3.9 ADAPTATION TO THE EFFECTS OF CLIMATE CHANGE

As the climate changes, so must Fairfax. To effectively address the challenges that a changing climate will bring, the Town must not only reduce its greenhouse gas emissions, but be prepared to respond to the expected impacts of climate change. Many of the mitigation measures incorporated in this CAP will help the community prepare for the effects of climate change. Reducing water use will ease competition for limited water supplies expected from higher temperatures and reduced snowmelt, while reducing electricity use will help ease demand for diminishing hydroelectric power. Other expected effects from climate change – such as a higher frequency of large damaging fires and pest and insect epidemics – must be anticipated through adequate public safety, emergency, and public health responses.

Recommended Actions

ADPT-1. Incorporate the likelihood of climate change impacts into Town emergency planning and training. (GP S-4, esp. S-4.5)

ADPT-2. Partner with neighboring municipalities and regional agencies to develop and implement regional adaptation programs. (GP S-4.1.1.6, S-4.1.1.10, S-4.1.1.11, S-4.1.1.12, S-4.3.2.1 and others)

ADPT-3. Encourage federal, state and local agencies to be pro-active and supportive of efforts to combat the expected rise in sea levels.

ADPT-4. Coordinate internally and with water districts, wildlife agencies, flood control and fire districts, Marin County, and other relevant organizations. Address human health and the health and adaptability of natural systems, including the following:

(a) Water resources including expanded rainwater harvesting, water storage and conservation techniques, water reuse, and water use and/or irrigation efficiency. (GP CON-4.1.1)

(b) Biological resources including land acquisition, creation of marshlands/wetlands as a buffer against sea level rise and flooding, and protection of existing natural barriers. (GP CON-4.2.2)

(c) Cultural resources including documenting and monitoring the condition of archaeological and historical sites as they are stressed and/or impacted by climate change (i.e., in flood plains). (GP CON-8.2, though not specific regarding flooding or climate change mitigation)

(d) Public health including heat-related health plans, vector control, safe water, and improved sanitation.

(e) Environmental hazards including storm surge barriers and fire protection. (GP S-2 and S-3)

4.0 PLAN IMPLEMENTATION

Fairfax recognizes that responding to and preparing for climate change is a critical step toward a sustainable future. The Town's early actions to reduce its contribution to climate change reflect the Town's history and commitment to decrease the impacts of day-to-day activities on the natural environment while enhancing its vibrant quality of life. Mitigating climate change will require everyone – residents, businesses, government agencies and nonprofit organizations – to work together to implement this plan.

This plan provides a strategy to achieve emission reductions that will achieve the Town's target of 20% below 2005 emissions by the year 2020. A wide range of programs that exceed the Town's reduction goal have been included to allow for the evaluation and prioritization of potential programs and capital improvement projects as new program and funding opportunities arise. Successful implementation of the plan will require staff and the Town Council to identify and commit resources to climate change mitigation activities, and to monitor and report on progress towards meeting emissions reduction goals.

4.1 STRATEGY FOR IMPLEMENTATION

The General Plan calls in program CON-1.1.1.1 for formation of a Fairfax Climate Action Committee (CAC)[23]. The CAC is listed in the General Plan as being responsible for certain programs. Therefore the CAC needs to become a functional committee, with members prepared to focus specifically on the implementation of the CAP. Some programs within the CAP will be the primary responsibility of CAC, whereas for others (e.g. promotion of bicycling), CAC will only monitor their progress and attempt to translate that progress into GHG-reduction terms.

GPIC will monitor and report on the CAC's progress, as it does with other Town committees responsible for portions of the General Plan implementation.

IMP-1. The Town will continue to update the baseline Greenhouse Gas Emissions Inventory every five years.

IMP-2. CAC will review and update the Climate Action Plan to reflect the results of GHG inventories, to comply with state regulations and to incorporate other new information.

IMP-3. Continue and expand public and private partnerships that support implementation of the CAP, including membership in the MCEP. Partnerships with MCEP, MCE, CPUC, PG&E, MMWD, Marin Sanitary and others will be essential for obtaining the data needed for implementation of the GHG-Meter.

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[23] The General Plan used an interim name of FCAC for the proposed Climate Committee.

IMP-4. Identify funding sources for recommended actions, and pursue local, regional, state and federal grants as appropriate.

APPENDIX

Calculation of Emissions Reduction Measures

GHG EMISSIONS REDUCTION SUMMARY
Town of Fairfax Climate Action Plan

ERM	Measure	2020 GHG Emissions Reductions (MTCO2e/yr)
Local Actions		
1	Tree Planting	-14.2
2	Public Tree Planting	-7.1
3	Bicycle and Pedestrian Transportation	-310.9
4	School Transportation	-71.9
5	Public Transportation	-87.8
6	Carpooling	-46.4
7	Bike Sharing	-0.4
8	Carpool Parking	-10.4
9	EV Parking	-8.8
10	Market Price Parking	-4.7
11	Vehicle Idling	-9.2
12	High-Efficiency Town Vehicles	-7.3
13	Town Employee Commute Incentives	-0.2
14	Energy Efficiency Beyond Title 24	-3.6
15	Energy Efficiency	-255.3
16	Energy Audits	-22.6
17	Marin Clean Energy	-146.2
18	Renewable Energy	-40.7
19	Municipal Energy Efficiency Energy Projects	-15.6
20	Street Lights	-10.5
21	Municipal Marin Clean Energy	-9.9
22	Green Purchasing	-0.7
23	Food and Green Waste	-371.7
24	Construction & Demolition Waste	-64.7
25	Paper Waste	-561.5
26	Municipal Food and Green Waste	-4.5
27	Municipal C&D Waste	-1.4
28	Municipal Paper Waste	-3.4
29	Indoor Water Efficiency and Conservation	-211.3
30	Outdoor Water Efficiency and Conservation	-9.1
31	Rainwater Catchment	-0.1
32	Greywater	-3.3
33	Municipal Outdoor Water Conservation	-0.1
34	Resilient Neighborhoods & Businesses	-652.0
TOTAL - LOCAL ACTIONS		-2,968
State Actions		
RPS		-1,591
TITLE 24		-49
PAVLEY 1 and LCFS		-3,829

CSI	-61
TOTAL - STATE ACTIONS	-5,529
Projected Emissions	
Projected 2020 BAU Community-Wide GHG Emissions	34,734
Emissions Reduction from Local and State Actions	-8,497
2020 Community-Wide Emissions with Local and State Actions Implemented	26,237
Reduction from 2005 Baseline Emissions	
2005 Community-Wide GHG Emissions	36,166
2020 Community-Wide Emissions with Local and State Actions Implemented	26,237
% Reduction from 2005 Baseline	27%

COMMUNITY TREE PLANTING

Emissions Reduction Measure ERM 1

Related CAP Programs	NAT-1, NAT-2, NAT-3, NAT-4, NAT-5
2020 Reductions ($MTCO_2e$)	Implementation options:
-7.1	Plant 10 new trees each year
-14.2	Plant 20 new trees per year
-28.3	Plant 40 new trees per year
Methodology	CAPCOA Measure V-1. Assumed default annual sequestration rate of .0354 MTCO2 accumulation per tree per year and an active growing period of 20 years. Thereafter, the accumulation of carbon in biomass slows with age, and will be completely offset by losses from clipping, pruning, and occasional death.
Sources	California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010.

