Appendix B: Climate Action Plan Strategies Calculations Detail and Assumptions

This appendix summarizes the assumptions and parameters used to calculate greenhouse gas (GHG) emission reduction performance of CAP measures.

Summary Table		
Measure Number and Title	**Scaled % GHG Emission Reduction**	**GHG Emission Reduction (MT CO_2e/year)**
BE-1.1: Zero-Emission City Buildings by 2015	0.96%	150
BE 2.1: Energy Efficiency and Renewable Energy Investments	18.74%	2,935
BE-2.3: Residential and Commercial Energy Efficiency Retrofit	8.37%	1,310
BE-2.4: Empowerment Districts	14.02%	2,195
BE-3.1: Meet Green Building Code in New Construction	9.90%	1,550
BE-4.1: Smart Grid	1.02%	160
BE-4.2: LED Street Lights	1.09%	170
BE-4.3: Community Choice Aggregation	– [1]	– [1]
BE-4.4: Comparative Energy Billing	0.83%	130
TL-1.1: Expand and Enhance Bicycle Infrastructure (Stage 1)	– [2]	110
TL-1.1: Expand and Enhance Bicycle Infrastructure (Stage 2)	1.95%	305
TL-1.2: Bike Parking	1.47%	230
TL-1.3: Walking Infrastructure	3.90%	610
TL-1.5: Commercial Use Diversity	7.34%	1,150
TL-2.2: Transit Stops and Safety Infrastructure	0.73%	115
TL-2.3: Free Transit Passes and Shuttles for City Employees	0.07%	11
TL-3.1: Public Education	0.45%	70
TL-3.2: Design and Density	5.04%	790
TL-4.1: Jobs/Housing Balance	1.44%	225
TL-4.2: Improve Fuel Efficiency of City Vehicle Fleet	0.12%	19
TL-4.4: TDM Program	7.28%	1,140
WR-1.1: Waste Reduction Ordinance	14.11%	2,210
GI-1.1: Street Trees	0.83%	130
WC-1.1: Residential and Commercial EBMUD Water Audit	0.03%	5
WC-1.2: Residential and Commercial Outdoor Water Conservation	0.03%	5

Summary Table		
Measure Number and Title	**Scaled % GHG Emission Reduction**	**GHG Emission Reduction (MT CO_2e/year)**
WC-2.1: New Construction and Remodel Indoor Water Efficiency	0.16%	25
WC-2.2: New Landscape Project Outdoor Water Efficiency	0.13%	20
Total GHG Emission Reductions	–	15,660

[1] Community Choice Aggregation is not included in the summary because different ranges of GHG-free electricity portfolios would also affect the GHG reduction potential of other electricity efficiency-related reduction measures. See Chapter III or Measure BE-4.3 below for detailed descriptions of the measure and its reduction potential.

[2] Stage 1 of Measure TL-1.1 is noted included in the summary because Stage 2 includes the cumulative GHG reduction potential of Stage 1 and 2. Therefore, if Stage 1 was included, Measure TL-1.1 would be double counted.

Municipal Building Measures

Measure BE-1.1: Install cost-effective renewable energy systems on all City buildings and install building performance data displays to demonstrate savings.

This measure is based on a three-tier approach to reducing energy consumption from the City's buildings. The first tier includes implementation of energy efficiency measures to reduce the amount of energy used by City buildings. The second tier includes the installation of renewable energy systems on City buildings to serve energy demands. The third tier includes purchasing all remaining energy demands from renewable sources (i.e., solar, wind, and hydroelectric sources). To demonstrate energy savings to the public, the City would install building performance data displays. Implementation of this measure would reduce the total GHG emissions associated with all City buildings. The City was able to provide their current building energy consumption, which was used to calculate the GHG emission reduction using the same PG&E-specific emission factor used to calculate the City's GHG emissions associated with electricity consumption.

