

MCCAP

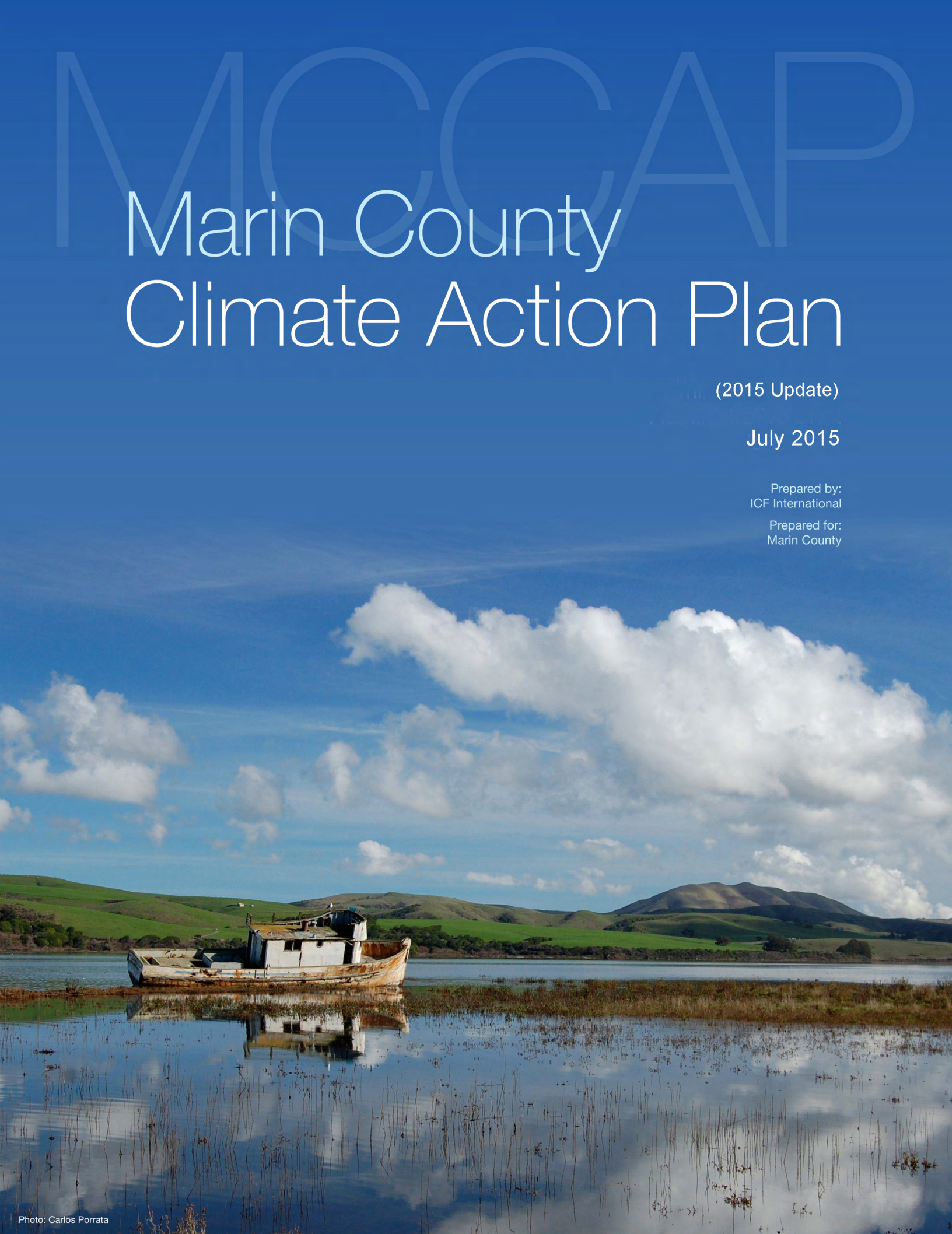
Marin County Climate Action Plan

(2015 Update)

July 2015

Prepared by:
ICF International

Prepared for:
Marin County



MARIN COUNTY CLIMATE ACTION PLAN (2015 UPDATE)

**PREPARED BY:
ICF INTERNATIONAL**

**PREPARED FOR:
MARIN COUNTY**

July 2015

ACKNOWLEDGEMENTS:

Many individuals and organizations contributed to the completion of this document by providing data and guidance, including:

County of Marin Staff

Dana Armanino, Community Development Agency (CDA)

Cindy Brown, Human Resources

Chris Chamberlain, Marin County Parks (Parks)

Brian Crawford, CDA

Linda Dahl, Parks

Kellen Dammann, CDA

Steve Devine, Dept. of Public Works (DPW)

Dan Eilerman, Office of the County Administrator (Admin)

John Ferrari, Parks

Gordon Haberfelde, Information Services and Technology (IST)

Dave Hattem, Parks

Thomas Lai, CDA

Roger Leventhal, DPW

Jeanne Miche, DPW

Mike Norton, DPW

Stefan Parnay, Agriculture, Weights and Measures

Omar Pena, CDA

Steve Petterle, Parks

Rachel Reid, CDA

Robert Ruiz, DPW

Brian Sanford, Parks

Joyce Siegan, DPW

Alex Soulard, DPW

David Speer, Admin

Eric Steger, DPW

Leelee Thomas, CDA

Marin County Planning Commission

Katherine Crecelius

Ericka Erickson (former)

Don Dickenson

Margot Biehle

John Eller

Wade Holland

Peter Theran

David Paoli

Community Groups and Agencies

Bolinas Community Public Utility District

Central Marin Sanitation Agency

Las Gallinas Valley Sanitary District

Marin Carbon Project

Marin Municipal Water District

Marin Sanitary Service

Marin Clean Energy (MCE)

Metropolitan Transportation Commission

North Marin Water District

Novato Sanitary District

Pacific Gas and Electric Company

Sausalito Marin City Sanitary District

Sewerage Agency of Southern Marin

Stinson Beach County Water District

Tomales Village Community Services District

Transportation Authority of Marin

UC Cooperative Extension

CITED AS:

ICF International. 2015. *Marin County Climate Action Plan (2015 Update)*. July. (ICF 00464.13.) San Francisco. Prepared for Marin County, California.

Contents

List of Tables and Figures	iv
List of Acronyms and Abbreviations	vi
Executive Summary	ES-1
Introduction	ES-1
Marin County Greenhouse Gas Emissions Inventories and Forecasts	ES-2
Actions to Reduce Greenhouse Gas Emissions	ES-6
Greenhouse Gas Reduction Goals	ES-7
Community Actions	ES-10
Municipal Actions	ES-12
Summary of Strategies	ES-13
Implementation Program	ES-16
Adaptation Plan	ES-17
Funding Acknowledgement	ES-18
Chapter 1 Introduction and Purpose	1-1
1.1 Purpose of the Climate Action Plan Update	1-1
1.2 Basic Terms	1-2
1.3 Community and Municipal Climate Action Planning	1-3
1.4 Contents of the Climate Action Plan Update	1-4
1.5 How to Use the Climate Action Plan Update for CEQA “Tiering”	1-5
Chapter 2 Climate Change Science and Regulations	2-1
2.1 Introduction	2-1
2.2 Background on Climate Change and GHG Emissions	2-1
2.3 Local Climate Change Effects	2-4
2.4 Climate Change Regulations	2-5
2.4.1 Federal, State, and Regional Initiatives	2-5
2.4.2 Local Actions	2-5
Chapter 3 Updated Emissions Inventories and Forecasts	3-1
3.1 Introduction	3-1
3.2 Overview of Analysis Methods	3-2
3.2.1 Community Emissions Overview	3-2
3.2.2 Municipal Emissions Overview	3-4
3.2.3 Previous Inventories	3-5
3.3 Marin County Community Inventories and Forecast	3-6
3.3.1 1990 and 2012 Emissions Inventories	3-6
3.3.2 2020 Business-as-Usual Forecast	3-10