Calculation

Annual sequestration rate	0.0354 $MTCO_2$/per tree per year
Annual tree planting:	
10	7.1 $MTCO_2e$
20	14.2 $MTCO_2e$
40	28.3 $MTCO_2e$

PUBLIC TREE PLANTING

Emissions Reduction Measure ERM 2

Related General Plan Program	NAT-1, NAT-2, NAT-4, NAT-5
2020 Reductions ($MTCO_2e$)	Implementation options:
-3.5	Plant 5 new trees each year
-7.1	Plant 10 new trees per year
-14.2	Plant 20 new trees per year
Methodology	CAPCOA Measure V-1. Assumed default annual sequestration rate of .0354 MTCO2 accumulation per tree per year and an active growing period of 20 years. Thereafter, the accumulation of carbon in biomass slows with age, and will be completely offset by losses from clipping, pruning, and occasional death.
Sources	California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010.

Calculation

Annual sequestration rate	0.0354 $MTCO_2$/per tree per year
Annual tree planting:	
5	3.5 $MTCO_2e$
10	7.1 $MTCO_2e$
20	14.2 $MTCO_2e$

BICYCLE AND PEDESTRIAN TRANSPORTATION

Emissions Reduction Measure ERM 3

Related CAP Programs	TLU-1, 2, 3, 4, 7, 9, 16, 17
2020 Reductions ($MTCO_2e$) -310.9	Implementation: Increase walking and biking mode share to 20%.
Methodology	According to a 2007 survey prepared for the Marin County Nonmotorized Transportation Pilot Program, 11.8% of utilitarian trips (trips made to a destination and not solely for recreation or exercise) in 2007 were made by walking and 1.8% by bicycle, for a total mode share of 13.6%. Studies cited by CAPCOA show: Pedestrian network improvements can reduce VMT 1-2%. Traffic calming measure can reduce VMT by 0.25 to 1%. Each additional mile of bike lanes per square mile increases the share of workers commuting by bicycle by 1%. The Town of Fairfax Pedestrian and Bicycle Master Plan proposes a 0.18 mile multi-use path, 0.89 striped bicycle lanes and 6.17 signed bicycle routes for a total of 7.24 miles of new bikeways. There were a total of 3.42 miles of existing bikeways in 2008.
Sources	2010 U.S. Census, SF1:DP-1. Average daily walking and bicycling data: Federal Highway Administration, "Interim Report to the U.S. Congress on the Nonmotorized Transportation Pilot Program SAFETEA-LU Section 1807," November 2007. California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010. Town of Fairfax Pedestrian and Bicycle Master Plan, prepared by Alta Planning + Design, February 2008 update.

Calculation

Average daily walking and bicycling for utilitarian purposes per adult in Marin	0.62 miles
Population 18 years and over in Fairfax, 2010	6,005 people
Population 18 years and over in Fairfax, 2020	6,172 people
Annual walking and biking miles, 2020 BAU	1,396,735 miles
Walking and biking mode share for utilitarian trips, 2010	13.6 %
Increase walking and biking mode share to:	20 %
VMT avoided	657,287 VMT
Emissions reductions	310.9 $MTCO_2e$

SCHOOL TRANSPORTATION

Emissions Reduction Measure ERM 4

Related CAP Programs	TLU-1, 5, 6, 7, 9, 11, 16, 17
2020 Reductions ($MTCO_2e$)	Implementation options:
	Increase use of carpooling, shuttle or school buses, and Safe Routes to School to transport students to local schools.
-36.0	Increase alternative transportation mode share by 10%.
-71.9	Increase alternative transportation mode share by 20%.
Methodology	Average trip length was determined by modeling trip lengths to Fairfax schools and Sir Francis Drake High School.
	Estimated 1,408 students enrolled in Fairfax schools and Sir Francis Drake High School in 2010.
	180 days in a school year.
	32% of students travelled in Family Vehicles in 2010; 68% traveled by alternative transportation (15% walk, 13% bike, 26% school bus, 12% carpool, 4% transit, 1% other).
Sources	Trip lengths modeled with Google Maps, maps.google.com.
	Travel mode data from Safe Routes to School surveys, http://www.saferoutestoschools.org/mv.html#surveys.

Calculation

Average trip length	1.5 miles	
Students in Fairfax schools in 2010	1,408 students	
Miles travelled annually by students (all mode shares)	760,223 miles	
Increase in alternative transportation mode share	10%	20%
VMT avoided	76,022 VMT	152,045 VMT
Emissions reductions	36.0 $MTCO_2e$	71.9 $MTCO_2e$

PUBLIC TRANSPORTATION

Emissions Reduction Measure ERM 5

Related CAP Programs	TLU-7, 9, 10, 16, 17
2020 Reductions ($MTCO_2e$) -43.5 -87.8	Implementation options: Increase public transportation use as an alternative to the single-occupant vehicle. Increase public transportation mode share to 9%. Increase public transportation mode share to 11%.
Methodology	7% of workers commuted to work via public transportation. Census data for public transportation use is only available for commuting to work. VMT reductions were calculated assuming 365 days per year of additional public transportation miles in order to estimate public transportation use for other purposes. Average trip length was determined by modeling trip lengths from Fairfax town limits to various points in Fairfax.
Sources	2007-2011 American Community Survey, DP03. Trip lengths modeled with Google Maps, maps.google.com.

Calculation

Workers 16 years and over in Fairfax, 2010	4,153 people	
Workers 16 years and over in Fairfax, 2020	4,269 people	
Percent using public transportation for commuting, 2010	7%	
Average trip length	1.50 miles	
Increase public transportation mode share to:	9%	11%
VMT avoided	92,029 VMT	185,510 VMT
Emissions reductions	43.5 $MTCO_2e$	87.8 $MTCO_2e$

CARPOOLING

Emissions Reduction Measure ERM 6

Related CAP Programs	TLU-7, 11, 16, 17
2020 Reductions ($MTCO_2e$)	Implementation options:
	Increase carpooling and implement ridesharing programs as an alternative to the single-occupant vehicle.
-46.4	Increase carpooling mode share to 10%.
-90.7	Increase carpooling mode share to 12%.
Methodology	7.9% of workers carpooled to work in 2010.
	Census data for carpooling is only available for commuting to work. VMT reductions were calculated assuming 365 days per year of additional SOV miles avoided in order to estimate carpooling and ridesharing for other purposes.
	Average trip length was determined by modeling trip lengths from Fairfax town limits to various points in Fairfax.
Sources	2007-2011 American Community Survey, DP03.
	Trip lengths modeled with Google Maps, maps.google.com.