Measure value = 150 MT/year

Residential and Commercial Energy Efficiency Retrofit Measures

Measure BE-2.1: Develop comprehensive outreach programs to encourage energy efficiency and renewable energy investments in the community.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
6%	8.49% (Electricity)	4%	0.02%	10
14%	20.86% (Natural gas)	4%	0.13%	90
Total			**0.15%**	**100**

Sources of information:

California Energy Commission [CEC] 2003. Impact Analysis 2005 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings;

California Energy Commission [CEC] 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
6%	12.37% (electricity)	8%	0.06%	45
9%	11.66% (natural gas)	8%	0.08%	60
Total			**0.14%**	**105**

Sources of information:

California Energy Commission [CEC] 2003. Impact Analysis 2005 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings;

California Energy Commission [CEC] 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings

It was assumed that 100% of electricity would be generated by renewable energy for all participating (assumed 20%) units from solar panels and a 70% reduction in natural gas would occur for solar water heating.

Strategy	Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector	Sub Sector	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
Solar panels	100%	9.01% (electricity, residential)	-	20%	1.80%	1,300
Solar water heaters	70%	23.72% (natural gas, residential)	60%	20%	1.99%	1,430
Total					**3.79%**	**2,730**

Measure BE-2.3: Develop and implement point-of-sale residential and commercial energy efficiency upgrades.

These measures assume a performance standard of a 20% increase in energy efficiency in existing residential units.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
6%	8.49% (Electricity)	43%	0.21%	150
14%	20.86% (Natural gas)	43%	1.29%	895
Total			**1.50%**	**1,045**

Sources of information:

California Energy Commission [CEC] 2003. Impact Analysis 2005 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings;

California Energy Commission [CEC] 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings

These measures would improve energy efficiency of commercial buildings by 15% for both natural gas and electricity consumption.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
6%	12.37% (electricity)	21%	0.16%	115
9%	11.66% (natural gas)	21%	0.21%	150
Total			**0.38%**	**265**

Sources of information:

California Energy Commission [CEC] 2003. Impact Analysis 2005 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings;

California Energy Commission [CEC] 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings

Nonresidential Energy Efficiency Retrofit Measures

Measure BE-2.4: Identify and facilitate solar energy EmPowerment districts in commercial, industrial, and mixed-use portions of the City.

This measure is based on the availability of commercial, industrial, and mixed-use roof space for the installation of solar panels. Available commercial, industrial, and mixed-use roof square footage was determined using ArcGIS software. The amount of feasible solar panel square footage was calculated assuming 65% of the total roof space could be used for solar panels. A participation rate of 40% was applied to the total square footage.

The solar potential of the feasible roof space was calculated using assumptions regarding the wattage potential and hours of operation. Solar panels were assumed to generate 10 watts per square foot and operate for at this capacity for 4 hours per day. These assumptions were used to calculate the total kilowatt-hours generated from implementation of the measure. The GHG reduction potential of this measure was calculated using the same PG&E-specific electricity consumption emission factor used to calculate the City's GHG emissions associated with electricity consumption.

Solar Photovoltaic:

Percent of Feasible Solar Roof	Participation Rate	Solar Potential (watts/square foot)	Operational Time (hours/year)	GHG Emissions Reduction (MT/year)
65%	40%	10	1,460	1,730

Solar Hot Water:

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector	Sub Sector	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
70%	11.53% (natural gas, non-residential)	40%	20%	0.65%	465

Total Measure performance = 2,195 MT/yr

Sources of information:

California Energy Commission [CEC] 2005. Electricity Usage During Peak Periods. Available: http://www.energy.ca.gov/electricity/peak_loads.html

Measure BE-3.1: Require new construction to comply with Tier 2 energy efficiency standards contained within section 503.1.2 of the California Green Building Code.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Inventory (MT GHG/year from new growth)	GHG Emissions Reduction (MT/year)
44.84% (residential electricity)	558	250
35.95% (residential natural gas)	2,512	900
33.43% (non-residential electricity)	1,010	340
36.58% (non-residential natural gas)	160	60
Total		**1,550**

Sources of information:

California Energy Commission [CEC] 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings

Measure BE-4.1: Partner with other neighboring cities and PG&E to fast-track "Smart Grid" technology in Albany.