3.4	Marin County Municipal Inventories and Forecast	3-12
3.4.1	1990 and 2012 Emissions Inventories.....	3-12
3.4.2	2020 Business-as-Usual Municipal Forecast	3-14
Chapter 4	Community Greenhouse Gas Reduction Goals and Measures	4-1
4.1	Introduction.....	4-1
4.2	Marin County Greenhouse Gas Reduction Goals	4-1
4.3	Climate Action Plan Framework	4-3
4.3.1	Reduction Measures	4-3
4.3.2	Emissions Reductions.....	4-4
4.3.3	Cost–Effectiveness Analysis	4-4
4.3.4	Community Co-Benefits	4-5
4.4	Meeting Marin County’s Greenhouse Gas Reduction Goals	4-6
4.5	Measures to Reduce Greenhouse Gas Emissions.....	4-9
4.5.1	State Programs.....	4-9
4.5.2	Local Measures	4-9
Chapter 5	Municipal Greenhouse Gas Reduction Goals and Measures.....	5-1
5.1	Introduction.....	5-1
5.2	Marin County Greenhouse Gas Reduction Goals	5-1
5.3	Climate Action Plan Framework	5-3
5.3.1	Reduction Measures	5-3
5.3.2	Emissions Reductions.....	5-3
5.3.3	Cost–Effectiveness Analysis	5-4
5.3.4	Co-Benefits.....	5-4
5.4	Meeting Marin County’s Greenhouse Gas Reduction Goals	5-4
5.5	Measures to Reduce GHG Emissions.....	5-6
5.5.1	State Programs.....	5-6
5.5.2	Local Measures	5-7
Chapter 6	Agriculture	6-1
6.1	Introduction.....	6-1
6.2	Agricultural Greenhouse Gas Emissions and Carbon Sequestration	6-1
6.2.1	Agricultural GHG Emissions.....	6-1
6.2.2	Agricultural Carbon Stocks and Sequestration.....	6-3
6.3	Greenhouse Gas Reduction Measures	6-3
6.3.1	Agriculture-1: Methane Capture and Energy Generation at Dairies.....	6-4
6.3.2	Agriculture-2: Carbon Farming.....	6-5
6.3.3	Agriculture-3: Promote the Sale of Locally Grown Foods and/or Products	6-14
Chapter 7	Greenhouse Gas Reduction Measure Implementation Program	7-1
7.1	Introduction.....	7-1
7.2	Marin County Sustainability Team	7-1

7.3	Implementation Actions	7-2
7.4	Implementation Schedule	7-2
7.5	Funding Strategies	7-5
7.5.1	County and CAP-Level Financing.....	7-6
7.5.2	Community and Project-Level Financing.....	7-6
7.6	Outreach and Education	7-7
7.7	Evaluation and Monitoring	7-8
7.8	Regional Collaboration	7-9
7.9	Beyond 2020.....	7-10
Chapter 8	Climate Change Adaptation.....	8-1
8.1	Introduction.....	8-1
8.2	How the Climate May Be Changing in Marin County.....	8-1
8.2.1	Observed and Projected Changes in Temperature, Precipitation, and Sea Level Rise	8-1
8.2.2	Potential Effects of Projected Climate Change on Marin County	8-3
8.3	Status of Adaptation Efforts in Marin County	8-5
8.3.1	Efforts Under Way	8-5
8.3.2	Additional Efforts Needed.....	8-7
8.4	Potential Impacts of Climate Change on Marin County’s Sectors and Potential Adaptation Actions.....	8-8
8.4.1	Water	8-11
8.4.2	Natural Heritage.....	8-12
8.4.3	Transportation	8-13
8.4.4	Agriculture	8-13
8.4.5	Energy	8-14
8.4.6	Human Health	8-15
Chapter 9	References	9-1
9.1	Print and Web References.....	9-1
9.2	Personal Communications.....	9-6

Appendix A Summary of Adaptation Actions

Appendix B Inventory and Forecast Details

Appendix C Reduction Strategy Details and Analysis Methods

Appendix D Funding Strategies

Appendix E Sea Level Rise Maps

Tables and Figures

Tables

ES-1	Unincorporated Marin County 1990 and 2012 Community Greenhouse Gas Emissions Inventories and 2020 Business-as-Usual Forecast	ES-5
ES-2	Unincorporated Marin County 1990 and 2012 Municipal Greenhouse Gas Emissions Inventories and 2020 Business-as-Usual Forecast	ES-5
ES-3	Summary of Community Emissions Reduction Strategies.....	ES-13
ES-4	Summary of Municipal Emissions Reduction Strategies	ES-15
2-1	Principal Greenhouse Gas Emissions.....	2-3
3-1	Marin County 1990 and 2012 Community Greenhouse Gas Inventories.....	3-7
3-2	Marin County 2012 Community GHG Inventory Compared with Other Jurisdictions.....	3-9
3-3	Summary of Marin County’s 2020 Business-as-Usual Community Forecast and Comparison to the 2012 and 1990 Community Inventories (MTCO ₂ e)	3-11
3-4	Marin County 1990 and 2012 Municipal Inventories	3-13
3-5	Summary of Marin County’s 2020 BAU Municipal Forecast and Comparison to the 2012 Municipal Inventory (MTCO ₂ e).....	3-14
4-1	Achieving Marin County’s 2020 Community Greenhouse Gas Reduction Target—Sector View ..	4-7
4-2	Summary of 2020 Greenhouse Gas Emissions Reductions by Community Measure (MTCO ₂ e) ..	4-8
5-1	Achieving Marin County’s 2020 Municipal Greenhouse Gas Reduction Target—Sector View	5-5
5-2	Summary of 2020 GHG Emissions Reductions by Municipal Measure (MTCO ₂ e)	5-6
6-1	Approved Natural Resource Conservation Service Practices for Improved Organic Matter.....	6-7
6-2	GHG Reduction Potential of Carbon Farming on Three Marin County Farms (MTCO ₂ e)	6-11
7-1	Implementation Timeline for the Community GHG Reduction Measures	7-4
7-2	Implementation Timeline for the Municipal GHG Reduction Measures	7-5
7-3	Overview of Potential Community Funding Sources by Strategy Area	7-7
8-1	Projected Climate Changes in the North Bay (including Marin County)	8-2
8-2	Example Adaptation Actions by Sector	8-9

Figures	Page
ES-1 Unincorporated Marin County 2012 Community Greenhouse Gas Emissions Inventory by Sector....	ES-3
ES-2 Unincorporated Marin County 2012 Municipal Greenhouse Gas Emissions Inventory	ES-3
ES-3 Unincorporated Marin County Community Greenhouse Gas Reduction Goal.....	ES-7
ES-4 Unincorporated Marin County Municipal Greenhouse Gas Reduction Goal	ES-8
ES-5 Community Co-Benefits	ES-9
1-1 Overlap between Community Emissions and Municipal Emissions	1-4
1-2 CEQA and the CAP: Project Streamlining Benefits	1-6
2-1 The Greenhouse Effect.....	2-1
2-2 Key Federal, State, and Regional Greenhouse Gas Legislation	2-6
3-1 Marin County 2012 Community Inventory by Sector.....	3-8
3-2 Trends in Community Emissions from 1990 to 2012 by Sector.....	3-10
3-3 Marin County’s 2020 Business-as-Usual Community Forecast by Sector	3-12
3-4 Marin County 2012 Municipal Inventory by Sector	3-13
3-5 Marin County’s 2020 BAU Municipal Forecast by Sector	3-15
4-1 Marin County 2020 Community Emissions Reduction Goals	4-2
4-2 Community Co-Benefits	4-6
5-1 Marin County 2020 Municipal Emissions Reduction Goal.....	5-2
6-1 Comparative Agricultural Share of Overall GHG Emissions.....	6-2
6-2 Carbon Farming.....	6-5
6-3 Example Draft Carbon Farm Plan	6-10
7-1 Implementation Timeline for the Greenhouse Gas Reduction Measures.....	7-3
7-2 Achieving the 2050 Emissions Target of 80% below 1990 Levels.....	7-11
8-1 Example Inundation Zone: Sea-Level Rise Exposure and Asset Identification Map for Stinson Beach, Marin County Under Different Scenarios	8-4