Calculation

Workers 16 years and over in Fairfax, 2010	4,153 people	
Workers 16 years and over in Fairfax, 2020	4,269 people	
Percent carpooling for commute, 2010	7.9%	
Average trip length	1.50 miles	
Increase carpooling mode share to:	10%	12%
VMT avoided	98,155 VMT	191,636 VMT
Emissions reductions	46.4 $MTCO_2e$	90.7 $MTCO_2e$

BIKE SHARING

Emissions Reduction Measure ERM 7

Related CAP Programs	TLU-7, 11
2020 Reductions ($MTCO_2e$) -0.4	Implementation action: Implement Phase II bike share program
Methodology	Assumptions based on Marin County Bicycle Feasibility Study which identified a station in downtown Fairfax as a Phase 1 station location. Phase 1 envisions 12 stations and 100 bicycles in Marin, focused on the highest demand areas near downtown and transit hubs. Estimated annual demand for the Fairfax station is 1,612 bikes out for Phase 1, rising to 1,683 for Phase II and III as the system expands to 24 and 37 stations. Average trip length is 2 miles. Average trip length was determined by modeling bicycle trip length on the Sir Francis Drake Boulevard Road segment within the town limits.
Sources	Trip lengths modeled with Google Maps, maps.google.com. Alta Planning + Design, "Marin County Bicycle Share Feasibility Study" prepared for the Transportation Authority of Marin.

Calculation

Estimated annual demand (bikes out)	1,683 trips
Percent of trips that replace vehicle use	25%
Average trip length	2.0 miles
VMT avoided	842 VMT
Emissions reductions	0.4 $MTCO_2e$

CARPOOL PARKING

Emissions Reduction Measure ERM 8

Related CAP Program	TLU-12
2020 Reductions ($MTCO_2e$)	Implementation options: Utilize zoning and parking regulations to provide parking spaces dedicated to carpools to help reduce VMT. Programs will facilitate the development of:
-5.2	10 carpool parking spaces.
-10.4	20 carpool parking spaces.
-15.6	30 carpool parking spaces.
Methodology	Average trip length was determined by modeling trip lengths from Fairfax town limits to various points in Fairfax. Each carpool vehicle was assumed to be occupied by two people (thereby avoiding one vehicle trip) and each carpool parking space was assumed to be associated with one round trip vehicle trip per day.
Sources	Trip lengths modeled with Google Maps, maps.google.com.

Calculation

Average trip length	1.50 miles
Miles generated annually by two SOV drivers	2,192 miles
Annual emissions generated annually by two SOV drivers, 2040 BAU	1.04 $MTCO_2e$
Emissions reductions per parking space	0.52 $MTCO_2e$
Total annual emissions reduction for:	
10 parking spaces	5.2 $MTCO_2e$
20 parking spaces	10.4 $MTCO_2e$
30 parking spaces	15.6 $MTCO_2e$

EV PARKING

Emissions Reduction Measure ERM 9

Related CAP Programs	TLU-12, 15, 16, 17
2020 Reductions ($MTCO_2e$)	Implementation options: Utilize local resources, building and zoning codes, parking regulations, and a GHG-Meter to provide EV charging facilities that enhance the adoption of electric vehicles. Programs will facilitate the development of:
-4.4	10 parking spaces with charging facilities.
-8.8	20 parking spaces with charging facilities.
-13.2	30 parking spaces with charging facilities.
Methodology	Average trip length was determined by modeling trip lengths from Town limits to employment centers. Each parking space was assumed to be associated with two round trip EV vehicle trips per day. Assumes electric vehicle efficiency of .32 kWh/mile, based on the Nissan Leaf fuel economy for city driving.
Sources	Trip lengths modeled with Google Maps, maps.google.com. Electric vehicle fuel economy from www.fueleconomy.gov.

Calculation

Average trip length	0.70 miles
Miles impacted annually per parking space	1,023 miles
Annual emissions per parking space, 2020 BAU	0.48 $MTCO_2e$
Annual electricity use per parking space	327 kWh
Electric vehicle emissions per parking space, 2020	0.04 $MTCO_2e$
Emissions reductions per parking space	0.44 $MTCO_2e$
Total annual emissions reduction for:	
10 parking spaces	4.4 $MTCO_2e$
20 parking spaces	8.8 $MTCO_2e$
30 parking spaces	13.2 $MTCO_2e$

MARKET PRICE PUBLIC PARKING

Emissions Reduction Measure ERM 10

Related CAP Program	TLU-12
2020 Reductions ($MTCO_2e$)	Implementation options:
-2.4	50 metered parking spaces.
-4.7	100 metered parking spaces.
-9.5	200 metered parking spaces.
Methodology	Average trip length was determined by modeling trip lengths for cars "cruising" for available parking spaces. Each parking space was assumed to be occupied for an average of 60 minutes. Meters were assumed to be in operation 7 days per week and 10 hours per day. CAPCOA PDT-3 methodology used to estimate emissions reduction by implementing market price public parking. The measure indicates a 2.8 - 5.5% reduction in VMT and GHG emissions by increasing on-street parking prices 25 - 50%. Since the program would charge parking fees for currently free parking spaces, the higher end was applied.
Sources	Trip lengths modeled with Google Maps, maps.google.com. California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010.

Calculation

Annual operational hours of each metered parking space	3,640 hours
Average occupancy of parking space	1 hours
Average "cruising" trip length for each parking space occupancy	0.5 miles
Miles generated annually per parking space	1,820 miles
Annual emissions per parking space	0.86 $MTCO_2e$
Emissions reductions per parking space occupancy (5.5%)	0.05 $MTCO_2e$
Total annual emissions reduction for:	
50 parking spaces	2.4 $MTCO_2e$
100 parking spaces	4.7 $MTCO_2e$
200 parking spaces	9.5 $MTCO_2e$

VEHICLE IDLING

Reduction Measure 11

Related CAP Program	TLU-12
2020 reductions ($MTCO_2e$)	Implementation options:
-9.2	Reduce idling by 25%
-18.5	Reduce idling by 50%
Methodology	Adopt and implement a policy requiring limitation on idling for commercial vehicles, construction vehicles, buses and other similar vehicles beyond state law. State law currently prohibits heavy duty diesel vehicles (10,000 lbs or heavier) from idling for more than 5 minutes. School bus drivers must turn off engine upon stopping at a school, or within 100 feet for a school, and may not turn the engine on more than 30 seconds before departing from the location. Marin County heavy duty vehicle idling emissions estimated using EMFAC 2011 for year 2020 and include CO2 reductions attributed to implementation of Pavley and LCFS. Fairfax's share of countywide vehicle idling emissions estimated using ratio of Fairfax VMT to Marin County VMT.
Sources	EMFAC 2011. 2011 California Public Road Data, Highway Performance Monitoring System, Caltrans.