This measure would catalyze the City's integration into the "Smart Grid" system. The "Smart Grid" system would help the City manage and serve its electricity demand more efficiently in every demand scenario (e.g., peak, off-peak). The City's integration into the "Smart Grid" system is anticipated to reduce total electricity consumption from both the residential and non-residential sector by 4%.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Electricity)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
4%	9.01% (residential)	25%	0.09%	65
4%	13.40% (non-residential)	25%	0.13%	95
Total			**0.22%**	**165**

Measure BE-4.2: Work with Alameda County to convert all street lights to LED bulbs or LED-solar systems.

This measure is based on the energy efficiency of LED bulbs or LED-solar systems with respect to the existing street light system. The GHG emission reduction potential of this measure was calculated conservatively assuming that all street lights would be converted to LED bulbs and not LED-solar systems. The energy savings associated with this measure were calculated assuming LED bulbs are 70% more energy efficient than the existing street lights. The City was able to provide total kilowatt-hours used for the existing streetlight system, to which the 70% reduction was applied. The GHG emission reduction associated with this measure was calculated using the same PG&E-specific electricity consumption emission factor used to calculate the City's GHG emissions associated with electricity consumption. In reality, this measure may have a greater GHG emission reduction potential due to the installation of solar systems in addition to the LED bulbs.

Measure performance = 170 MT/year

Measure BE-4.3: Research the feasibility of joining Community Choice Aggregation efforts of Berkeley, Oakland, Emeryville, and other neighboring cities.

The benefits of a CCA are directly relevant to GHG reduction efforts, as communities are able to proactively determine the amount of GHG-free energy (e.g., renewable, hydro-electric, nuclear) they purchase. Joining the CCA would allow the City to independently select electricity providers. The City would be able to reduce their electricity-related GHG emissions by selecting an electricity-supply portfolio that utilizes more GHG-free energy sources than the current Pacific Gas and Electric (PG&E) portfolio. The current PG&E electricity portfolio is comprised of 55% GHG-free sources; therefore, in order for the CCA to provide a net benefit in GHG reductions, it is assumed that the City's CCA portfolio would range from 60–100% GHG-free electricity generation sources. The range of GHG-free portfolio mixes (i.e., 60 to 100%) was used to adjust the current PG&E-specific electricity emission factor assuming the same ratio of GHG-producing sources (i.e., natural gas and coal) would continue with the CCA.

An issue with implementation of the CCA is that the CCA would reduce the GHG emissions reduction potential of other Building Energy measures because less GHG emissions would be generated by electricity consumption. If the CCA purchased 100% of its electricity from GHG-free sources, the reduction potential of other electricity conservation or renewable electricity generation measures would be nullified. If the CCA purchased 60% of its electricity from GHG-free sources, the impact to the reduction potential would be minimal. For this reason, the potential CCA is stated independently below, but is not included in the Summary Table above.

Measure performance with 60% GHG-free sources = 1,800 MT/year
Measure performance with 100% GHG-free sources = 16,140 MT/year

Measure BE-4.4: Encourage PG&E and EBMUD to provide comparative energy and water conservation metrics on utility bills.

As part of this measure, PG&E would provide comparative energy consumption data for neighborhoods within individual energy bills. The energy bills will include both energy and water efficiency measures that customers can implement and other ways to reduce energy and water consumption. This type of comparative energy billing was found to reduce energy consumption by 2% over the course of a year.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Residential Electricity)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
2%	9.01%	100%	0.18%	130

Transportation and Land Use

Measure TL-1.1: Expand and enhance bicycle infrastructure throughout the City.