Acronyms and Abbreviations

2006 GHG Reduction Plan	Marin County Greenhouse Gas Reduction Plan in 2006
AB	Assembly Bill
ABAG	Association of Bay Area Governments
ARB	California Air Resources Board
BAAQMD	Bay Area Air Quality Management District
BACERP	Bay Area Climate & Energy Resilience Project
BayREN	Bay Area Regional Energy Network
BCDC	Bay Conservation and Development Commission
C&D	construction and demolition
CAA	federal Clean Air Act
CAFF	Community Alliance with Family Farmers
CalCAN	California Climate and Agriculture Network
Caltrans	California Department of Transportation
CAP Update	Climate Action Plan Update
CAPCOA	California Air Pollution Control Officers Association
CCA	Community Choice Aggregation
CEQA	California Environmental Quality Act
CIMIS	California Irrigation Management Information System
cm	centimeters
County	County of Marin
Countywide Plan	2007 Marin Countywide Plan
EOF	Emergency Operations Facility
EPA	U.S. Environmental Protection Agency
EVs	electric vehicles
GHG	greenhouse gas
GWP	global warming potential
HFCs	hydrofluorocarbons
ICLEI	ICLEI—Local Governments for Sustainability
JPA	Joint Powers Authority
LGOP	Local Government Operations Protocol
MCE	Marin Clean Energy
MCEP	Marin Climate and Energy Partnership
MCEW	Marin County Energy Watch

MCP	Marin Carbon Project
MMTCO _{2e}	million metric tons of carbon dioxide equivalent
MTC	Metropolitan Transportation Commission
MTCO _{2e}	metric tons of carbon dioxide equivalent
MTCO _{2e}	metric tons of carbon dioxide equivalent
NPV	net present value
NRCS	Natural Resources Conservation Service
OPC	Ocean Protection Council
PACE	property assessed clean energy
PFCs	perfluorinated carbons
PG&E	Pacific Gas and Electric
RCD	Marin Resource Conservation District
RPS	Renewables Portfolio Standard
SB 375	Senate Bill 375
SCS	sustainable communities strategy
SLR	sea level rise
SMART	Sonoma-Marín Area Rail Transit
TAM	Transportation Authority of Marin
UCCE	University of California Cooperative Extension
USDA	U.S. Department of Agriculture
VMT	vehicle miles traveled

Executive Summary



Photo: Marin Community Development Agency

Introduction

The Unincorporated County of Marin (hereafter referred to as “County” or “Marin County”) acknowledges that climate change due to global warming poses an immediate threat to the environment and to human health and society. The consensus among leading scientists is that it is essential to reduce greenhouse gas (GHG) emissions.

Marin County was one of the first counties in California to take formal action addressing GHG emissions when it adopted the *Marin County Greenhouse Gas Reduction Plan*¹ in 2006 (2006 GHG Reduction Plan). Measures identified in the GHG Reduction Plan were then incorporated into the *Marin Countywide Plan* update which was adopted in 2007. The 2006 GHG Reduction Plan set a target to reduce GHG emissions from both community and municipal activities in the unincorporated areas of Marin County by at least 15% below 1990 levels by 2020. The County government and private sector have invested heavily in energy efficiency, renewable energy, alternative fuel vehicles, water conservation, and waste minimization to reduce GHG emissions substantially. By 2012, the County had already reduced community emissions to 15% below 1990 levels—8 years ahead of the 2020 target.

This document, the *Marin County Climate Action Plan 2015 Update* (CAP Update), builds on the 2006 GHG Reduction Plan and provides an update of GHG emissions in 2012, forecasts of emissions for 2020, and an assessment of actions that the County will take to further reduce emissions by 2020. The CAP Update includes two targets.

- **2020 Community Emissions Reduction Target**—a goal to reduce GHG emissions from community activities in unincorporated areas of Marin County by at least 30% below 1990 levels by 2020. This target is more than the 2006 GHG Reduction Plan target and more ambitious than the state’s goals in Assembly Bill (AB) 32, which commits to reducing statewide GHG emissions to 1990 levels by 2020. California Executive Order S-03-05, which was issued in 2005, articulates a long-term goal for the state of 80% below 1990 emissions levels by 2050. If adopted, the County’s target of 30% below 1990 levels by 2020 would be one of the most ambitious local jurisdiction reduction targets in California and the United States. Because the County is already ahead of its 2006 community target for 2020, Marin is now adopting a more aggressive community target in the CAP Update to achieve even greater reductions than previously planned in an attempt to get ahead of the curve and be on-track to meet the S-03-05 statewide target for 2050.
- **2020 Municipal Emissions Reduction Target**—a goal to reduce GHG emissions from the County’s municipal activities by at least 15% below 1990 levels by 2020.² This target is consistent with the 2006 GHG Reduction Plan target. Because the County is on-track to meet the original 2006 municipal target for 2020, Marin is retaining the same target for the CAP Update.

¹ At that time, the term “Climate Action Plan” had not yet been adopted but the Greenhouse Gas Reduction Plan was the functional equivalent of a CAP.

² The current 1990 municipal emissions estimate does not account for all sources of emissions because of data limitations. Actual emissions in 1990 are therefore higher than emissions reported here. Consequently, municipal emissions in 2012 are likely lower compared to actual 1990 emissions than reported here, and the county may be able to reduce actual emissions by more than 15% below 1990 levels by 2020.

The proposed new community emissions target would put the County on the forefront of climate action planning in California and a trajectory to reduce emissions significantly by 2050.

This CAP Update describes the County's plan for reaching these targets, including specific strategy areas for each of the major emissions sectors, and provides details on the 2012 and projected 2020 emissions in the unincorporated areas.

Implementing state measures and the local measures in the CAP Update would avoid the generation of more than 100,000 metric tons of carbon dioxide equivalent (MTCO_{2e}) in 2020 (annually), which is equivalent to the following individual actions (U.S. Environmental Protection Agency 2014a):

- removing more than 20,000 passenger vehicles from the road each year,³ or
- reducing gasoline consumption by more than 11 million gallons per year, or
- providing renewable energy to power over 9,000 homes each year.

The actions in the CAP Update are priority actions and intended for near-term implementation, such that the County can achieve its GHG reduction targets for 2020 for the unincorporated areas of Marin County.

Marin County Greenhouse Gas Emissions Inventories and Forecasts

In 2012, estimated GHG emissions generated by community activities in Marin County's unincorporated areas were approximately 477,000 MTCO_{2e} (Figure ES-1), or per capita emissions of approximately 7.1 MTCO_{2e} for the 67,000 residents in the unincorporated areas. This amount is equivalent to the annual GHG emissions generated by approximately 100,000 passenger vehicles. Of these total emissions, as shown in Figure ES-1, on-road transportation and building energy use (residential and non-residential) are the largest sources of emissions (35% each). The third largest source is agriculture (23%)⁴, followed by off-road equipment (4%), solid waste treatment (2%), wastewater treatment (1%), and water conveyance (0.2%).

For municipal activities from County government operations, estimated GHG emissions in 2012 were approximately 15,000 MTCO_{2e} (Figure ES-2), or emissions of 7.0 MTCO_{2e} per County employee. This amount is equivalent to the annual GHG emissions generated by approximately 3,000 passenger vehicles. Of these total emissions, as shown in Figure ES-2, employee commute is the largest source of emissions (43%). Building energy use is the second largest source of emissions (36%). The third largest source is the vehicle fleet (18%), followed by wastewater treatment (1.4%), streetlights and traffic signals (0.6%), refrigerants (0.4%), stationary sources (0.4%), solid waste generation (0.3%), and water conveyance (0.2%).