Calculation

Annual heavy duty vehicle idling CO2 emissions in Marin County, 2020 (metric tons)	2,777
Percent of vehicle idling emissions attributed to Fairfax VMT	1.33%
Annual vehicle idling emissions attributed to Fairfax local roads, 2020	36.9

HIGH-EFFICIENCY TOWN VEHICLES

Emissions Reduction Measure ERM 12

Related CAP Program	TLU-13
2020 Reductions ($MTCO_2e$)	Implementation options:
-3.7	Replace 2 vehicles with hybrid vehicles.
-7.3	Replace 4 vehicles with hybrid vehicles
Methodology	Assumes vehicles with an average of fuel economy of 20 MPG are replaced with hybrid vehicles with a fuel economy of 45 MPG. Assumes vehicles travel an average of 7,500 miles annually. Emissions reduction calculated for CO_2 only since N_2O and CH_4 emissions are dependent on VMT and VMT is unaffected.
Sources	www.fueleconomy.gov

Calculation

Annual mileage per vehicle	7,500 VMT	
Annual fuel use per vehicle at 20 MPG fuel economy	375 gallons	
Annual fuel use per vehicle at 45 MPG fuel economy	167 gallons	
Annual fuel saved per car replaced	208 gallons	
Annual emissions reduced per vehicle	1.8 $MTCO_2$	
Number of vehicles replaced with hybrid vehicles	2 vehicles	4 vehicles
Emissions reductions	3.7 $MTCO_2e$	7.3 $MTCO_2e$

TOWN EMPLOYEE COMMUTE INCENTIVES

Emissions Reduction Measure ERM 13

Related CAP Program	TLU-14
2020 Reductions ($MTCO_2e$) -0.2	Implementation action: Provide Town employees with incentives to use alternatives to single occupant vehicles including flexible schedules, transit incentives, bicycle facilities, ridesharing services and subsidies, and telecommuting when practical.
Methodology	CAPCOA Measure TRT-1. Assuming a low density suburb and 100% of employees are eligible for incentives, VMT reduction is 5.2%. Average trip length was determined by modeling trip lengths from Fairfax town limits to Town offices.
Sources	California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010. Trip lengths modeled with Google Maps, maps.google.com.

Calculation

Employee commute VMT, 2040 BAU	194,235 VMT
Reduction in VMT	5.2%
VMT avoided for Government Operations Inventory	10,100 VMT
Emissions reduction for Government Operations Inventory	4 MTCO2e
Number of City employees	30 employees
Number of participating City employees	2 employees
Daily VMT per employee within City limits	1.2 miles
Annual participating City employee VMT within City limits	276 miles
VMT avoided within City limits	431 miles
Emissions reductions	0.2 $MTCO_2e$

ENERGY EFFICIENCY REDUCTIONS BEYOND TITLE 24

Emissions Reduction Measure ERM 14

Related CAP Programs	EN-1, 2, 3, 5
2020 Reductions ($MTCO_2e$) -3.6	Implementation action: 10% of new construction projects elect to reduce energy use by 15% over Title 24 requirements.
Methodology	CAPCOA Measure BE-1 used for estimating building energy savings.
Sources	California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010.

Calculation

Residential

Percent over Title 24 Energy Requirements	15 %
Percent of participating new residential units	10%
New construction electricity use, BAU	230,552 kWh
New construction electricity use, after Title 24	174,017 kWh
Additional reduction in electricity use	186 kWh
New construction natural gas use, BAU	22,795 therms
New construction natural gas use, after Title 24	20,614 therms
Additional reduction in natural gas use	276 therms
Emissions reductions	1.5 $MTCO_2e$

Commercial

Percent over Title 24 Energy Requirements	15 %
Percent of participating new commercial space	10%
New construction electricity use, BAU	767,284 kWh
New construction electricity use, after Title 24	724,048 kWh
Additional reduction in electricity use	2,824 kWh
New construction natural gas use, BAU	29,667 therms
New construction natural gas use, after Title 24	26,460 therms
Additional reduction in natural gas use	286 therms
Emissions reductions	2.1 MTCO2e

Reductions in Energy Use for Every 1% Over 2008 Title 24 Energy Requirements, Zone 5

	Electricity	Natural Gas	Source
Commercial	0.26%	0.72%	CAPCOA Measure BE-1
Residential - Multifamily	0.09%	0.88%	
Residential - Single	0.04%	0.91%	
Residential - Townhome	0.05%	0.90%	
Residential (38% single, 62% multifamily)	0.07%	0.89%	Calculation

ENERGY EFFICIENCY

Emissions Reduction Measure ERM 15

Related CAP Programs	EN-1, 2, 3, 4, 5, 7, 9, 13
2020 Reductions ($MTCO_2e$) -255.3	Implementation action: Utilize building construction standards, regulatory incentives, public financing programs (including AB 811), and public information campaigns for residential and commercial energy efficiency projects.
Methodology	Assumes 5% of households and businesses will complete energy efficiency projects that reduce energy use by 31% . Energy Upgrade California demonstrated energy savings averaging 31% Btu for projects completed in Marin County between June 2010 and May 2012.
Sources	Marin County Energy Watch Partnership, Dana Armanino, Sustainability Planner, County of Marin, darmanino@marincounty.org

Calculation

Community electricity use 2020 BAU	26,123,317 kWh
Community natural gas use 2020 BAU	2,153,271 therms
Percentage of participating households and businesses	5%
Electricity reduction	31%
Natural gas reduction	31%
Annual electricity savings	404,911 kWh
Natural gas savings	33,376 therms
Electricity emissions reductions	77.9 $MTCO_2e$
Natural Gas emissions reductions	177.4 $MTCO_2e$
TOTAL emissions reductions	255.3 $MTCO_2e$

ENERGY AUDITS

Emissions Reduction Measure ERM 16

Related CAP Program	EN-6
2020 Reductions ($MTCO_2e$) -22.6	Implementation action: Require energy audits for residential and commercial buildings prior to completion of sale.
Methodology	81 housing units sold annually, based on 10-year average for 2003-2012 (Marin County Assessor). Assumes 10% of audited housing units will reduce energy use by 10%.
Sources	Marin County Assessor, http://www.marincounty.org/depts/ar/divisions/assessor/sales

Calculation

Average household electricity use 2010	5,489 kWh
Average household natural gas use 2010	543 therms
Number of housing units sold annually	81 units
Number of housing units provided energy audits (2014-2020)	567 units
Percent of participating housing units	10%
Number of housing units implementing energy efficiency projects	57 units
Electricity reduction	10%
Natural gas reduction	10%
Annual electricity savings	31,124 kWh
Natural gas savings	3,077 therms
Electricity emissions reductions	6.2 $MTCO_2e$
Natural gas emissions reductions	16.4 $MTCO_2e$

MARIN CLEAN ENERGY

Emissions Reduction Measure ERM 17

Related CAP Programs	EN-8
2020 Reductions ($MTCO_2e$)	Implementation action:
-73.1	100 households switch to Deep Green electricity
-146.2	200 households switch to Deep Green electricity
-219.4	300 households switch to Deep Green electricity
Methodology	Number of households switching to Deep Green is addition to number of households switching to Deep Green as a result of participating in the Resilient Neighborhoods program (ERM 34). As of January 2014, 3.6% of all electricity accounts in Fairfax are enrolled in MCE's Deep Green option. Assuming similar rate of particpation for number of households, approximately 130 existing households are currenlty enrolled in Deep Green.
Sources	Personal communication, Rafael Silberblatt, MCE Program Coordinator, rsilberblatt@marinenergy authority.org