Complete streets include bike lanes and pedestrian sidewalks on both sides of streets, traffic calming features such as pedestrian bulb-outs, cross-walks, traffic circles, and elimination of physical and psychological barriers (e.g., sound walls and large arterial roadways, respectively). Depending on the level of implementation of this measure, the performance in vehicle trip and vehicle miles traveled reduction can range from 1–5%. It was assumed that nearly all of the listed criteria for a complete street would be met, and the performance of this measure would correspond to the upper end of the range (i.e., 4%). Bicycle infrastructure would account for 1/3rd of the reduction associated with this measure while pedestrian infrastructure (Measure TL-1.3 discussed below) would account for the remaining reduction potential (2/3rd).

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Transportation)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
4%	31.99%	100%[a]	1.28%	305
[a] 100% participation indicates that this measure would be applicable community-wide.				

Sources of information:

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

Measure TL-1.2: Install bicycle racks in commercial and civic areas of City where racks do not currently exist.

This measure was expected to reduce vehicle trips, and associated GHG emissions by 1%.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Transportation)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
1%	31.99%	100%	0.32%	230

Sources of information:

Victoria Transport Policy Institute. 2009. Online TDM Encyclopedia (Bicycle Parking). Available: <http://www.vtpi.org/tdm/tdm85.htm>. Accessed 2009.

Measure TL-1.3: Evaluate the community's walking infrastructure, identify potential barriers, and implement improvements.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Transportation)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
4%	31.99%	100%	1.28%	610

Sources of information:

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

Measure TL-1.5: Encourage additional neighborhood serving commercial uses and mixed-use development within City's existing commercial districts. Strive to provide access to daily goods and services within 1/4 mile of residences.

The performance of this measure is related to the elasticity of increased diversity of uses. The literature supports a 5% reduction in vehicle miles traveled for every 100% increase in land use diversity. For the City, it was assumed that this measure would result in a 100% community-wide increase in diversity by dispersing commercial uses in residential neighborhoods that currently do not have access to neighborhood serving retail.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Transportation)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
5%	31.99%	100%	1.60%	1,150

Sources of information:

Ewing, Reid, et al. 2001. Travel and the Built Environment: A Synthesis. Transportation Research Record 1780. Paper No. 01-3515 as cited in Urban Land Institute. 2008. Growing Cooler. ISBN: 978-0-87420-082-2. Washington, DC

Measure TL-2.2: Work with AC transit to provide transit stops with safe and convenient bicycle and pedestrian access and essential improvements such as shelters, route information, benches and lighting.

This measure was assumed to reduce vehicle trips and associated emissions by 0.5%.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Transportation)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
0.50%	31.99%	100%	0.16%	115

Sources of information:

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

Measure TL-2.3: Provide passes and shuttles to transit to encourage use of alternative transportation by City employees.

This measure was assumed to reduce City worker commute trips based on a survey conducted by the City's Transportation Department and average commute distances within the City.

Unscaled Measure Performance (% employees to use pass)	Total City Employees	Miles Per Commute Trip (miles/day)	Work Days Per Year	GHG Emissions Reduction (MT/year)
40%	130	2	240	11

Measure TL-3.1: Provide public education about benefits of well-designed, higher-density housing and relationship between land use and transportation.

This measure is related to the implementation of a comprehensive community-wide public education campaign to inform residents, businesses, and consumers about the incentive programs that would be implemented as part of the CAP designed to reduce GHG emissions. 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). The Sacramento region conducted an analysis of the effectiveness of the Spare the Air program as it relates to emission reduction. 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 emissions from all sectors (e.g., transportation, electricity, natural gas, waste, water) by about 10%.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (all)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
10%	100%	1%	0.10%	70

Sources of information:

Based on SMAQMD 2009. Spare the Air Control Measure Program; Revision to State Implementation Plan Staff Report.

Measure TL-3.2: Update planning documents to promote high-quality, mixed-use, pedestrian- and transit-oriented development in the San Pablo/Solano Avenue commercial districts.

The performance of this measure is related to the elasticity of design. The literature supports a 3% reduction in vehicle miles traveled for every 100% improvement in design. For the City, it was assumed that this measure would result in a 100% community-wide increase in design.

