle Charging Infrastructure Review. Final Report: Battelle Energy Alliance Contract No. 58517. U.S. Department of Energy Vehicle Technologies Program – Advanced Vehicle Testing Activity.

<http://avt.inel.gov/pdf/phev/phevInfrastructureReport08.pdf>.

Measure TLU 1.2: Transportation Demand Management (TDM)

Methodology:

Rideshare incentive programs: Rideshare/Carpooling assumed to currently be at 20% consistent with other cities as ranked in the Bay Area 2000 census (http://www.mtc.ca.gov/maps_and_data/datamart/census/dp234/PlaceCarpoolRank.htm)

Participation in car sharing programs in a typical region is 10–20% of residents living in neighborhoods suitable for car sharing, and perhaps 3–5% of those residents would car share rather than own a private vehicle if the service were available (VTPI 2009). Car share is found to typically be used by residents that drive 6,000 miles a year or less. Reduction is approximately 50%, or 3,000 miles a year. We assume that half of these miles are within Walnut Creek.

Estimated number of vehicles in Walnut Creek calculated by assuming that the number of cars per household is constant with the countywide car per household figure. Car population derived from EMFAC2007, which uses historical DMV registration data. (754,277 cars/344,129 = 2.19 cars per household, which is in line with the national average).

Fiscal Impact:

Cost to the City: Start-up costs for car-sharing programs vary, but numerous federal and local grants are available to fund initiation of a program, including the U.S. Department of Transportation, the Federal Congestion Mitigation and Air Quality fund, the U.S. EPA, and the California Department of Transportation. Alternatively, other cities have provided incentives to the private community to initiate a private car-share program (e.g., in Canada, many localities provide loans or start-up grants to private car share programs, usually under \$20,000). The U.S. EPA awarded the City of Vancouver \$64,000 to implement a car-share/bike-share program. Hence, costs vary, but it is assumed that the City will seek and

obtain grant funding to initiate and manage this program (Shaheen and Meyn 2002).

Private cost: Rideshare costs are excluded. Ridesharing is the most cost effective form of transit and is minimal; therefore, costs for rideshare are excluded from this measure (VTPI 2008). All costs based on car-share programs. Participants in car-share programs must pay a fee, which varies based on time of use and other factors (City Car Share n.d.). Cost assumes a rate structure utilized by Chicago's car share program.

Assumes the average length of per person number of trips per year and trip miles established in the methodology of Measure TLU 1.4 (total VMT on local roads/population of target year X average distance of local trips, or 11,254 miles). Using the 1,500-mile reduction in per person VMT assumed under this measure results in a 13% reduction in annual per person VMT. It is therefore assumed that each car-share participant will travel 9,754 miles through car share, and (as assumed in Measure TLU 1.4, that each of these trips is on average 5 miles in length and 10 minutes in time), totaling 19,580 trips and 195,800 minutes of travel for each participant per year.

This time and mileage per participant was utilized to determine costs. The City Car Share program (2009) provides a Share Local Rate that is conducive to local trips and a higher number of road trips, costing \$5.50 per hour + 35 cents per mile, plus a \$20 per month participation fee. This rate structure was utilized to determine car share costs for participants.

It is important to note that this cost is much lower than the cost of owning a personal vehicle. According to City Car Share (n.d.), once a car-share participant has traveled over 5,000 miles a year, they have passed the break-even point for participation and will be saving money by participating in a car-share program rather than owning a personal automobile. Since the average per person mileage in Walnut Creek is assumed to be 9,754 for participants in car share, participants will see a significant cost savings. All costs shown in this measure will replace the costs of maintaining a personal automobile and actually save participants money.

Reduced VMT for 2010 result from existing rideshare programs not requiring additional investment. As a car-share program is not yet in existence, the costs for participation in car share are not included for this target year.

Annual cost savings: Based on reduced VMT. Conversion from VMT to equivalent gallons completed using Contra Costa County mpg from EMFAC2007 (11.06 mpg for gasoline). Used for the purposes of consistency with other measures. Assumes that all fuel use offset by this measure will be gasoline (rather than diesel).

Sources:

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- City Car Share. 2009. Rates and savings. <http://www.citycarshare.org/sharelocalplusalittle.do>.
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- Huffaker, Matt. 2009. Free Ride Operations Report, September 2009, for Walnut Creek. Reported by Link.
- San Luis Obispo Council of Governments (SLOCOG). 2009. Update to Long Range Socio-Economic Projections: May 15, 2009.
- Shaheen, S., and M. Meyn. 2002. Shared-Use Vehicle Services: A Survey of North American Market Developments. ITS World Congress. <http://76.12.4.249/artman2/uploads/1/UCD-ITS-RP-02-15.pdf>.
- Victoria Transport Policy Institute (VTPI). 2008. TDM Encyclopedia. Ridesharing. <http://www.vtpi.org/tdm/tdm34.htm>.

———. n.d. Car Share. <http://www.vtpi.org/tdm/tdm7.htm>.

Measure TLU 1.3: Traffic Calming

Methodology:

The percentage of total VMT penetrated by this measure was multiplied by projected VMT and the percentage of VMT reductions possible through traffic calming measures.

Assumptions:

Assumes that a comprehensive menu of traffic calming measures will be installed to utilize the full elasticity of vehicle travel.

The penetration of traffic calming measures is phased in, assuming that installation of such devices will impact 15% of VMT in 2020 and 20% of VMT in 2030.

Assumes that total VMT reductions from this action will be 10% by 2020 and 20% by 2030, based on realistic reductions from other case studies (VTPI 2008).

Fiscal Impact:

Cost to the City and private cost: It is assumed that the City will pay for half of the cost of traffic calming, and the other half will be paid through private funds through new development or infill. Therefore, the methodology below was used to derive total cost, with half applied to the City and half applied to private costs.