Calculation

Number of households in 2020	3,459		
Average electricity use per household	5,489 kWh		
Number of households that switch to Deep Green	100	200	300
Electricity saved (kWh)	548,933	1,097,865	1,646,798
Reduction in GHG emissions (MTCO2e)	73.1	146.2	219.4

RENEWABLE ENERGY

Emissions Reduction Measure ERM 18

Related CAP Programs	EN-2, 7, 9, 10
2020 Reductions ($MTCO_2e$) -40.7	Implementation action: Utilize building construction standards, regulatory incentives, public financing programs (including AB 811), and public nformation campaigns to develop renewable energy projects for residential and commercial buildings.
Methodology	45 residential systems were installed between 2007 and 2012 with an average 5,213 kWh generated per system. 3 commercial systems were installed (excluding government) with an average 22,668 kWh generated annually per system. The analysis assumes the current annual rate of installation will continue through 2040. Systems installed between 2010-2016 are credited to the California Solar Initiative as a State Action.
Sources	California Solar Initiative, http://www.californiasolarstatistics.ca.gov/.

Calculation

Residential Renewable Energy

Average number of residential solar systems installed annually	7.5
Number of systems projected to be installed 2017-2020	30.0
Average electricity generated per installation	5,213
Annual electricity savings	156,397 kWh
Electricity emissions reductions	31.4 $MTCO_2e$

Commercial Renewable Energy

Average number of commercial systems installed annually	0.5
Number of systems projected to be installed 2011-2016	2.0
Average electricity generated per installation	22,668
Annual electricity savings	45,336 kWh
Electricity emissions reductions	9.3 $MTCO_2e$

MUNICIPAL ENERGY EFFICIENCY PROJECTS

Emissions Reduction Measure ERM 19

Related CAP Program	EN-11
2020 Reductions ($MTCO_2e$) -15.6	Implementation action: Complete all identified projects.
Methodology	Annual kWh savings for identified projects provided by the Marin Energy Management Team (MarinEMT). Completed projects are included in the analysis since their energy savings were not reflected in the 2010 Inventory.
Sources	Proposed energy-efficiency projects and estimated energy savings based on Energy Management Study for the Town of Fairfax prepared by the Marin Energy Management Team on June 8, 2006.

Calculation

Project	Annual Electricity Savings (kWh)	Annual Natural Gas Savings (therms)	Note
Lighting Retrofit	98,459	0	Completed
Occupancy Sensors	801	0	
Heater	0	310	
Cool Roof	0	253	
Heat Pump - Corp Yard	294	0	
Radiant Heaters	0	677	
TOTAL	99,554	1,240	
Emissions reductions ($MTCO_2e$)	9.06	6.6	

STREET LIGHTS

Emissions Reduction Measure ERM 20

Related CAP Program	EN-12
2020 Reductions ($MTCO_2e$) -10.5	Implementation options: Replace street lights with LED lamps.
Methodology	Potential replacement lamps provided by Republic ITS for illustrative purposes only; actual replacement lamps will require further analysis. Fairfax was awarded an Energy Efficiency and Conservation Block Grant in 2010 from the California Energy Commission to replace 64 existing HPS fixtures with induction lamps.
Sources	Streetlight inventory provided by Republic ITS. Potential LED replacement lamps provided by MarinEMT. Electricity usage derived from the PG&E TC-1 rate schedule, effective 6/27/12.

Calculation

Lamp Type	Quantity	Annual Energy Use (kWh)	2010 GHG Emissions ($MTCO_2e$)	Potential Replacement Lamp	Annual Energy Use (kWh)	Electricity Emissions ($MTCO_2e$)	Reduction in Annual Energy Use (kWh)	Electricity Emissions Reductions ($MTCO_2e$)
HPS 70w, 120v	475	165,300	14.06	LED 37w	72,960	6.21	92,340	7.85
HPS 70w, 120v	62	21,576	1.84	Induc 40w	10,416	0.89	11,160	0.95
HPS 70w, 240v	31	12,648	1.08	LED 37w	4,762	0.40	7,886	0.67
HPS 100w, 120v	14	6,888	0.59	LED 54w	3,007	0.26	3,881	0.33
HPS 150w, 120v	2	1,440	0.12	LED 90w	718	0.06	722	0.06
HPS 150w, 120v	2	1,440	0.12	Induc 85w	720	0.06	720	0.06
HPS 200w, 120v	11	10,560	0.90	LED 106w	4,844	0.41	5,716	0.49
HPS 200w, 240v	2	2,400	0.20	LED 106w	1,128	0.10	1,272	0.11
TOTAL	599	222,252	18.90		98,555	8.38	123,697	10.52

MUNICIPAL MARIN CLEAN ENERGY

Emissions Reduction Measure ERM 21

Related CAP Program	EN-16
2020 Reductions ($MTCO_2e$) -9.9	Implementation action: Continue to purchase MEA Deep Green electricity for all government buildings, irrigation, and public lighting.
Methodology	
Sources	

Calculation

Government operations electricity emissions in 2010	29.5 $MTCO_2e$
Electricity emissions reduced through other measures	19.6 $MTCO_2e$
Reduction in GHG emissions	9.9 $MTCO_2e$

GREEN PURCHASING

Emissions Reduction Measure ERM 22

Related CAP Programs	PUR-1, 2, 3
2020 Reductions ($MTCO_2e$) -0.7	Implementation actions: Purchase energy-efficient office equipment and implement operational policies to reduce energy use and conserve resources.
Methodology	Estimated energy savings for office equipment based upon energy savings calculators developed by the U.S. Environmental Protection Agency and U.S. Department of Energy and available at www.energystar.gov. For estimating purposes, monitors were assumed to not have sleep settings activated and to be turned off at night. Computer CPUs were assumed to not be turned off at night.
Sources	www.energystar.gov

Calculation

Energy-Efficient Office Equipment

Equipment	Quantity	Annual Energy Savings (kWh)	Emissions Reductions ($MTCO_2e$)
Monitors	28	2408	0.2
Computer CPU	22	4114	0.4
Imaging Equipment	4	710	0.1
TOTAL	54	7,232	0.7

FOOD AND GREEN WASTE

Emissions Reduction Measure ERM 23

Related CAP Programs	WST-1, 2, 3, 5, 6, 7, 8, 11,12
2020 Reductions ($MTCO_2e$) -371.7	Implementation action: Eliminate 94% of food and green waste from waste disposal. Compost food waste and green waste and/or use food waste to produce soil amendments and biogas.
Methodology	Fairfax's 2025 goal is to have Zero Waste. Assumes 94% diversion is an achievable goal by 2020. 22.85% of landfilled waste is food waste. 7.98% of landfilled waste is yard waste. 10.9% of alternative daily cover (ADC) is plant debris. GHG emissions calculated using ICLEI Clean Air and Climate Protection 2009 Software, Version 3.0.
Sources	Landfill waste characterization: Marin County Hazardous and Solid Waste Management JPA, "Final Draft Zero Waste Feasibility Study," prepared by R3 Consulting Group, December 2009. http://www.marinrecycles.org/Docs/Final_Draft_Zero_Waste_Feasibility_Study_121609.pdf ADC waste characterization: CalRecycle, "Alternative Daily Cover (ADC) by Jurisdiction of Origin and Material Type," http://www.calrecycle.ca.gov/LGCentral/Reports/Viewer.aspx?P=ReportName%3dEdrsJurisAndMaterials%26CountyID%3d21%26ReportYear%3d2010.