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Transportation)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
3%	31.99%	100%	0.96%	690

Sources of information:

Ewing, Reid, et al. 2001. Travel and the Built Environment: A Synthesis. Transportation Research Record 1780. Paper No. 01-3515 as cited in Urban Land Institute. 2008. Growing Cooler. ISBN: 978-0-87420-082-2. Washington, DC

The performance of this measure is related to net population density. The performance of this measure is based on the following formula:

Step 1. 2005 Density = 16,800 Population year *2005*
+ 4,840 Employees year *2005* =
21,640 persons ÷ 1.5 square miles = 14,427 persons/sq.mile in year 2005

Step 2. 2020 Density = 18,043 Population year *2020*
+ 5,493 Employees year *2020* =
23,536 persons ÷ 1.5 square miles = 15,691 persons/sq.mile in year 2020

Step 3. Density Change = 15,691 persons/sq.mile
- 14,427 persons/sq.mile =
1,264 persons/sq.mile ÷14427 persons/sq.mile = 0.0876 = **8.76% increase in density between 2005 and 2020**

The performance of this measure is related to the elasticity of increased density. The literature supports a 5% reduction in vehicle miles traveled for every 100% increase in density. For the City, it was assumed that this measure would result in approximately 8.76% community-wide increase in density by 2020, per the calculation above.

8.76% (increase in density) * 5% (reduction in VMT) = **0.438% reduction in VMT**

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Transportation)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
0.44%	31.99%	100%	0.14%	100

Sources of information:

Criterion Planners. 2008. Appendix A - 5D Method Technical Memorandum, INDEX Planbuilder Manual. Portland, OR.

Ewing, Reid, et al. 2001. Travel and the Built Environment: A Synthesis. Transportation Research Record 1780. Paper No. 01-3515 as cited in Urban Land Institute. 2008. Growing Cooler. ISBN: 978-0-87420-082-2. Washington, DC

Measure TL-4.1: Work with ABAG and neighboring cities to improve jobs-housing balance within the City and regional transit corridors.

This measure's performance is based on the formula:

Trip reduction = (1- (ABS (1.5 * h – e) / (1.5 * h + e)) – 0.25) / 0.25 * 0.03

Where: h = study area households (or housing units)
e = study area employment

Under existing conditions (2005), Albany had 7,130 households and 4,840 jobs, with a jobs/housing ratio of 0.68.

According to ABAG 2020 projections under the Focused Future growth scenario, Albany would accommodate approximately 7,619 housing units and 5,493 jobs (jobs/housing = 0.72).

Trip reduction (existing 2005) = (1 – (ABS (1.5 * 7,130 – 4,840)/(1.5 * 7,130 + 4,840)) – 0.25) / 0.25 * 0.03 = 0.0448 = 4.48%

If Albany were to improve jobs/housing balance by 20% from existing conditions (i.e., jobs/housing = 0.68), the jobs/housing ratio would be 0.81. If housing were expected to remain constant at the projected 7,619 households in the year 2020, the number of jobs needed to achieve a jobs/housing balance of 0.81 would be 6,206 jobs. Substituting HH = 7,619 and jobs = 6,206 into the formula below:

Trip reduction (20% above 2005) = (1 – (ABS (1.5 * 7,619 – 6,206)/(1.5 * 7,619 + 6,206)) – 0.25) / 0.25 * 0.03 = 0.0545 =5.45%

Trip reduction (existing 2005) – Trip reduction (20% above 2005) = 0.0448 - 0.0545 = -0.00973 = -0.973%

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Transportation)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
0.97%	31.99%	100%	0.31%	225

Sources of information:

Nelson/Nygaard Consultants. 2005. Crediting Low-Traffic Developments: Adjusting Site-Level Vehicle Trip Generation Using URBEMIS. Pg 12, (adapted from Criterion and Fehr & Peers, 2001)

Measure TL-4.2: Improve the fuel efficiency of the City vehicle fleet by purchasing low or zero-emissions vehicles when vehicles are retired from service.

Although some vehicles would be replaced with zero-emissions vehicles (i.e., electric vehicles), this measure assumes at a minimum, all City-owned, non-emergency light-duty automobiles and light-duty trucks would meet the fuel efficiency requirements of AB 1493.