To determine affected mileage of roadways:

- Assumes all traffic calming measures will take place on local roads and that all VMT penetrated by measure is on local roads. VMT affected assumed to be the portion of total VMT that is penetrated by this measure and that takes place on local roads. Percentage of VMT attributed to local roads (49.3%) calculated using data from the 2005 GHG inventory, by dividing baseline local road travel by total travel. Assumed to be constant in 2020 and 2030.
- Resulting VMT is translated to mileage of road using assumptions for Measure TLU 1.4. Assumes each

local trip is on average 5 miles in length. Hence, it is assumed that each 5-mile trip is a round trip (2.5 miles going each way on a given piece of roadway). Therefore, half of VMT is taken to deduce the mileage that reflects the mileage of roadway affected by this measure.

To determine cost of improvements for affected mileage, looks at the cost to calm traffic, assuming a 15% penetration for 184.76 miles of roadway, with an average cost of \$83,000 per 10 miles of roadway. Splits costs equally between private and City costs, assuming measure will be achieved through both new development and enhancements to existing roads. :

Annual cost savings: Based on reduced VMT. Conversion from VMT to equivalent gallons completed using Contra Costa County mpg from EMFAC2007 (11.06 mpg for gasoline). Used for the purposes of consistency with other measures. Assumes that all fuel use offset by this measure will be gasoline (rather than diesel).

Sources:

Victoria Transport Policy Institute (VTPI). 2008. TDM Encyclopedia. Traffic Calming: Roadway Design to Reduce Traffic Speeds and Volumes. <http://www.vtpi.org/tdm/tdm4.htm>.

Measure TLU 1.4: Anti-Idling Efficient Traffic Signal Timing

Methodology & Assumptions:

Average local trip length in miles and minutes derived from various local driving scenarios modeled through Google Maps and Yahoo driving directions. Credit to date based on MTC findings for fuel savings achieved as of 2011.

Percentage of VMT attributed to local roads calculated using data from the 2005 GHG inventory, by dividing baseline local road travel by total travel. Assumed to be constant in 2020 and 2030.

Average number of local trips calculated by dividing the local road VMT by the average trip length.

Decrease in trip length from traffic signal synchronization based on a range of 8–25% as reported by John S. Niles in the Seattle Times article, “T-Ops: Use Technology to Combat Congestion.” The 16% reduction is a median and supported by the traffic light synchronization project in Los Angeles (bloomekatz 2009).

Truck population: According to EMFAC2007, the 2005 population of heavy-duty trucks (over 10,000 pounds) was 3,111 in Contra Costa County. Assuming that truck activity in Walnut Creek is proportionate with heavy-duty truck activity per the percentage of VMT for heavy-duty trucks reported in the 2005 Baseline Inventory (for 12% of VMT), Walnut Creek would be responsible for 12% of traffic and vehicles or approximately 374 heavy-duty trucks. Assumes that this anti-idling enforcement successfully targets half, or 137 heavy-duty trucks by 2020 and all trucks by 2030.

Assumes heavy-duty trucks idle for one hour per day for 240 days per year (5-day workweek minus holidays).

According to <http://www.cobbcountyga.gov/green/downloads/measure37-reduction.pdf>, vehicles consume 1 gallon of diesel fuel for every hour of idling. Assume 0.5 gallons per hour for passenger cars.

Conversion to equivalent VMT completed using Contra Costa County mpg from EMFAC2007 - 11.06 for gasoline and 7.03 for diesel. Used for the purposes of consistency with other measures.

Fiscal Impact:

Cost to the City: Assumes the cost from a Portland case study. According to the Climate Leadership Group (2009), the City of Portland spent \$533,000 to synchronize 135 intersections and 16 streets. This was the amount the City received in a grant, and the City was not able to synchronize all signals. Costs to re-time a single intersection range from \$1,000 to \$3,000 per intersection. For this measure, it was assumed the City would spend \$533,000 to synchronize an equivalent amount of signals and streets. The City can pursue grant funding to finance this effort and may be able to allocate more funds than anticipated here, depending on amounts awarded.

Private cost: None.

Annual cost savings: Reduced gasoline and diesel usage from improved flow of vehicle traffic achieved by this measure. Conversion from VMT to equivalent gallons completed using Contra Costa County mpg from EMFAC2007 (11.06 mpg for gasoline). Used for the purposes of consistency with other measures. Assumes that all fuel use offset by this measure will be gasoline (rather than diesel).

Sources:

Bloomekatz, Ari B. 2009. 82% of L.A.’s signal-controlled intersections are now synchronized, mayor will announce. Los Angeles Times, October 8. <http://latimesblogs.latimes.com/lanow/2009/10/82-of-las-streets-now-covered-by-synchronized-traffic-lights.html>.

Climate Leadership Group – Clinton Foundation. 2009. Buildings: Berkeley, United States of America. http://www.c40cities.org/bestpractices/buildings/berkeley_standards.jsp.

TLU 2: REDUCE VEHICLE MILES TRAVELED THROUGH SMART LAND USE AND DESIGN

Measure TLU 2.1: Smart Growth

Methodology & Assumptions:

The performance of this measure is related to the elasticity of increased density and reduced travel associated with the increased mixture of uses. The literature supports a 5% reduction in vehicle miles traveled for every 100% increase in density and increase in convenience. To calculate the net increase in density in the city between 2005 and the target years, the following variables were needed:

Population density from residents and employees citywide in 2005, 2020, and 2035.

Based on a study by Ewing, Reid, et al. (2001), it was assumed that a 5% reduction in VMT would result from each 100% increase in density. Accordingly, 0.05 was taken of each target year’s percentage increase in density. The resulting

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number was the percentage reduction in VMT for the target year. The percentage of reduction in VMT for the target year that resulted from the measure was multiplied by the annual VMT projected for that year. This resulted in a total projected decrease in VMT citywide attributed to increased density.