Calculation

Landfilled food waste emissions 2020 BAU	328.8 $MTCO_2e$
Landfilled yard waste emissions 2020 BAU	65.1 $MTCO_2e$
ADC plant debris emissions 2020 BAU	6.3 $MTCO_2e$
Less waste from government operations	4.7 $MTCO_2e$
Diversion rate	94%
TOTAL emissions reduction	371.7 $MTCO_2e$

CONSTRUCTION AND DEMOLITION WASTE

Emissions Reduction Measure ERM 24

Related CAP Programs	WST-1, 2, 3, 4, 5, 6, 8, 11, 12
2020 Reductions ($MTCO_2e$) -64.7	Implementation action: Eliminate 94% of wood and textile waste from landfill waste disposal.
Methodology	9.57% of landfilled waste is wood and textile waste. GHG emissions calculated using ICLEI Clean Air and Climate Protection 2009 Software, Version 3.0.
Sources	Landfill waste characterization: Marin County Hazardous and Solid Waste Management JPA, "Final Draft Zero Waste Feasibility Study," prepared by R3 Consulting Group, December 2009. http://www.marinrecycles.org/Docs/Final_Draft_Zero_Waste_Feasibility_Study_121609.pdf

Calculation

Landfilled wood and textile waste emissions 2020 BAU	68.9 $MTCO_2e$
Less waste from government operations	1.5 $MTCO_2e$
Waste diversion rate	94%
TOTAL emissions reduction	64.7 $MTCO_2e$

PAPER WASTE

Emissions Reduction Measure ERM 25

Related CAP Programs	WST-1, 2, 3, 5, 6, 8, 9, 11, 12
2020 Reductions ($MTCO_2e$) -561.5	Implementation action: Eliminate 94% of paper waste from waste disposal.
Methodology	23.48% of landfilled waste is paper waste. GHG emissions calculated using ICLEI Clean Air and Climate Protection 2009 Software, Version 3.0.
Sources	Landfill waste characterization: Marin County Hazardous and Solid Waste Management JPA, "Final Draft Zero Waste Feasibility Study," prepared by R3 Consulting Group, December 2009. http://www.marinrecycles.org/Docs/Final_Draft_Zero_Waste_Feasibility_Study_121609.pdf

Calculation

Landfilled paper waste emissions 2020 BAU	597.4 $MTCO_2e$
Less paper waste emissions from government operations	3.6 $MTCO_2e$
Paper waste diversion rate	94%
TOTAL emissions reduction	561.5 $MTCO_2e$

MUNICIPAL FOOD AND GREEN WASTE

Emissions Reduction Measure ERM 26

Related CAP Programs	WST-1, 2, 3, 5, 6, 7, 8, 11, 13
2020 Reductions ($MTCO_2e$) -4.5	Implementation action: Eliminate 94% of municipal food and green waste from waste disposal.
Methodology	Assumes 94% diversion is anchievable by 2020. 22.85% of landfilled waste is food waste. 7.98% of landfilled waste is yard waste. GHG emissions calculated using ICLEI Clean Air and Climate Protection 2009 Software, Version 3.0.
Sources	Landfill waste characterization: Marin County Hazardous and Solid Waste Management JPA, "Final Draft Zero Waste Feasibility Study," prepared by R3 Consulting Group, December 2009. http://www.marinrecycles.org/Docs/Final_Draft_Zero_Waste_Feasibility_Study_121609.pdf

Calculation

Waste emissions from government operations 2020 BAU	15.4 $MTCO_2e$
Food and plant debris emissions 2020 BAU	4.7 $MTCO_2e$
Diversion rate	94%
TOTAL emissions reduction	4.5 $MTCO_2e$

MUNICIPAL CONSTRUCTION AND DEMOLITION WASTE

Emissions Reduction Measure ERM 27

Related CAP Programs	WST-1, 2, 3, 4, 5, 6, 8, 11
2020 Reductions ($MTCO_2e$) -1.4	Implementation action: Eliminate 94% of wood and textile waste from landfill waste disposal.
Methodology	9.57% of landfilled waste is wood and textile waste. GHG emissions calculated using ICLEI Clean Air and Climate Protection 2009 Software, Version 3.0.
Sources	Landfill waste characterization: Marin County Hazardous and Solid Waste Management JPA, "Final Draft Zero Waste Feasibility Study," prepared by R3 Consulting Group, December 2009. http://www.marinrecycles.org/Docs/Final_Draft_Zero_Waste_Feasibility_Study_121609.pdf

Calculation

Waste emissions from government operations 2020 BAU	15.4 $MTCO_2e$
C&D emissions 2020 BAU	1.5 $MTCO_2e$
Diversion rate	94%
TOTAL emissions reduction	1.4 $MTCO_2e$

MUNICIPAL PAPER WASTE

Emissions Reduction Measure ERM 28

Related CAP Programs	WST-1, 2, 3, 5, 6, 8, 9, 11, 13
2020 Reductions ($MTCO_2e$) -3.4	Implementation action: Eliminate 94% of paper waste from waste disposal.
Methodology	23.48% of landfilled waste is paper waste. GHG emissions calculated using ICLEI Clean Air and Climate Protection 2009 Software, Version 3.0.
Sources	Landfill waste characterization: Marin County Hazardous and Solid Waste Management JPA,

Calculation

Waste emissions from government operations 2020 BAU	15.4 $MTCO_2e$
Landfilled paper waste emissions 2020 BAU	3.6 $MTCO_2e$
Paper waste diversion rate	94%
TOTAL emissions reduction	3.4 $MTCO_2e$

INDOOR WATER EFFICIENCY AND CONSERVATION

Emissions Reduction Measure ERM 29

Related CAP Programs	WAT-1, 4, 5, 6, 7, 9
2020 Reductions ($MTCO_2e$) -211.3	Implementation action: Reduce indoor water use by 20%.
Methodology	20% reduction in indoor water use is based on the following: Installing all low-flow water fixtures can reduce indoor residential water use by 20% and indoor non-residential water use by 17-31% (CAPCOA Measure WUW-1). 2010 California Green Building Standards Code requires all new construction to reduce indoor water use by 20%. The Water Conservation Act (SBX 7-7) requires the state to achieve a 20% reduction in urban per capita water use by the year 2020. 67% of water consumption is for indoor use, and hot water use is 30% of indoor water use. Calculation includes emissions avoided for treating and transporting potable water by MMWD and treating wastewater by CSMA. Programs related to hot water use from the MMWD 2007 Water Conservation Master Plan were used to estimate potential savings from water conservation education, outreach, rebates, incentives, audits, and requirements that exceed Title 24 requirements.
Sources	California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010. EBMUD Indoor Water Conservation Study (p. 31), 2003, http://www.ebmud.com/sites/default/files/pdfs/residential-indoor-wc-study.pdf. ICLEI Climate and Air Pollution Planning Assistant - CAPPA V1.5 Marin Municipal Water District, 2007 Water Coonservation Master Plan Personal communication with Dan Carney, MMWD.