Measure performance = 19 MT/year

Measure TL-4.4: Create and implement a voluntary transportation demand management (TDM) program to reduce weekday peak period single car occupancy commute and school trips.

The performance of this measure is a function of the performance standard set for the TDM program. The measure applies to commute trips only, which compose approximately 33% of trips in Alameda County (according to URBEMIS 2007).

Unscaled Measure Performance (% reduction in GHG emissions)	Emissions Sector (Transportation)	Participation Rate	Scaled Measure Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
15%	31.99%	33%	1.58%	1,140

Sources of information:

Rimpo and Associates. 2008. URBEMIS 2007 v.9.2.4. Urban Emissions Model. Available: http://www.urbemis.com.

Waste Reduction

Measure WR-1.1: Establish a citywide zero-waste stream target for 2030.

This measure originates from the StopWaste.org goal to achieve a 90% reduction from 1990 waste disposal levels by 2030. The GHG emissions reduction associated with this measure were calculated using the ICLEI CACP software. The CACP software contains nation-wide emission factors for various categories of waste. As discussed in Chapter IV Baseline, the percent distributions of waste categories from the *Alameda County Waste Categorization Study* were used to calculate GHG emissions using the CACP software. Waste categories from the *Alameda County Waste Categorization Study* were combined to better match the CACP software categories. The reduction in waste disposal (tons) from 2004 levels to projected 2020 levels (i.e., 80% below 1990 baseline) was used to calculate total GHG emission reductions. Waste categorization percentages were assumed to remain constant from 2004 to 2020.

Measure performance = 2,210 MT/yr

Green Infrastructure

Measure GI-1.1: Enhance the Urban Forestry/Urban Plants Program to maximize carbon sequestration on all public and private lands, including rooftops. Prepare a Green Albany Plan to evaluate all potential "growing areas", including parks, streets, rights-of-way, parking lots, and rooftops, for carbon sequestration.

This measure is based on the CO_2 sequestration rates of 500 trees planted in the City each year from 2010 to 2019. Carbon sequestration rates specific to the species and age of the planted trees were used calculate the annual sequestration potential of the trees from 2009 to 2020. The City's forester stated that with additional funding, Albany could plant 500 street trees per year over the next ten years.

Total value of measure: 130 MT/year

Sources of information:

The Center for Urban Forest Research Tree Carbon Calculator. Available:<http://www.fs.fed.us/ccrc/topics/urban-forests/>

USDA Forest Service, Pacific Northwest Research Station. "California Study Shows Shade Trees Reduce Summertime Electricity Use." Science Daily 7 January 2009. 20 February 2009 <http://www.sciencedaily.com/releases/2009/01/090105150831.htm>.

California Energy Commission [CEC] 2005. Electricity Usage During Peak Periods. Available: <http://www.energy.ca.gov/electricity/peak_loads.html>

California Energy Commission [CEC] 2007. Impact Analysis 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings

Water Conservation

Measure WC-1.1: Encourage residential and commercial users to participate in EBMUD's free water audit program.

This measure is based on residential water consumption data provided by EBMUD. EBMUD was able to provide percentage of water consumed for single-family (SFR) and multi-family (MFR) residential units, the percent of indoor and outdoor water use for both SFR and MFR, and the percent of indoor water use associated with faucets and leaks. This measure's water efficiency actions would reduce indoor water faucet efficiency by 40% and eliminate all indoor leaks. It was assumed that 3% of the residential homes within the City would participate in this water efficiency measure.

Percent of Total Water Consumption	Percent Indoor Water Consumption	Percent Indoor Water Consumption to Faucets	Percent Indoor Water Consumption to Leaks	Participation Rate	Total GHG Emissions Reduction (MT/year)
46% (SFR)	62% (SFR)	69%	8%	3%	5
17% (MFR)	86% (MFR)	69%	8%	3%	

Measure WC-1.2: Encourage 50% reduction in outdoor potable water usage for existing residential and commercial properties.