Similarly, the literature supports a 5% reduction for increasing job/housing balance and convenience of shopping and services. Relying on the percentage of travel attributed to shopping and commuting from national averages (14% shopping and 18% commuting), it was assumed that shopping and commuting related trips would be reduced by 5%.

Fiscal Impact:

Cost to the City: Assumes \$30,000 to update the Zoning Code and General Plan.

This measure captures increases in density based on development projections; therefore, attaining this measure does not require significant investment from the City. However, by taking additional steps for implementation, the City can ensure achievement and possibly achieve even greater reductions.

Private cost: This measure is based on anticipated development scenarios and requires the City to direct development in certain land use patterns. It is premised on development the City can reasonably expect based on regional forecasts and does not pose additional costs on the development community.

Annual cost savings: Based on reduced fuel use resulting from reduced VMT. Conversion from VMT to equivalent gallons completed using Contra Costa County mpg from EMFAC2007 (11.06 mpg for gasoline). Used for the purposes of consistency with other measures. Assumes that all fuel use offset by this measure will be gasoline (rather than diesel).

Measure TLU 2.2: Jobs/Housing Balance

Methodology:

Trip Reduction = $(1 - (\text{ABS}(1.5 * h - e) / (1.5 * h + e)) - 0.25) / 0.25 * 0.03$ where h = study area housing units, e =

study area employment. Household and employment growth rates were obtained from ABAG Projections 2009.

Fiscal Impact:

Cost to the City: Costs for implementation of this measure will be achieved through the Draft Housing Element. Any required code modifications or other work on part of the City to implement the Draft Housing Element will be outlined in the Draft Housing Element, and hence, no additional costs are incurred here.

Private cost: This measure is based on anticipated development scenarios and projected modifications to the jobs/housing balance; therefore, it creates no additional private costs. (It is premised on private investment the City can reasonably expect based on regional projections.)

Annual cost savings: Based on reduced fuel use resulting from reduced VMT. Conversion from VMT to equivalent gallons completed using Contra Costa County mpg from EMFAC2007 (11.06 mpg for gasoline). Used for the purposes of consistency with other measures. Assumes that all fuel use offset by this measure will be gasoline (rather than diesel).

Sources:

City of Walnut Creek. 2009. Draft Housing Element 2007–2014. <http://www.walnut-creek.org/civica/filebank/blobdload.asp?BlobID=3753>.

Nelson/Nygaard Consulting Associates. 2005. Creating Low-Traffic Developments: Adjusting Site-Level Vehicle Trip Generation Using URBEMIS

Rimpo and Associates. 2007. URBEMIS Version 9.2.4.

Sacramento Metropolitan Air Quality Management District (SMAQMD) 2007. Recommended Guidance for Land Use Emission Reductions, Version 2.4.

Measure TLU 2.3: Affordable Housing

Methodology:

URBEMIS provides a 4% reduction in vehicle trips for each deed-restricted below-market-rate (BMR) unit. Thus, the total

reduction is as follows: Trip reduction = % of units that are BMR * 0.04. The units assumed to be BMR are based on assumptions from the Draft 2009 Housing Element, as clarified below.

Assumptions:

Assumes that all new traffic is caused by new business growth and new housing growth equally.

Assumes that all housing units dedicated to extremely low-, very low-, and low-income levels receive the reductions in VMT attributed to BMR units (extremely low income = 0–30% of area median income (AMI), very low income = 31–50% of AMI, and low income = 51–80% of AMI) (City of Walnut Creek 2009). This likely underestimates the City's provision of affordable housing, since the City's BMR program also supports moderate-income households (those earning up to 120% of AMI).

All projected housing units for extremely low-, very low-, and low-income levels are taken from the Draft 2009 Housing Element (City of Walnut Creek 2009).

For 2010, takes credit for 70 very low-income units constructed from 2007 to 2008, 13 low-income units under construction in 2009, and 33 very low-income units under construction in 2009 (City of Walnut Creek 2009).

For 2020, assumes that all affordable housing projects currently under review by the City, as outlined in the Draft Housing Element, will be constructed.

For 2030, assumes that 10% of all high potential residential housing units identified by the Draft Housing Element will be constructed as low-, very low-, or extremely low-income units.

Please note that 2010, 2020, and 2030 numbers are cumulative.

Fiscal Impact:

Cost to the City: Implementation of this measure generates no additional costs to the City, beyond funds and programs it already has committed. Costs and resources here would be the same outlined in the Draft Housing Element (not in addition to) (City of Walnut Creek 2009).

Approximately 8–10% of the City's affordable housing programs are paid out of the General Fund, but most funds come from other sources. According to the Draft Housing Element, the City has several main sources for these funds: federal Community Development Block Grant (CDBG) funds (~\$30,000/year, a minimum of 50% going directly to affordable housing programs), City Redevelopment Agency Housing Set-Aside funds (RDA) (~\$190,000 each year between 2010 and 2014), and City Revolving Bond funds (a total of \$194,000) (City of Walnut Creek 2009). In addition to these sources, the City utilizes money from private sources as outlined below.

Private costs: New development is required to contribute to affordable housing, but such investment is determined on a case-by-case basis according to project characteristics and City ordinances. The reductions established in this measure are based on projects planned or that the City reasonably expects to partner with private developers to implement; therefore, this measure does not create any costs but is premised on investment the City has already assumed will take place.