³ Assuming 10,000 miles traveled per year in a typical vehicle.

⁴ Nearly all of Marin County's agricultural activity occurs in the unincorporated area. When comparing agricultural emissions to countywide emissions, including emissions in the incorporated cities, agricultural emissions make up only about 6% of overall emissions. California's agricultural emissions, by comparison, are 8% of total emissions.

Figure ES-1. Unincorporated Marin County 2012 Community Greenhouse Gas Emissions Inventory by Sector

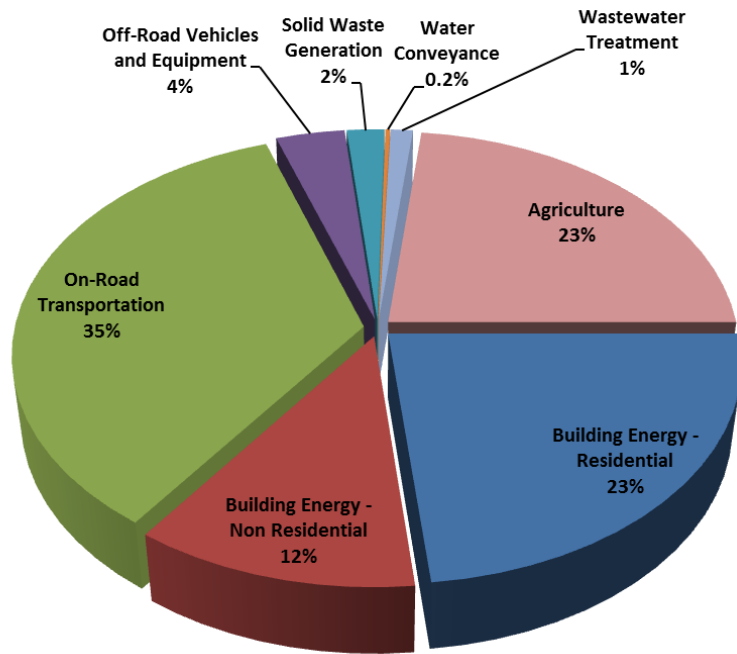
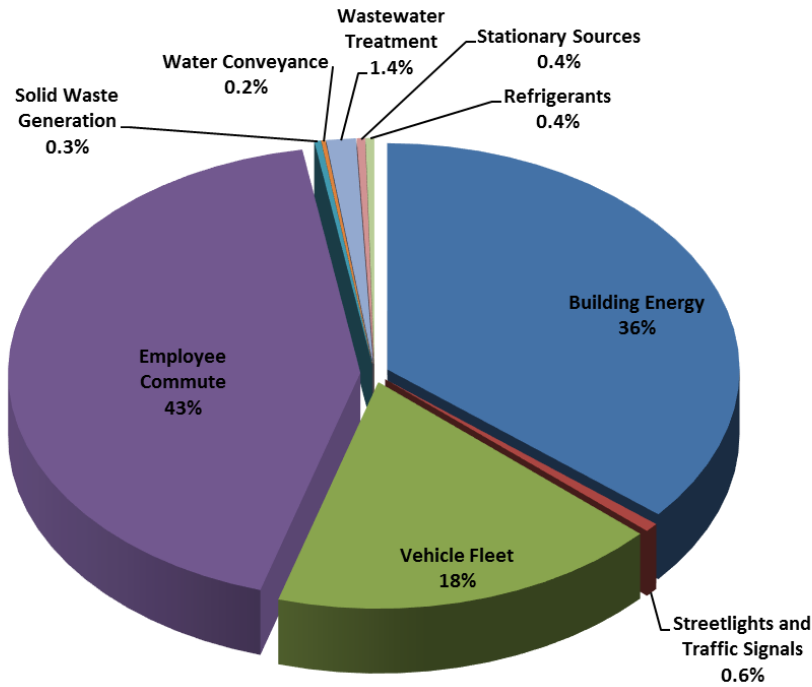


Figure ES-2. Unincorporated Marin County 2012 Municipal Greenhouse Gas Emissions Inventory



The CAP Update is composed of state and local actions to reduce GHG emissions within the unincorporated areas. The state actions considered in the CAP Update include the Renewables Portfolio Standard, Title 24 Standards for Commercial and Residential Buildings (Energy Efficiency and CALGREEN), Pavley/Advanced Clean Cars (Vehicle Efficiency), the Low Carbon Fuel Standard, and various AB 32 transportation reduction strategies. These state actions generally do not require action from the County but will result in local GHG reductions in the unincorporated areas.

As the county grows, energy consumption, water usage, waste generation, and transportation activities will increase. For the CAP Update, the County developed two business-as-usual (BAU) forecasts to evaluate the impacts of this growth on future GHG emissions in 2020, one for community emissions (referred to as the *2020 BAU Community Forecast*) and one for municipal emissions (referred to as the *2020 BAU Municipal Forecast*). These forecasts are based on changes in population, households, and employment and represent scenarios that do not consider the effects of future local, state, or federal actions to reduce GHG emissions. Table ES-1 compares the 2020 BAU Community Forecast to the 1990 and 2012 Community GHG Inventories and indicates that community GHG emissions are expected to increase by 3% (13,392 MTCO_{2e}) between 2012 and 2020. Much of this difference is attributable to increases in building energy use, vehicle trips, and off-road equipment. Table ES-2 compares the 2020 BAU Municipal Forecast to the 1990 and 2012 Municipal GHG Inventories and indicates that municipal GHG emissions are expected to increase by 13% (1,899 MTCO_{2e}) between 2012 and 2020. This difference is largely due to the new Emergency Operations Facility (EOF) and increasing activity as the County hires new employees.

State Actions

The following state actions will reduce GHG emissions in the County.

RPS: The RPS obligates certain utilities to procure at least 33% of retail sales from renewable resources by 2020.

Title 24: Requires that building shells and building components be designed to conserve energy and water.

Pavley: Will reduce GHG emissions from automobiles and light-duty trucks by 30% from 2002 levels by the year 2016.

LCFS: Will reduce GHG emissions by requiring a low carbon intensity of transportation fuels sold in California by at least 10% by the year 2020.

Table ES-1. Unincorporated Marin County 1990 and 2012 Community Greenhouse Gas Emissions Inventories and 2020 Business-as-Usual Forecast

Emission Sector ^a	Emissions (MTCO ₂ e)			Percent Growth	
	1990	2012	2020	1990-2012	2012-2020
Building Energy—Residential	131,265	111,484	115,713	-15%	4%
Building Energy—Non-Residential	74,190	55,142	61,194	-26%	11%
On-Road Transportation	193,544	166,773	167,002	-14%	0.1%
Off-Road Vehicles and Equipment	19,300	17,126	19,823	-11%	16%
Solid Waste Generation	14,414	9,362	9,358	-35%	-0.04%
Water Conveyance	1,319	1,157	1,215	-12%	5%
Wastewater Treatment	5,453	5,562	5,745	2%	3%
Agriculture ^b	122,366	110,850	110,798	-9%	-0.05%
Marin County Total	561,851	477,456	490,848	-15%	3%
<i>Emissions for Informational Purposes</i>					
<i>Stationary Sources (MTCO₂e/year)</i>	-	648	688	-	6%
<i>Forestry (MTCO₂e/year)</i>	-	-207,151	-207,151	-	0%
<i>Rangeland Soil Carbon Stock (MT C)^c</i>	-	10,783,021	10,783,021	-	0%
<i>Aboveground Carbon Stock (MT C)^c</i>	-	7,248,888	7,248,776	-	0%

Notes:

MTCO₂e = metric tons of carbon dioxide equivalent. MT C = metric tons of carbon.

Additional emissions sources that were not estimated (or included in the inventory or forecasts) include aircraft, non-local passenger rail, freight rail, ferries, ozone depleting substances, and other gases with high global warming potential. Agricultural emissions make up about 6% of overall countywide emissions when including the cities.