Percent of Total Water Consumption	Percent Outdoor Water Consumption	Percent Reduction of Outdoor Water Consumption	Participation Rate	Total GHG Emissions Reduction (MT/year)
46% (SFR)	38% (SFR)	50%	4%	5
17% (MFR)	14% (MFR)	50%	4%	

Measure WC-2.1: Require new construction and major remodels to achieve indoor water efficiency 20% above the California Building Standards Code.

Percent of Total Water Consumption	Percent Indoor Water Consumption	Percent Indoor Water Consumption to Faucets	Percent Indoor Water Consumption to Leaks	Participation Rate	Total GHG Emissions Reduction (MT/year)
46% (SFR)	62% (SFR)	69%	8%	18%	25
17% (MFR)	86% (MFR)	69%	8%	18%	

Measure WC-2.2: Require new landscape projects to reduce outdoor potable water use by 50%.

Percent of Total Water Consumption	Percent Indoor Water Consumption	Percent Indoor Water Consumption to Leaks	Participation Rate	Total GHG Emissions Reduction (MT/year)
46% (SFR)	62% (SFR)	8%	53%	20
17% (MFR)	86% (MFR)	8%	53%	

Senate Bill 107

SB 107 requires utilities to establish renewable energy portfolios of 20% by 2010, which would result in reduction of GHG emission factors associated with electricity generation and consumption. It was assumed that GHG emissions associated with electricity consumption in Albany would be reduced by 20% between the base year (2004) and 2020 associated with the implementation of this legislation. When SB 107 was taken into account in 2020 GHG emissions projections, growth in population and associated emissions in Albany would be outpaced by the reduction in emission factors associated with renewable energy portfolio standard.

Unscaled Regulation Performance	Emissions Sector (electricity)	Scaled Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
6%	22%	1.34%	968

Assembly Bill 1493 (Pavley)

AB 1493, California's mobile-source GHG emissions regulations for passenger vehicles, was signed into law in 2002. AB 1493 has not been implemented at the time of writing, because California has not received federal approvals to implement these emissions standards. This authorization to implement more stringent standards in California was requested in the form of a CAA Section 209, subsection (b) waiver in 2005. Since that time, EPA failed to act on granting California authorization to implement the standards. It appears likely that AB 1493 will be implemented in the near future, as the new presidential administration has directed EPA to reexamine its position for denial of CCAA's waiver and for its past opposition to GHG emissions regulation. California received the waiver on June 30, 2009.

The CO_2 reduction associated with the foreseeable implementation of AB 1493 is currently unknown. The ARB's AB 32 Scoping Plan (the State's plan for implementing AB 32) expects approximately a 19.7% reduction in on-road mobile-source GHG emissions (ARB 2008[1]). The AB 32 Scoping Plan also notes that "AB 32 specifically states that if the Pavley regulations do not remain in effect, ARB shall implement alternative regulations to control mobile sources to achieve equivalent or greater reductions of greenhouse gas emissions (HSC §38590)." Thus, it is reasonable to assume implementation of AB 1493 standards, or equivalent programs that would be implemented by ARB.

Because AB 1493 allows automakers two years lead time prior to the first model year of regulation, if AB 1493 were implemented in 2009, the earliest model year that would reasonably be expected to be regulated would be model year 2012.

It was assumed that AB 1493 would be 80% implemented by the year 2020 (allowing for two years of delay). Thus, the likely effect of AB 1493 on mobile-source GHG emissions in Albany was assumed to be approximately 15.76%.

Unscaled Emission Reduction	Sector (Transportation)	Scaled Performance (% reduction in GHG emissions)	GHG Emissions Reduction (MT/year)
15.76%	31.99%	5.04%	3,629

[1] California Air Resources Board. 2008 (December). *Climate Change Proposed Scoping Plan*. Sacramento, CA. Available: <http://www.arb.ca.gov/cc/scopingplan/document/scopingplandocument.htm>. Last updated December 2008. Accessed May 18, 2009.

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