Two ordinances ensure that private development contributes to the City's affordable housing (City of Walnut Creek 2009):

1. The City's Inclusionary Housing Ordinance requires all residential developments to either provide affordable units or pay an affordable housing in-lieu fee. Developments providing more than 10 units must provide affordable units at varying percentages. Developers providing less than 10 units may either provide at least one affordable unit or pay an in-lieu fee. All in-lieu fees are used by the City to provide 100% affordable housing or subsidies for low and very-low income residents.
2. The City's Commercial Linkage Fee ordinance requires all commercial developments to pay into a housing linkage fee based on the number of square feet of the net new commercial development. These funds exclusively fund the City's affordable acquisition or new/construction program.

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Annual cost savings: Based on reduced fuel use resulting from reduced VMT. Conversion from VMT to equivalent gallons completed using Contra Costa County mpg from EMFAC2007 (11.06 mpg for gasoline). Used for the purposes of consistency with other measures. Assumes that all fuel use offset by this measure will be gasoline (rather than diesel).

Sources:

California Air Pollution Control Officers Association (CAPCOA). 2008. CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act. (Appendix B MSG-21).

City of Walnut Creek. 2009. Draft Housing Element 2007–2014. <http://www.walnut-creek.org/civica/filebank/blobload.asp?BlobID=3753>.

Holtzclaw, John, Robert Clear, Hank Dittmar, David Goldstein, and Peter Haas. 2002. Location Efficiency: Neighborhood and Socio-Economic Characteristics Determine Auto Ownership and Use – Studies in Chicago, Los Angeles and San Francisco. *Transportation Planning and Technology*, 25 (1): 1–27.

Nelson/Nygaard Consulting Associates. 2005. Creating Low-Traffic Developments: Adjusting Site-Level Vehicle Trip Generation Using URBEMIS.

TLU 3: CONVERT VEHICULAR TRIPS TO NON-VEHICULAR OR TRANSIT TRIPS

Measure TLU 3.1: Bicycle Planning

Methodology & Assumptions:

Each mile of bikeway per 100,000 residents increases bicycle commuting 0.075%, all else being equal. Calculates the increase in bicycle commuting through the cumulative amount of bike lanes, both new lanes planned for construction and those already existing.

Assumes that 1% of trips are performed by bikes per national average (Comsis Corporation 1993).

Assumes that Class I lanes are paved right-of-way completely separated from any street or highway; Class II lanes are located on the outside edge of roadways; and Class III lanes provide for shared use with pedestrian traffic.

Assumes that development of bike lanes will be phased in, with 75% of improvements in the Bicycle Plan completed by 2020 and 100% completed by 2030.

2010 reductions take credit for existing bike lanes, as stated by the Draft Bicycle Plan. Also takes credit for improvements planned to Ygnacio Valley Road, assuming that it will lead to the installation of approximately .7 mile of Class III bike lanes, based on approximations from Google Maps. According to the City of Walnut Creek (2009a), the 2008–2010 CIP allocates \$890,000 for the Ygnacio Valley Road Pedestrian and Bicycle Facility Improvement project, which would include plans, bids, and construction of a widened sidewalk on Ygnacio Valley Road from Ygnacio Court to Marchbanks. Money is allocated for this project from CIP Outside Grant funds, and construction was completed in 2009.

Fiscal Impact:

Costs to the City: All costs to the City for implementation of the projected bike lanes come from the Draft Bicycle Plan. Costs reflect building costs, but do not include maintenance, design, inflation, or specific engineering-related costs for construction. Total cost for implementation is \$38,218,500. Consistent with the phasing of this measure, it is assumed that 75% of project costs will be expended by 2020 and the remaining 25% of project costs expended by 2030, with the total 100% of the project cost spent cumulatively and distributed over the target years.

Private costs: Assumes private developers will share costs of design and engineering, assuming cost of \$29,000 per mile of bicycle lane.

Annual cost savings: Achieved through reduced fuel use that results from reduced VMT. Conversion from VMT to equivalent gallons completed using Contra Costa County mpg from EMFAC 2007 (11.06 mpg for gasoline). Used for the purposes of consistency with other measures. Assumes that all fuel use offset by this measure will be gasoline (rather than diesel).

Sources:

City of Walnut Creek. 2009a. Bicycle Plan, Draft September 2009. http://www.walnut-creek.org/citygov/depts/cd/transit/bicycle_plan.asp.

———. 2009b. Capital Investment Program FY 2008–2010. Adopted June 24, 2009. <http://www.walnut-creek.org/civica/filebank/blobdload.asp?BlobID=3770>. p. 3.

Comsis Corporation. 1993. Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience, USDOT and Institute of Transportation Engineers.

Dierkers, G., E. Silsbe, S. Stott, S. Winkelman, and M. Wubben. 2007. CCAP Transportation Emissions Guidebook. Washington, D.C.: Center for Clean Air Policy. <http://www.ccap.org/safe/guidebook.php>. as cited in California Air Pollution Control Officers Association (CAPCOA) 2008. CEQA and Climate Change.

Victoria Transportation Planning Institute (VTPI). 2009. TDM Encyclopedia. Cycling Improvements. <http://www.vtpi.org/tdm/tdm93.htm>.

Measure TLU 3.2: Multi-Modal Wayfinding**Methodology & Assumptions:**

The Victoria Transportation Planning Institute cites up to a 17% reduction of auto VMT as users opt for walking, cycling, or transit as a result of a multi-modal navigation tool system that is integrated as part of a comprehensive TDM program. This is a high estimate based on a facility-level wayfinding system. In order to adjust for a citywide program and to account for overlap with Measure TLU 1.3, this measure is assumed to lead to an additional 5% decrease in VMT by 2030. This reduction is phased in, with 3% attainment in 2020. Installation of the informational kiosks in Downtown is assumed to achieve a .05% reduction in VMT by 2010. These reductions are only applied to a portion of local VMT serving major arterials.