Rangeland soil carbon and aboveground carbon stock numbers are in units of metric tons of carbon, not metric tons of carbon dioxide equivalent. These are reported on a total mass basis, not on an annual basis.

Table ES-2. Unincorporated Marin County 1990 and 2012 Municipal Greenhouse Gas Emissions Inventories and 2020 Business-as-Usual Forecast

Emission Sector ^a	Emissions (MTCO ₂ e)			Percent Growth	
	1990	2012	2020	1990-2012	2012-2020
Building Energy	3,100	5,499	6,701	77%	22%
Streetlights and Traffic Signals	52	97	98	87%	1%
Vehicle Fleet ^b	4,900	2,732	2,973	-44%	9%
Employee Commute	7,100	6,528	6,957	-8%	7%
Solid Waste Generation	29	47	50	63%	7%
Water Conveyance	0	29	32	-	8%
Wastewater Treatment	0	207	222	-	7%
Stationary Sources	0	59	63	-	7%
Refrigerants	0	61	78	-	29%
Marin County Total	15,181	15,258	17,175	1%	13%

Notes:

MTCO₂e = metric tons of carbon dioxide equivalent.

^a Emissions from energy consumed in leased facilities are not included because energy use data were not available from Pacific Gas & Electric.

^b Emissions from off-road vehicles are included in the vehicle fleet sector.

Actions to Reduce Greenhouse Gas Emissions

The CAP Update includes a variety of regulatory and incentive-based strategies that will reduce GHG emissions from both existing and new development in the county. Local strategies adopted by the County will supplement state programs and achieve additional emissions reductions.

There are 15 local community actions and 8 local municipal actions included in the CAP Update. Additional supporting but unquantified actions are described in Appendix C. These local actions are grouped into the following strategy areas.

- Energy Efficiency and Renewable Energy (community and municipal actions).
- Land Use, Transportation, and Off-Road Equipment (community actions only).
- Vehicle Fleet and Employee Commute (municipal actions only).
- Water Conservation and Wastewater Treatment (community and municipal actions).
- Waste Reduction, Reuse, and Recycling (community and municipal actions).
- Agriculture (community actions only).

Many of the local actions are cost effective, particularly in the Energy Efficiency and Renewable Energy strategy area, with several energy efficiency investments that can recoup initial costs in 1–5 years. In addition to reducing GHG emissions, all local actions have many co-benefits, such as improved public health.

The following figures present the GHG Reduction Targets for community and municipal emissions. They show the BAU emissions for 2020 along with the contribution of state and local measures, by individual sector, toward the target. Figure ES-3 presents the community greenhouse gas reduction goal, and Figure ES-4 presents the municipal greenhouse gas reduction goal.

Greenhouse Gas Reduction Goals

Figure ES-3. Unincorporated Marin County Community Greenhouse Gas Reduction Goal

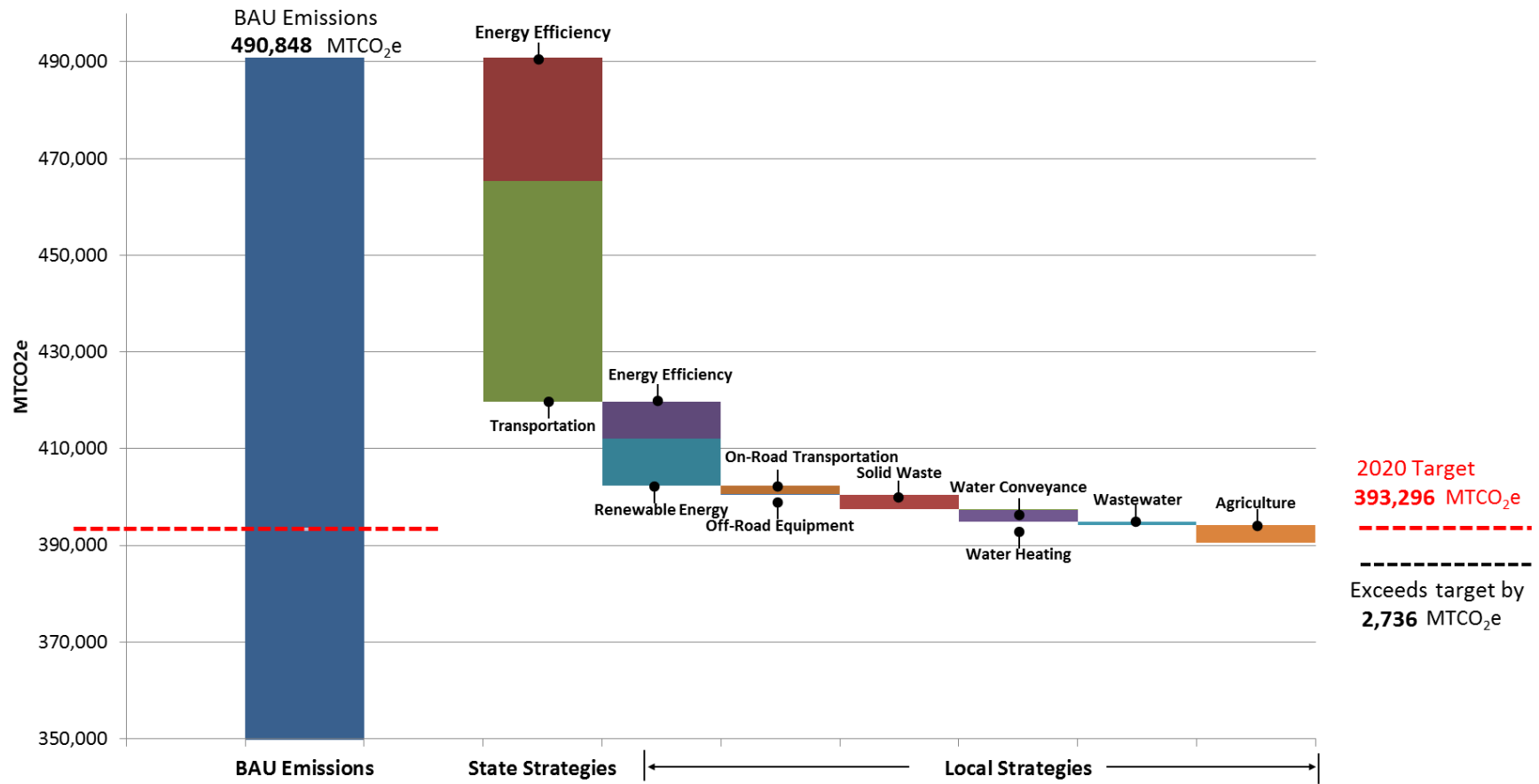
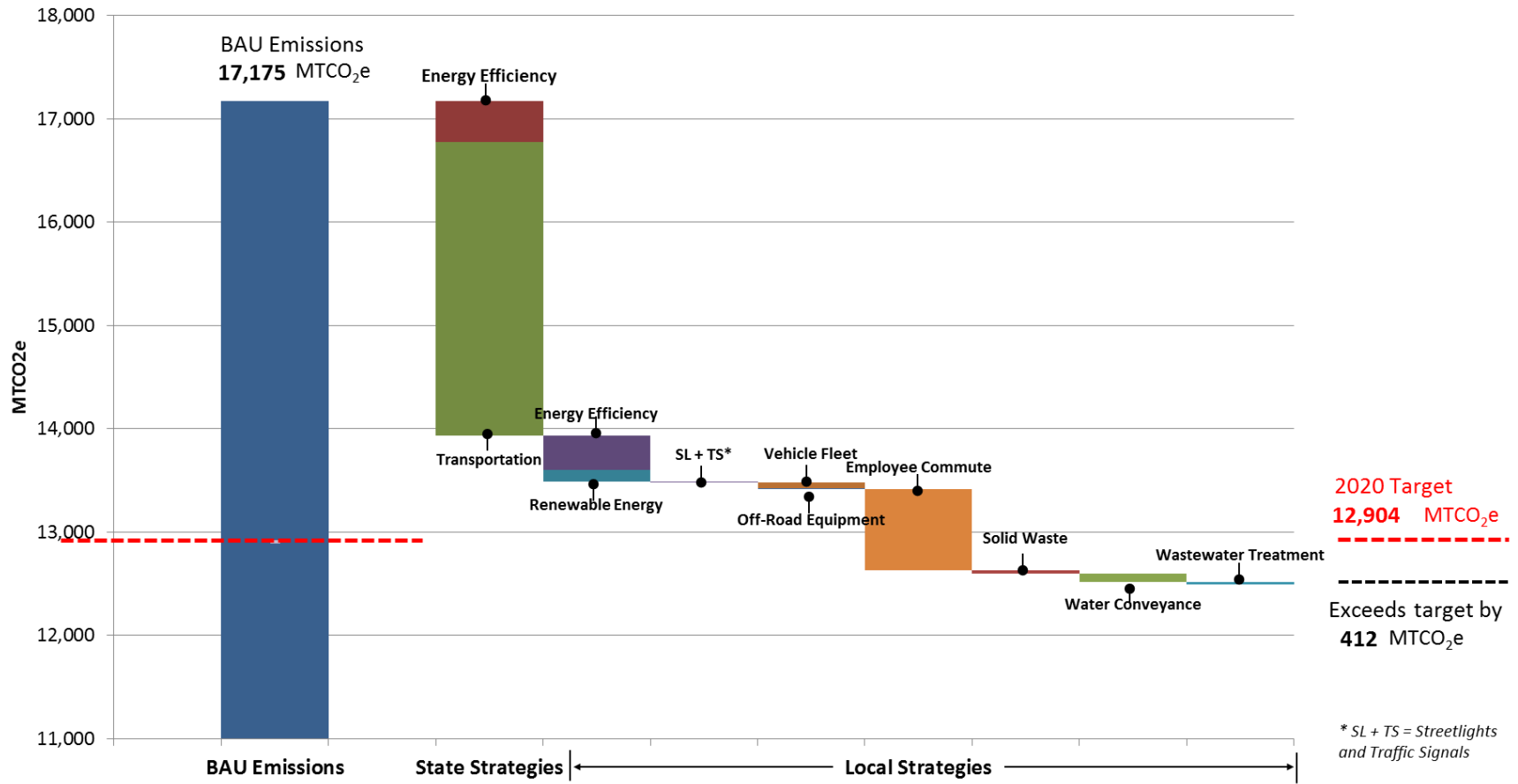