Calculation

Indoor Water Consumption 2010	218,040,583	gallons
Indoor Water Consumption 2020 BAU	224,106,220	gallons
Percent water reduction	20%	
Indoor water consumption reduction	44,821,244	gallons
Water and wastewater-related electricity saved	192,051	kWh
Indoor hot water consumption reduction	2,920,440	gallons
Natural gas required to heat one gallon of water	0.0098	therms
Electricity required to heat one gallon of water	0.19	kWh
Percent water heaters that use natural gas	58%	
Therms saved	16,600	therms
Electricity saved	233,051	kWh
GHG emissions reduction	211.3	$MTCO_2e$

OUTDOOR WATER EFFICIENCY AND CONSERVATION

Emissions Reduction Measure ERM 30

Related CAP Program	WAT-1, 3, 5, 6, 7, 9
2020 Reductions ($MTCO_2e$) -9.1	Implementation action: Reduce outdoor water use by 20%.
Methodology	20% reduction in outdoor water use is based on the following: Water efficient landscapes can reduce outdoor water use by up to 70% (CAPCOA Measure WUW-3). Water-efficient landscape irrigation systems reduce outdoor water use by 6.1% (CAPCOA Measure WUW-4). In compliance with AB 1881, MMWD has adopted a Water Efficient Landscape Ordinance that limits landscape water use. The Water Conservation Act (SBX 7-7) requires the state to achieve a 20% reduction in urban per capita water use by the year 2020. 33% of water consumption is for outdoor use. Calculation includes emissions avoided for treating and transporting potable water by MMWD.
Sources	California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010. Personal communication with Dan Carney, Water Conservation Manager, MMWD.

Calculation

Outdoor water consumption 2010	107,393,123 gallons
Outdoor water consumption 2020 BAU	110,380,675 gallons
Percent outdoor water reduced	20%
Outdoor water consumption reduction	22,076,135 gallons
Electricity saved	52,376 kWh
GHG emissions reduction	9.1 $MTCO_2e$

RAINWATER CATCHMENT

Emissions Reduction Measure ERM 31

Related CAP Programs	WAT-3
2020 Reductions ($MTCO_2e$)	Implementation options:
0.0	50,000 gallons of water storage capacity installed.
-0.1	100,000 gallons of water storage capacity installed.
-0.1	150,000 gallons of water storage capacity installed.
Methodology	Rainwater cisterns vary in size from 50 gallon barrels to 15,000+ gallon storage tanks. This analysis assumes an average 500 gallons of storage per tank, and tanks that are emptied twice per year.
Sources	

Calculation

Average rainwater storage capacity per tank		500 gallons
Avoided water-related electricity use per storage tank per year		2 kWh
	100 tanks	237 kWh
	200 tanks	475 kWh
	300 tanks	712 kWh
Avoided GHG emissions per storage tank per year		0.0004 $MTCO_2e$
	100 tanks	0.04 $MTCO_2e$
	200 tanks	0.08 $MTCO_2e$
	300 tanks	0.12 $MTCO_2e$
Avoided water usage per storage tank per year		1,000
	100 tanks	100,000 gallons
	200 tanks	200,000 gallons
	300 tanks	300,000 gallons

GREYWATER

Emissions Reduction Measure ERM 32

Related CAP Programs	WAT-8
2020 Reductions ($MTCO_2e$)	Implementation options:
-0.7	100 households using greywater systems.
-1.7	250 households using greywater systems.
-3.3	500 households using greywater systems.
Methodology	CAPCOA Measure WSW-2 used for estimating greywater generation. Assumes 25 gallons generated per residential occupant per day from showers, bathtubs, and wash basins and 15 gallons per occupant per day from laundry machines. Greywater assumed to be used for landscape irrigation for the typical irrigation season of May through October.
Sources	California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010. MMWD potable water production for 2010 provided by Nancy Gibbs, MMWD Business Systems Analyst. MMWD electricity consumption provided by Jon LaHaye, MMWD Principal Engineer. KWh/MG was calculated from this data.

Calculation

Greywater generation per residential occupant per day	40 gallons
Greywater generation per household per year available for irrigation	16,092 gallons
Avoided electricity use per household per year	38 kWh
100 households	3,818 kWh
250 households	9,545 kWh
500 households	19,089 kWh
Avoided GHG emissions per household per year	0.01 $MTCO_2e$
Avoided water usage per year (gallons):	
100 households	1,609,208
250 households	4,023,020
500 households	8,046,039

MUNICIPAL WATER CONSERVATION

Emissions Reduction Measure ERM 33

Related CAP Program	WAT-2
2020 Reductions ($MTCO_2e$) -0.1	Implementation action: Reduce water use by 20%.
Methodology	Water efficient landscapes can reduce outdoor water use by up to 70% (CAPCOA Measure WUW-3). Water-efficient landscape irrigation systems reduce outdoor water use by 6.1% (CAPCOA Measure WUW-4).
Sources	California Air Pollution Control Officers Association, "Quantifying Greenhouse Gas Mitigation Measures: A Resource for Local Government to Assess Emission Reductions from Greenhouse Gas Mitigation Measures," August, 2010.

Calculation

Municipal outdoor water use, 2010 and 2040 BAU (est.)	1,420,860 gallons
Annual electricity used by Town for irrigation	398 kWh
Water use reduction	20%
Avoided electricity for operating irrigation systems	80 kWh
Avoided water-related electricity	674 kWh
Total electricity reduction	754 kWh
GHG emissions reduction	0.1 $MTCO_2e$
Avoided water usage	284,172 gallons

RESILIENT NEIGHBORHOODS

Emissions Reduction Measure ERM 34

Related CAP Programs	Promote Education and Citizen Involvement
2020 Reductions ($MTCO_2e$)	Implementation options:
-326.0	100 participating households.
-652.0	200 participating households.
-1,630.0	500 participating households.
Methodology	Based on a pilot program in Marin, 98 households reduced emissions by 3.26 metric tons CO_2e on average, excluding actions related to solid waste reduction and purchase of Marin Clean Energy Light Green electricity (to avoid double-counting), air travel, upstream emissions, and purchased carbon and travel offsets.
Sources	Tamra Peters, Director, Resilient Neighborhoods, tamra@resilientneighborhoods.org.