Fiscal Impact:

Cost to the City: Based on a case study of Portland. Portland initiated a SmartTrips program to increase biking, walking, and use of public transit (leading to reduced VMT). This project incorporated a highly effective “individualized marketing” method through an advanced wayfinding campaign that targets key areas. It cost \$550,000 in initial investment per 20,000 households, or approximately \$27.50 for each targeted household (Climate Leadership Group 2009).

To determine a number of households affected by this measure, total projected VMT for each target year was divided by total projected households (VMT/household) to obtain occurrence of VMT by household. This ratio was applied to the projected reduction in VMT for this measure in order to determine the number of households affected by the measure (25.76). Lastly, the ratio of initial investment per household targeted (\$550,000/20,000 households) was utilized to determine total costs for the City. Costs for project implementation in 2010 are based on the cost of kiosk installation expected by 2010, as established by the City CIP.

It was assumed that these costs reflect initiation only and not ongoing project maintenance.

Private costs: None.

Cost savings: Achieved through reduced fuel use that results from reduced VMT. Conversion from VMT to equivalent gallons completed using Contra Costa County mpg from EMFAC2007 (11.06 mpg for gasoline). Used for the purposes of consistency with other measures. Assumes that all fuel use offset by this measure will be gasoline (rather than diesel).

Sources:

City of Walnut Creek. 2009. Capital Investment Program FY 2008–2010. Adopted June 24, 2009. <http://www.walnut-creek.org/civica/filebank/blobdload.asp?BlobID=3770>.

Climate Leadership Group – Clinton Foundation. 2009. Transport: Portland United States of America.

http://www.c40cities.org/bestpractices/transport/portland_alternative.jsp.

Victoria Transport Policy Institute (VTPI). 2009. TDM Encyclopedia. Multi-Modal Navigation Tools: Improving User Information for Walking, Cycling, and Public Transit. <http://www.vtpi.org/tdm/tdm113.htm>.

Measure TLU 3.3: Bicycle Parking

Methodology:

The calculation for expected transportation emissions reductions was provided by the San Joaquin Valley Air Pollution Control District (SJVAPCD) Climate Change Action Plan and manipulated to correspond to the bicycle parking requirements proposed for the City of Walnut Creek.

For nonresidential uses, according to the California Air Pollution Control Officers Association (CAPCOA)/the SJVAPCD Plan, provision of short- and long-term bike parking at the rate of 1:20 vehicle spaces supports a 0.625% reduction in emissions. Assuming reduced emissions are attributed equally to short- and long-term bicycle parking spaces, one-half of the reduction (or 0.3125%) is attributable to each short- and long-term spaces provided at the 1:20 ratio. The City of Walnut Creek is proposing requiring short-term bike parking at twice that rate, or 1:20 vehicle spaces, so the reduction for this half of the measure would result in double 0.3125%, or 0.625%. The proposed long-term bike parking ratio of 1:20 would result in an additional 0.3125% reduction.

According to CAPCOA/the SJVAPCD Plan, provision of long-term bike parking at the rate of 1 per unit supports a 0.625% reduction in emissions.

According to the 2001 National Household Travel Survey, average annual VMT per household is 21,187 and the “to or from work” subcategory is 5,724 (27.0%). Shopping is 3,062 (14.5%). Other Family and Personal Business is 3,956 (18.7%). Social and Recreational driving is 5,186 (24.5%). Therefore, VMT attributed to commercial businesses is 27% + 14.5% = 41.5%, and VMT attributed to residents is 18.7% + 24.5% = 43.5 (trips to commercial destinations are captured within the commercial bike parking measure).

Assumptions:

It was assumed that emissions reductions for commercial bicycle parking are attributed equally to short- and long-term bicycle parking spaces.

In 2008, 47% of all housing units were multi-family (City of Walnut Creek 2009b), a 2% increase from 1990 (in an 18-year time span, an average increase of just approximately .11% per year). It was assumed that by 2020, the percentage of multi-family units would increase at a rate of .10% per year from 2008 to 48.2% of all units, and that by 2030, the percentage of multi-family units would increase at the same rate to 49.2% of all units.

Fiscal Impact:

Cost to the City: Minimal. No major costs will be incurred to adopt these code updates in conjunction with other related update processes called for by the General Plan.

Private cost: The VTPI (2009) states the cost of installing high-quality bike racks and lockers typically range from \$100 to \$500. It is assumed to cost \$150 per bike. This rate is multiplied by the projected number of bike spaces.

Multi-family bike spaces:

1. Assumes that the number of multi-family housing units is based on the projected percentage that will be multi-family units, using the calculation above for the reduction. Also assumes the existing average household size for multi-family units is 2.09 persons per household. Therefore, assumes that all multi-family units constructed will be two bedrooms (as a conservative estimate). Two-bedroom multi-family units require 2.25 parking spaces, as established in Section 10-2.3.206 of the Municipal Code.
2. Total number of multi-family parking spaces for the target year = projected multi-family households X 2.25 parking spaces. Of this total, 10% was taken (based on the bike parking ratio provided in this measure) to get a projected number of bike parking spots. This was multiplied by the assumed cost of \$350 per bike space

in order to project costs incurred by this measure for multi-family parking.