Figure ES-4. Unincorporated Marin County Municipal Greenhouse Gas Reduction Goal

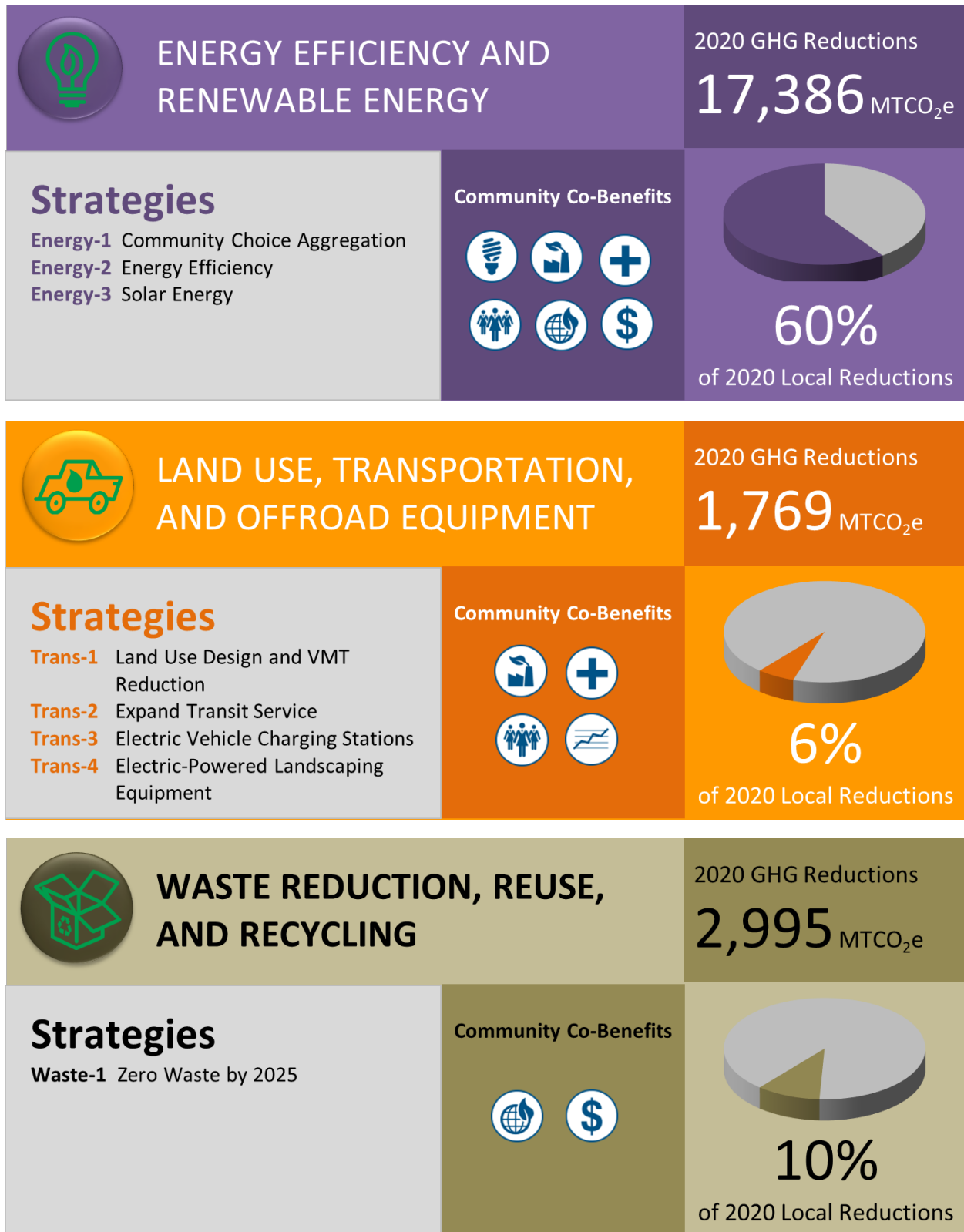


The following summaries for each strategy area include information on existing and continuing initiatives, estimated GHG reductions, potential community co-benefits, and the relevant CAP Update actions. Anticipated community co-benefits are presented in Figure ES-5.