Calculation

Number of households, 2020	3,459 HH		
Total participants by 2020	100 HH	200 HH	500 HH
Emissions reduction per household	3.26 $MTCO_2e$	3.26 $MTCO_2e$	3.26 $MTCO_2e$
Reduction in GHG emissions	326.0 $MTCO_2e$	652.0 $MTCO_2e$	1,630.0 $MTCO_2e$

RENEWABLE PORTFOLIO STANDARD

State Action

2020 Reductions (MTCO2e)	Implementation action:
-1,590.7	33% of PG&E and MEA electricity comes from eligible renewable energy sources by 2020.
Methodology	The Renewable Portfolio Standard (RPS) requires electricity providers to increase the portion of energy that comes from renewable sources to 20% by 2010 and by 33% by 2020. Projected CO_2 emission factor from the CPUC GHG calculator version 3c. Projected CH_4 and N_2O emission factors from the Local Government Operations Protocol, Table G7, 2007 data. According to Rafael Silberblatt, MCE Program Coordinator, as a matter of policy, MCE seeks to have a lower emission factor than PG&E. PG&E's projected 2020 emission factor was used as a conservative estimate for MCE. Assumes the same breakdown of the electricity load in 2020 (MEA, PG&E and DA) as in 2010.
Sources	PG&E, "Greenhouse Gas Emission Factors: Guidance for PG&E Customer," April 2013. California Air Resources Board, "Local Government Operations Protocol, Version 1.1," May 2010. Personal communication, Rafael Silberblatt, MCE Program Coordinator, rsilberblatt@marinenergyauthority.org

Calculation

	2010 (kWh)	2020 BAU (kWh)	Electricity Savings from Local and State Actions (kWh)	Net Electricity Use (kWh)	Emission Reductions ($MTCO_2e$)
Total Electricity Use (exclusing DA electricity)	25,713,139	26,906,624	2,862,984	24,043,641	1,590.70

Emission Factor ($MTCO_2e$/kWh)

2010 PG&E	0.0002035
2010 MEA (light and deep green combined)	0.0001486
2010 Weighted Average	0.0001994
2020 Projected for PG&E and MEA	0.0001332

Title 24

State Action

2020 Reductions (MTCO2e)	Implementation action:
-48.8	Implement Title 24 and subsequent building standards updates that ultimately achieve zero net energy use for new residential and non-residential construction.
Methodology	The California Energy Commission's 2007 Integrated Policy Report established the goal that new building standards achieve "net zero energy" levels by 2020 for residences and by 2030 for commercial buildings. The California Public Utility Commission's (CPUC) California Long Term Energy Efficiency Strategic Plan, dated July 2008, endorses the Energy Commission's zero net energy goals for all newly constructed homes by 2020 and for all newly constructed commercial buildings by 2030.
Sources	California Energy Commission, "Impact Analysis: 2008 Update to the California Energy Efficiency Standards for Residential and Nonresidential Buildings," prepared by Architectural Energy Corporation, November 7, 2007. California Energy Commission, http://www.energy.ca.gov/title24/2013standards/background.html California Energy Commission, http://www.energy.ca.gov/title24/2013standards/rulemaking/documents/2012-5-31-Item-05-Adoption_Hearing_Presentation.pdf

Calculation

Reductions from Title 24 Upgrades	2008 Reductions from 2005 Standards (assumed for development after 2010)		2013 Reductions from 2008 standards (assumed for development after 2015)	2020 Projected -- Reductions from 2010 Baseline
	Electricity Savings	Natural Gas Savings	Energy Savings	Energy Savings
Single-family New Construction	22.70%	10.00%	25.00%	100%
Multi-family New Construction	19.70%	7.00%	14.00%	50%
Residential New Construction (38% single, 62% multifamily)	20.83%	8.13%	18.15%	69%
Non-residential New Construction	4.90%	9.40%	30.00%	50%

Projected Residential Development with Title 24 Energy Reductions

	2011-2015	2016-2020	TOTAL	Emissions Reductions
New Residential (units)	1	41	42	
Electricity Use BAU	5,489	225,062	230,552	
Electricity Use Savings	1,143	55,391	56,535	11.3
Natural Gas Use BAU	543	22,253	22,795	
Natural Gas Use Savings	44	2,138	2,182	11.6

Projected Non-Residential Development with Title 24 Energy Reductions

	2011-2015	2016-2020	TOTAL	Emissions Reductions
Electricity Use BAU	383,642	383,642	767,284	
Electricity Use Savings	18,798	24,438	43,236	8.8
Natural Gas Use BAU	14,833	14,833	29,667	
Natural Gas Use Savings	1,394	1,813	3,207	17.0

PAVLEY AND LOW CARBON FUEL STANDARD

State Action

2020 Reductions ($MTCO_2e$) -3,828.8	Implementation action: State implements Pavley 1 and the Low Carbon Fuel Standard.
Methodology	Assembly Bill 1493 (Pavley) requires carmakers to reduce greenhouse gas emissions from new passenger cars and light trucks in two phases. Pavley 1 took effect for model years 2012 through 2016. The second phase, which is not included in this analysis, will take effect for model years 2017 through 2025. The Low Carbon Fuel Standard (CLFS) will reduce the carbon intensity of California's transportation fuels and encouraging the use of cleaner transportation fuels such as electricity, natural gas, hydrogen and low-carbon biofuels. Transportation emissions estimated using EMFAC 2011.
Sources	California Air Resources Board, EMFAC Emissions Database, http://www.arb.ca.gov/jpub/webapp//EMFAC2011WebApp/emsSelectionPage_1.jsp

Calculation

VMT 2020 BAU	33,272,954 VMT
VMT 2020 after local actions	32,156,771 VMT
Emissions 2020 without Pavley and LCFS	15,740 $MTCO_2e$
Emissions 2020 after local actions w/Pavley and LCFS	11,911 $MTCO_2e$
Reduction in emissions	3,829 $MTCO_2e$

CALIFORNIA SOLAR INITIATIVE

State Action

2020 Reductions ($MTCO_2e$)	Implementation action:
-61.0	State implements California Solar Initiative (CSI) program through 2016.
Methodology	45 residential systems were installed between 2007 and 2012 with an average 5,213 kWh generated per system. 3 commercial systems were installed (excluding government) with an average 68,004 kWh generated annually. The analysis assumes the current rate of installation and average system size will continue through the conclusion of the program in 2016.
Sources	California Solar Initiative, http://www.californiasolarstatistics.ca.gov/. Electricity production estimates from Jonathan Whelan, Senior Project Manager, Optony, Inc.

Calculation

Residential Renewable Energy

Average number of residential systems installed annually	8
Number of systems projected to be installed 2011-2016	45
Average electricity generated per installation	5,213
Annual electricity savings	234,595 kWh
Electricity emissions reductions	47.1 $MTCO_2e$

Commercial Renewable Energy

Average number of commercial systems installed annually	0.5
Number of systems projected to be installed 2011-2016	3
Average electricity generated per installation	22,668
Annual electricity savings	68,004 kWh
Electricity emissions reductions	13.9 MTCO2e