Commercial bike spaces:

1. Number of businesses: Total commercial businesses calculated using the actual number of licensed businesses with commercial locations in the City in November 2009 and job growth rates projected by Contra Costa County. Job growth rates were assumed to equal business growth rates. It was assumed that one-third of all licensed businesses are home occupations, so one-third of all licensed businesses were excluded as a conservative estimate to avoid taking reductions (two-thirds of 8,007 total licensed businesses = 5,338 licensed businesses counted for this measure in 2005, based on the 2003 Economic Development Report (City of Walnut Creek 2004) that states that in 2000, 28.5% of residents worked from home).
2. Square footage: Total commercial square footage includes all office, retail, and industrial space constructed between 1993 and 2003, and permitted development as of April 2003. Assumes that all commercial square footage provided in the 2003 Economic Development Report (City of Walnut Creek 2004) is reflected in the total square footages. The average business square foot was deduced using this figure and number of existing businesses in 2005 (2,798 square feet per business) and is assumed to remain constant in target years. This average square foot was applied to the projected number of businesses to get a projected total square footage figure. See Measure EU1.1 for additional projection calculations.
3. Vehicle parking ratio (from the Municipal Code) is assumed to be 1 space per every 200 square feet for all commercial and community facilities (Section 10-2.3.205). The total projected square footage was divided by 200 to project the number of vehicle parking spaces.

4. Bike spaces: The parking space total is divided by 20 (based on the bike parking ratio provided in this measure) to get a projected number of bike parking spots. This was multiplied by the assumed cost of \$350 per bike space in order to project costs incurred by this measure for commercial parking.

Cost savings: Achieved through reduced fuel use that results from reduced VMT. Conversion from VMT to equivalent gallons completed using Contra Costa County mpg from EMFAC2007 (11.06 mpg for gasoline). Used for the purposes of consistency with other measures. Assumes that all fuel use offset by this measure will be gasoline (rather than diesel).

Sources:

California Air Pollution Control Officers Association (CAPCOA). 2008. CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act (AppendixB).

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———. 2009b. Draft Housing Element 2007–2014. <http://www.walnut-creek.org/civica/filebank/blobdload.asp?BlobID=3753>.

———. n.d. Municipal Code. Title 10, Article 2: Off-Street Parking and Loading Regulations. <http://www.walnut-creek.org/civica/filebank/blobdload.asp?BlobID=2500>.

National Household Travel Survey. 2001. Summary of Travel Trends. <http://nhts.ornl.gov/2001/pub/STT.pdf>. See page 30 of the PDF.

San Joaquin Valley Air Pollution Control District (SJVAPCD) 2009. Climate Change Action Plan: Addressing Greenhouse Gas Emissions Under the California

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Environmental Quality Act; Draft Staff Report, June 30, 2009. p. 106.

Victoria Transportation Planning Institute (VTPI). 2009. TDM Encyclopedia. Cycling Improvements. <http://www.vtpi.org/tdm/tdm93.htm>.

Measure TLU 3.4: Transit Incentives

Methodology & Assumptions:

Assumes one average transit trip replaces a 7.16-mile vehicle trip to and from home. Based on the average median trip length of car trips for riders with home origins at the Walnut Creek BART station, as cited in the 2008 BART Station Profile Report, page 137 (the median distance from home to the Walnut Creek Station X 2, or 3.58 X 2). According to Victoria Transport Policy Institute, with a \$2 per day parking subsidy in a low-density, travel-mode-neutral setting, a 7.9% decrease in annual VMT attributed to employee commute is achieved. Cambridge Systematic (2009) finds a 4.5% decrease in VMT from parking cash-out programs. Assumes a 4.5% decrease for a \$2 subsidy.

Fiscal Impact:

Cost to the City: Equals the cost of transit incentive offered to each participant (\$2 per day). Cost to be offset through partnerships with transit authorities and regional programs.

Private cost: None.

Annual cost savings: Achieved through reduced fuel use that results from reduced VMT. Conversion from VMT to equivalent gallons completed using Contra Costa County mpg from EMFAC2007 (11.06 mpg for gasoline). Used for the purposes of consistency with other measures. Assumes that all fuel use offset by this measure will be gasoline (rather than diesel).

Sources:

American Public Transportation Association (APTA). 2009. 2009 Public Transportation Fact Book, 60th ed. http://www.apta.com/gap/policyresearch/Documents/APTA_2009_Fact_Book.pdf.

Bay Area Rapid Transit (BART). 2005. Walnut Creek Comprehensive Station Plan. <http://www.bart.gov/docs/planning/WalnutCreekCSP.pdf>.

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———. n.d. BART Quarterly Weekday Average Exits. <http://www.bart.gov/docs/QuarterlyExitsQ110.pdf>.

Cambridge Systematic. 2009. Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions. Technical Appendices. Prepared for the Urban Land Institute. (p. B-54). http://www.movingcooler.info/Library/Documents/Moving%20Cooler_Appendix%20B_Effectiveness_102209.pdf

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Measure TLU 3.5: BART Shuttles

Methodology & Assumptions:

The Walnut Creek Comprehensive Plan (2004) estimates a conservative increase of Walnut Creek BART Station ridership by 2025 to be 40.4% over 2004 levels of ridership, which equals an approximate average yearly increase in ridership of 1.923%. This yearly increase is applied to each target year over the 2008 observed ridership trends for total projected ridership, discussed below.

For 2010 reductions, the frequency of transit is based on actual transit use of Walnut Creek BART Station riders, cited in the BART 2008 Station Profile, which states that 7% of home origin Walnut Creek station users access BART by bus or transit. It is assumed that all transit use is new since the baseline year of 2005.

Assumes the average of amount of riders entering the Walnut Creek BART Station in 2008 is 6,084 (based on the 2008 BART Station Profile Study, page 107). Multiplying the number of daily entries by 240 days per year (based on a 5-day

workweek minus holidays) yields a transit ridership yearly average of 1,460,160. Since these trip trends have already been observed, they are credited to the 2010 year for reductions.

According to the BART Profile Study (page 107), 57% of average weekday trips are made by people with a home original in Walnut Creek; thus, it is assumed that this measure will impact 57% of all Walnut Creek BART users, the portion of BART users in Walnut Creek that will be affected by City implementation of this measure. Assumes that this portion of ridership remains constant.