Figure ES-5. Community Co-Benefits



Community Actions





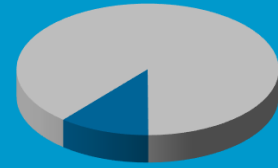
WATER CONSERVATION AND WASTEWATER TREATMENT

2020 GHG Reductions
3,256 MTCO₂e

Strategies

- Water/Wastewater-1** Water Conservation
- Water/Wastewater-2** Increase Pump Efficiency
- Water/Wastewater-3** Reduce Wastewater Generation

Community Co-Benefits



11%

of 2020 Local Reductions



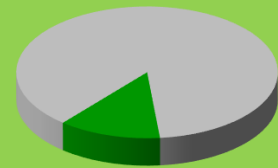
AGRICULTURE

2020 GHG Reductions
3,691 MTCO₂e

Strategies

- Agriculture-1** Methane Capture and Energy Generation at Dairies
- Agriculture-2** Carbon Farming (not included in reduction total)
- Agriculture-3** Promote the Sale of Locally Grown foods and/or products

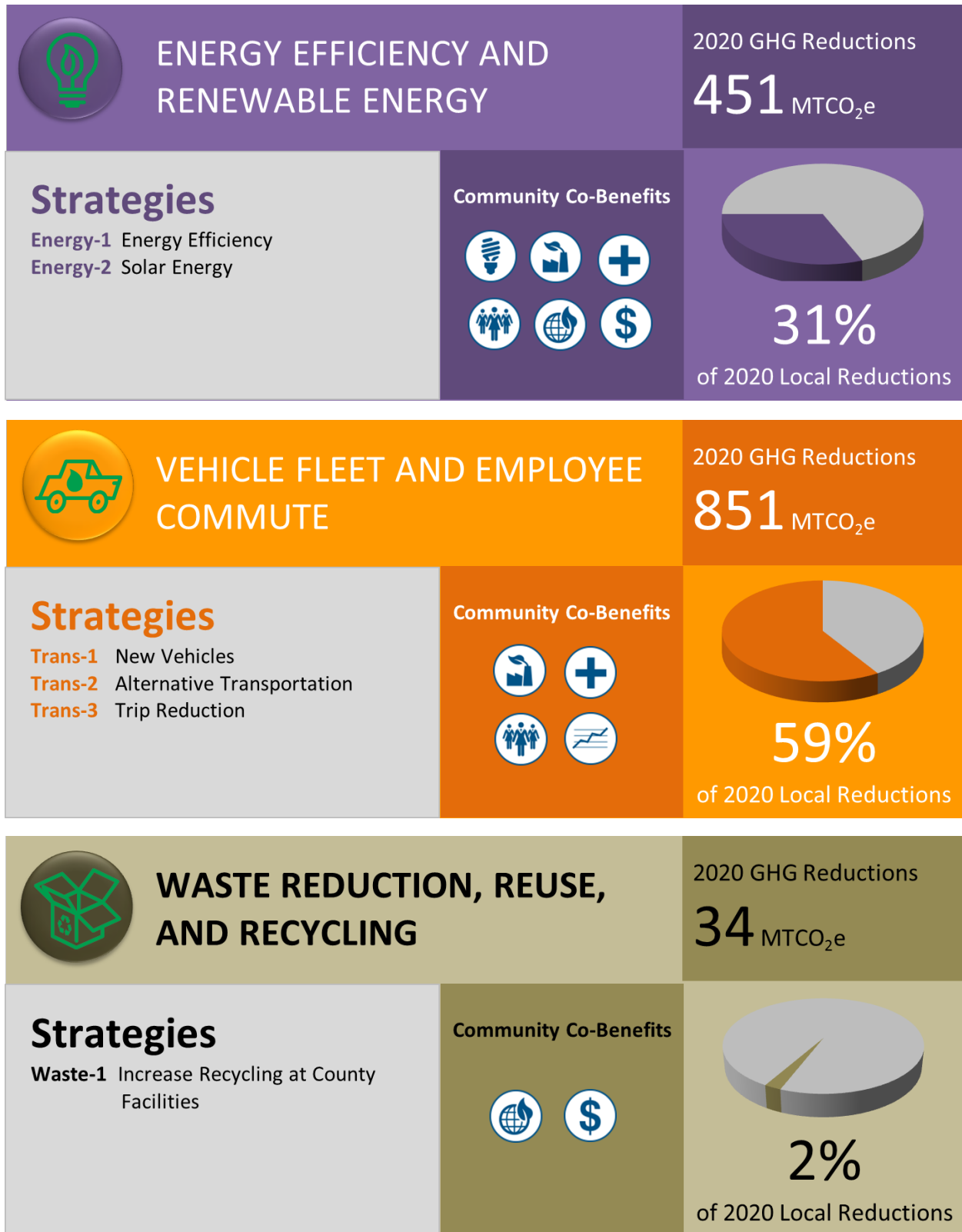
Community Co-Benefits



13%

of 2020 Local Reductions

Municipal Actions






Summary of Strategies

The following tables present a list of the GHG reduction strategies and their overall goals/targets.

Table ES-3. Summary of Community Emissions Reduction Strategies

Strategy Area	Local Strategy	Target/Goal
 <p>ENERGY EFFICIENCY AND RENEWABLE ENERGY</p>	Energy-1. Community Choice Aggregation	Increase participation in the Deep Green program from 1% to 5%
	Energy-2. Energy Efficiency	
	Energy-2.1. Community Energy Efficiency Retrofits	All existing energy retrofit programs
	Energy-2.2. Expand Community Energy Efficiency Retrofits Program	Existing buildings will be retrofit as follow: <ul style="list-style-type: none"> • 20% of existing single-family homes • 20% of existing multi-family homes • 15% of existing nonresidential buildings
	Energy-2.3. Shade Tree Planting	Plant at least 310 shade trees per year
	Energy-3. Solar Energy	
	Energy-3.1. Solar Installations for New Residential Development	Install solar on 20% of new residential buildings
	Energy-3.2. Solar Installations for New Nonresidential Development	Install solar on 20% of new nonresidential buildings
	Energy-3.3. Solar Installations for Existing Residential Development	Install solar on 20% of existing residential buildings
	Energy-3.4. Solar Installations for Existing Nonresidential Development	Install solar on 15% of existing nonresidential buildings








Strategy Area	Local Strategy	Target/Goal
 LAND USE AND TRANSPORTATION	Trans-1. Land Use Design and VMT Reduction	
	Trans-1.1 Promote Mixed-Use, Infill, and Transit-Oriented Developments	Promote longstanding Countywide Plan growth control strategy of focusing new development in the city center corridor through mixed-use, infill, and transit-oriented developments in downtown neighborhoods, transit-hubs, and transit corridors
	Trans-1.2. Vehicle miles traveled (VMT) Reduction Monitoring and Implementation and Transportation Demand Management Program	Require performance thresholds for reducing the VMT 20% below BAU levels in new developments
	Trans-1.3. Transportation Marketing	Implement marketing strategies to reduce commute trips
	Trans-2. Expand Transit Service	Expand local and regional bus service in range and/or frequency where service expansion would result in higher bus occupancy and lower GHG emissions per passenger mile than for average passenger vehicles.
	Trans-3. Electric Vehicle Charging Stations	Install 20 new electric vehicle (EV) charging stations by 2020
	Trans-4. Electric-Powered Landscaping Equipment	10% of landscaping equipment will be electric- or battery-powered
 WASTE REDUCTION, REUSE, AND RECYCLING	Waste-1. Zero Waste by 2025	Divert from landfills at least 83% of waste generated in the county overall by 2020
 WATER CONSERVATION AND WASTEWATER TREATMENT	Water/Wastewater-1. Water Conservation	
	Water/Wastewater-1.1. Senate Bill X7-7	20% reduction in urban per capita use
	Water/Wastewater-1.2. Additional Water Conservation for New Construction	Require adoption of the voluntary CALGreen Tier 1 water efficiency measures for new residential and nonresidential construction
	Water/Wastewater-1.3. Additional Water Conservation for Existing Buildings	Encourage existing buildings to adopt voluntary CALGreen Tier 1 water efficiency measures
	Water/Wastewater-2. Increase Pump Efficiency	10% reduction in water-related energy use by 2020
	Water/Wastewater-3. Reduce Wastewater Generation	Reduce residential wastewater generation by at least 15% and nonresidential wastewater generation by at least 10%
 AGRICULTURE	Agriculture-1. Methane Capture and Energy Generation at Dairies	Encourage the installation of methane digesters to capture methane emissions from the decomposition of manure. Capture 50% of methane emissions from 20% of all cows
	Agriculture-2. Carbon Farming	Support voluntary efforts of Marin County farmers and ranchers to increase soil carbon through sustainable farming practices.
	Agriculture-3. Promote the Sale of Locally Grown Foods and/or Products	Support local farmer's markets and school and community gardens to support local sustainable agricultural practices.