For every 1.0% increase in transit service (measured by transit vehicle mileage or operating hours), ridership increases 0.5% (Victoria Transportation Policy Institute, vtpi.org/tdm/tdm47.htm). With the projected usage of BART provided through detailed BART analyses and planning documents, we expect this reduction to be highly achievable in Walnut Creek.

Assumes one average transit trip replaces a 7.16-mile vehicle trip to and from home. Based on the average median trip length of car trips for riders with home origins in the Walnut Creek BART station, as cited in the 2008 BART Station Profile Report, page 137 (the median distance from home to the Walnut Creek Station X 2, or 3.58 X 2).

Fiscal Impact:

Cost to the City: Utilizes national averages to determine estimated operating and expense costs.

In 2007, the national total of expenses for bus transit was as follows (APTA 2009, Table 17): \$3,291 million for all capital costs and \$17,307.5 million for all operating costs (including all operations, maintenance, general administration, and purchased transportation). Hence, the national ratio of expense for capital expenses to operation was 1:10.06.

In 2005, the City spent \$180,000 to appropriate three buses for conversion into use as free trolleys. This cost is assumed to reflect all capital costs. It is also assumed that this cost was supplemented by operational costs at the national ratio established above, for a total of \$1,811,460.63 in operational

costs (\$180,000 X 10.06), a combined total of \$1,991,460.63 for all costs.

It is also assumed that these investments supported the 7% increase in ridership travel by 2010. Hence, a ratio of total investment of \$1,991,460.63 supported a 7% increase in ridership, at a ratio of \$284,494.38 investment for each 1% increase in transit use.

Using these ratios, the total cost of achieving the projected ridership in the target years was deduced. Note that total costs to the City were deduced by the costs projected for the private community below.

Private cost: The national average fare per unlinked bus trip was 85 cents (APTA 2009, Table 22). To offset the financial burden on the City, it was assumed that riders would be charged a \$1.00 round-trip ticket, good for a ride to and from BART. Hence, half the fare amount (50 cents) was multiplied by the projected number of riders for each year. Fees were not assumed to initiate until the 2020 target year.

Cost savings: Achieved through reduced fuel use that results from reduced VMT. Conversion from VMT to equivalent gallons completed using Contra Costa County mpg from EMFAC2007 (11.06 mpg for gasoline). Used for the purposes of consistency with other measures. Assumes that all fuel use offset by this measure will be gasoline (rather than diesel).

Sources:

- American Public Transportation Association (APTA). 2009. 2009 Public Transportation Fact Book, 60th ed. http://www.apta.com/gap/policyresearch/Documents/APTA_2009_Fact_Book.pdf.
- Bay Area Rapid Transit (BART). 2005. Walnut Creek Comprehensive Station Plan. <http://www.bart.gov/docs/planning/WalnutCreekCSP.pdf>.
- . 2008. BART 2008 Station Profile Study. (Provided by Matt Huffaker, City of Walnut Creek).
- . n.d. BART Fiscal Year Transit Exits. http://www.bart.gov/docs/station_exits_FY.pdf.

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<http://www.bart.gov/docs/QuarterlyExitsQ110.pdf>.

Victoria Transportation Policy Institute (VTPI). n.d.
vtpi.org/tdm/tdm47.htm.

Measure TLU 3.6: Safe Routes to School

Methodology:

Assumes number of school-age children increases evenly with population growth. 2005 number of school-age children includes children ages 5–17 in the city (City of Walnut Creek 2009).

According to VTPI, there are currently few detailed studies of the effectiveness of School Transport Management programs, but anecdotal evidence indicates that total reductions in automobile trips of 10–20% or more are possible at a particular school under programs such as a walking school bus. For the purposes of this study, we will assume a 15% reduction in automobile trips.

Assumes average round-trip drop off distance for parents is 5 miles

Assumptions:

All students living within 2 miles of a school will participate (GIS buffers to determine percentage of residences within 2 miles of schools).

Fiscal Impact:

Cost to the City: None. To be funded through a combination of grant programs.

Private cost: None.

Annual cost savings: Achieved through reduced fuel use that results from reduced VMT. Conversion from VMT to equivalent gallons completed using Contra Costa County mpg from EMFAC2007 (11.06 mpg for gasoline). Used for the purposes of consistency with other measures. Assumes that all fuel use offset by this measure will be gasoline (rather than diesel).

Sources:

California Air Pollution Control Officers Association (CAPCOA). 2008. CEQA and Climate Change: Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act, Appendix B MSG-2.

City of Walnut Creek. 2009. Draft Housing Element 2007–2014. <http://www.walnut-creek.org/civica/filebank/blobdload.asp?BlobID=3753>.

National Center for Safe Routes to School. n.d. http://www.saferoutesinfo.org/resources/collateral/srts_talkingpoints.doc.

Measure TLU 3.7: Parking Management

Methodology:

Cost-based parking pricing (i.e., prices set to recover the full cost of parking facilities) typically reduces parking demand 10–30% compared with unpriced parking (Shoup 2005). Reduction of 10% applied to local road trips to and from the downtown area, which were assumed to be a quarter of all local transportation.

Assumptions:

Percentage of VMT attributed to local roads calculated using data from the 2005 GHG inventory, by dividing baseline local road travel by total travel. Assumed to be constant in 2020 and 2030.

Fiscal Impact:

Cost to the City: The City will need to conduct a parking analysis and pay the costs of creating a parking plan. Including staff time, retention of a parking consultant, and adoption of the new plan, it is anticipated to cost the City \$75,000, plus \$10,000 in administration and modification costs in 2030.

Note that all private costs outlined in this measure are added as cumulative revenue to the City; hence, the negative cost and the profit in 2030, which accounts for the costs of

implementation and operation of the parking plan, plus revenues earned in 2020 and 2030.

Private cost: Consistent with Parking Task Force findings, assumes following price increases to achieve an 85% occupancy rate:

- Zone 1: Increase rate from \$1.00/hour to \$2.50 per hour
- Zone 2: Increase rate from \$0.50/hour to \$0.75/hour
- Zone 3: Increase rate from \$0.50/hour to \$0.50/hour.

The reduction in VMT applies to local road trips only that were not affected by this measure (49.3% of all VMT and 90% of all local VMT, when accounting for 10% reduction of this measure). Therefore, it was assumed that 44.37% of all VMT (VMT not reduced by this measure) was vulnerable to traffic pricing.

Based on the assumptions in Measure TLU 1.4, it was assumed that the average local trip length was 10 miles. Therefore, the remaining local VMT was divided by 10 miles to determine a number of trips on local roads that is unaffected by this measure. It was assumed that this measure would penetrate 25% of these trips by 2020 and 40% by 2030. Hence, the \$5.00 daily rate was converted into a yearly rate (\$5 X 22 days/month X 12 months/year) and multiplied by these affected trips.

Annual cost savings: Achieved through reduced fuel use that results from reduced VMT. Conversion from VMT to equivalent gallons completed using Contra Costa County mpg from EMFAC2007 (11.06 mpg for gasoline). Used for the purposes of consistency with other measures. Assumes that all fuel use offset by this measure will be gasoline (rather than diesel).

Sources:

Shoup, Donald. 2005. *The High Cost of Free Parking*. Planners Press (www.planning.org).

Transportation Research Board. 2003. *Transit Cooperative Research Program: Parking Management and Supply*.

Chapter 18. http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_95c18.pdf.

Victoria Transport Policy Institute (VTPI). 2008. *TDM Encyclopedia. Parking Management*. http://www.vtpi.org/tdm/tdm28.htm#_Toc128220495.

WR 1: IMPLEMENT A ZERO WASTE POLICY TO REDUCE WASTE SENT TO THE LANDFILL

Measure WR 1.1: Zero Waste

Methodology:

Walnut Creek's 2005 diversion rate is 48% as reported by the California Integrated Waste Management Authority.

Zero waste goal assumed to achieve a 75% diversion rate by 2020 and a 95% rate by 2030.

Current composting methods are understood to produce greenhouse gas emissions; however, commercial composting methods are expected to improve to negate these emissions by 2020 and 2030.

Fiscal Impact:

Cost to the City: None. According to the Central Costa County Solid Waste Authority, Walnut Creek's last solid waste contract was adopted in 2004 and will remain in effect until 2014 (CCCSWA 2004). To implement this measure, the City will work with CCCSWA to negotiate into the new contract an agreement that Allied Waste (the waste provider) will initiate a publicity program to advertise recycling and composting programs. For example, the San Carlos Climate Action Plan (2009) describes how Recology of San Mateo County has agreed to provide a free 6-month Commercial and Multi-Family Dwelling "Recycling Blitz" educational program (estimated to cost \$478,435) and will remit to the SBWMA member Agencies the revenue derived from the recyclable material that is collected during this program (estimated at \$210,000). They will also do ongoing outreach and public education as part of their contract with the City of San Carlos. Through a similar agreement, the City of Walnut Creek can

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ensure that Allied Waste helps the City achieve its goals, while also building a longer-term clientele for Allied Waste that will support its alternative waste programs. For instance, customers currently have to pay \$39–\$62 for a composting bin. The City can negotiate as part of its contract the limited supply of free composting bins to City residents, which will reduce waste while expanding Allied Waste’s composting program (CCCSWA 2009).

Private cost: It is assumed that three-quarters of all households whose waste is eliminated in the target years (according to the assumptions below) will have to purchase a composting bin. It is assumed that three-quarters of all households in 2020 will have to purchase bins and that in 2030 three-quarters of the new households whose waste is eliminated since 2020 will have to purchase bins. The cost of bins is assumed conservatively to be the more expensive composting model, which costs \$62. This cost is assumed to remain constant, although it is anticipated to reduce in price with increased use. Further, it is assumed that the one-quarter of all households not purchasing bins whose waste is eliminated by this measure will receive a bin through the outreach initiatives established in this effort.

Annual cost savings: The amount of waste in 2005 was divided by the population to determine an average tonnage per person in Walnut Creek, which was converted to annual gallons of waste per person. Ratio was assumed to remain constant. This ratio was used to determine how many households would essentially be eliminated in waste production for this measure in the target years, by dividing projected amount of waste reduced by this ratio.

It is assumed that on average all Walnut Creek households use 64-gallon waste carts, which cost \$31.80 a month. By assuming a diversion goal of 75% by 2020, it will eliminate a waste amount that was converted to the number of households whose waste was reduced. For each household whose was eliminated, it was assumed that their bin size was downgraded from 64 gallons to 20 gallons (the smallest waste bin size allowed, costing \$13.27 a month), and the resulting amount is the cost savings to the community.

Sources:

- California Integrated Waste Management Authority (CIWMA). n.d. <http://www.ciwmb.ca.gov/Profiles/Juris/JurProfile2.asp?RG=C&JURID=563&JUR=Walnut+Creek>
- Central Costa County Solid Waste Authority (CCSWA). 2004. *Diversions – A Publication of the Central Contra Costa Solid Waste Authority.* <http://wastediversion.org/files/managed/Document/275/04fall.pdf>.
- . 2009. *Residential Rates.* <http://www.wastediversion.org/files/managed/Document/231/Book1.pdf>.
- City of San Carlos. 2009. *Draft Climate Action Plan.* http://www.cityofsancarlos.org/generalplanupdate/whats_new_/draft_elements/draft_climate_action_plan/default.asp.