Table ES-4. Summary of Municipal Emissions Reduction Strategies

Strategy Area	Local Strategy	Target / Goal
 <p>ENERGY EFFICIENCY AND RENEWABLE ENERGY</p>	Energy-1. Energy Efficiency	
	Energy-1.1. Energy Efficiency Measures for the New Emergency Operations Facility	Save 1.17 million kilowatt hours and 812 therms at the EOF Facility
	Energy-1.2. Existing Building Retrofit Program	Reduce electricity use by 5% through retrofits of existing County buildings
	Energy-1.3. Energy Efficiency Measures for County-Owned Computers and Printers	<ul style="list-style-type: none"> replace 100 traditional desktop or laptop computers with tablets replace 50 printers with EnergyStar printers
	Energy-1.4. Computer Energy Management	Use Verdiem software (or other similar software) to reduce energy consumption in computers
	Energy-1.5. Shade Tree Planting	Plant 10 new shade trees each year
	Energy-1.6. Install Energy-Efficient Street Lights	Require that all streetlights use LED bulbs. Install light meters on streetlights at key distribution points
	Energy-2. Solar Energy	
	Energy-2.1. Install Solar Panels on Municipal Facilities	Install solar on municipal facilities by aiming to provide 1.1% of all 2012 electricity consumed by County buildings and properties by 2020
	Energy-2.2. Solar Panel Carports and Parking Areas ^b	Install solar panels over carports and parking areas (the equivalent of 200 parking spaces)
VEHICLE FLEET AND EMPLOYEE COMMUTE	Trans-1. New Vehicles	
	Trans-1.1. Purchase Fuel-Efficient (e.g., hybrid) and/or Smaller Fleet Vehicles to Replace Existing Fleet Vehicles	Replace 25 County-owned traditional-fueled vehicles (passenger/light-duty, medium-duty, and heavy-duty vehicles) with the most efficient vehicles (hybrid, compressed natural gas, or diesel) available
	Trans-1.2. Electric Vehicles	Replace 20 non-emergency gasoline-powered sedans with electric vehicles
	Trans-1.3. Electric Landscaping Equipment	Replace 10 pieces of County landscaping equipment with electric equipment
	Trans-2. Alternative Transportation	
	Trans-2.1. Guaranteed Ride Home	Provide a free shuttle or taxi ride home to employees in case of an emergency
	Trans-2.2. Green Commute Program	Reestablish the County's Green Commute Program
	Trans-2.3. Electric Vehicle Charging Stations	Install 10 new EV charging stations at County facilities by 2020
	Trans-3. Trip Reduction	
	Trans-3.1. Encourage Telecommuting by Municipal Employees	Update telework policies and practices for employees
Trans-3.2. Municipal Parking Management	Implement a Municipal Parking Management Program to discourage private vehicle use; implement a \$1.00 parking price for employees at selected County facilities	

Strategy Area	Local Strategy	Target / Goal
 WASTE REDUCTION, REUSE, AND RECYCLING	Waste-1. Increase Recycling at County Facilities	Increase the recycling rate at County facilities: <ul style="list-style-type: none"> • Civic Center – 83% • County Jail – 83% • 120 North Redwood – 83% • Kerner Campus – 83% • Marin County Fair – 95% • Marin Home Show – 95%
	 WATER CONSERVATION AND WASTEWATER TREATMENT	Water/Wastewater-1. Water Conservation
	Water/Wastewater-1.1. Water Conservation for Existing Buildings	Require a 10% savings in indoor and outdoor water use for existing buildings
	Water/Wastewater-1.2. Irrigation Monitoring and Management System	Install a water monitoring and management system for all of the County's irrigation needs

Implementation Program

The county faces many challenges—and correspondingly many opportunities—as it moves to reduce GHG emissions. Establishing a realistic and effective management program is necessary to ensure the CAP Update meets its GHG reduction objectives and is implemented in a timely and efficient manner. The County's Sustainability Team will lead and coordinate the County's efforts on implementing, monitoring, and managing the emissions reduction strategies. Composed of County staff, the Sustainability Team will be responsible for updating and adaptively managing the CAP Update.

Involvement from residents, businesses and County departments is integral to the success of the CAP Update, particularly because several strategies depend on voluntary commitment. Community members will incur some costs of implementing the emissions reduction strategies, although the County will help identify funding opportunities and resources to reduce monetary burdens on the private sector. The County will also develop a detailed community outreach and education plan to leverage community involvement, interests, and perspectives. The County will encourage and seek public participation in the implementation process. The County will reach out to vulnerable populations and make sure that a diversity of voices is heard and included in planning efforts for emission reductions and adaptation. The County will invest in grassroots education and training programs for the public, such as the Shore Up Marin partnership.⁵

Following adoption of the CAP Update, the emissions reduction strategies will be implemented to ensure the County's 2020 emissions reduction targets are achieved. Beginning in 2015, strategies will be prioritized for implementation based on several factors including cost effectiveness, emissions reduction efficacy, and general benefits to the community. Specific timelines and milestones for each strategy will be developed by the Sustainability Team (through consultation with various agencies, regional partners, community organizations, etc.) early in the implementation process.

⁵ Shore Up Marin is a partnership founded by Earth Day Marin, the Canal Welcome Center, Marin Grassroots, and GreenUp Learning. The mission is to support a diverse coalition of Marin residents across race, class, and other differences and advocate for equitable responses to climate change and sea level rise. More information is available here: <http://earthdaymarin.org/ShoreUpMarin.html>.

During each year of implementation, the County will monitor emissions reductions achieved by the state and local strategies. Data collected by routine monitoring will document the County's progress in reducing emissions and enable the County to make informed decisions on future priorities, funding, and scheduling. The County will monitor and track emission reduction progress, using tools that will allow for easy communication with the public. For example, In January 2015, the Marin Climate and Energy Partnership launched a new website to help track the climate efforts of Marin County jurisdictions over time.⁶ The County will also update the Community and Municipal Inventories, first in 2017 and again in 2019, to measure overall emissions trends in the community. The updated inventories will be submitted to the Board of Supervisors and distributed to the public for review. As the year 2020 approaches, the County will develop reduction targets for years beyond 2020 to continue the County's commitment to reducing GHG emissions.

Adaptation Plan

Adaptation refers to reducing the impact of unavoidable climate change effects. Although Marin currently enjoys a relatively mild climate, climate change may exacerbate existing climate-related hazards in the county (such as increased incidence of flooding) or introduce new challenges (such as erosion or coastal and bayland flooding due to sea level rise). These climate change effects could have wide-ranging impacts across the county's various economic sectors. It is important that Marin County considers potential climate change vulnerabilities as it moves forward with other planning activities.

Current research efforts have shown that Marin County and the North Bay region have already experienced some changes in climate, including increases in temperature and precipitation. Projections indicate that temperatures will continue to increase (North Bay Climate Adaptation Initiative 2013a) and that the region will most likely experience a shift to drier summers and wetter winters, characterized by heavier rain events (North Bay Climate Adaptation Initiative 2013a), and there will be a rise in local sea levels (Cayan et al. 2008; Knowles 2010, State of California Ocean Protection Council 2013). Increases in temperature, changes in precipitation, and sea level rise could result in the increased frequency or intensity of certain climate hazards, including shifts in the water supply and demand, wildfires, extreme heat, and inland flooding. Section 7 of this report explores the impacts of these climate hazards, potential adaptation actions, and suggests key stakeholders to engage relative to the following sectors: water, natural heritage, transportation, agriculture, energy, and human health.

There are many adaptation efforts already under way in Marin County. The County has proven to be a leader in thinking about adaptation and taking action to increase resiliency of local resources. However, there has not been a consolidated look at the vulnerabilities of Marin County across sectors and climate change stressors. A more comprehensive, countywide vulnerability assessment would help highlight where resources should be focused under adaptation planning efforts. Furthermore, effective adaptation requires coordination across many different stakeholders within a county, and a "big picture" understanding of the sectors and geographic locations that are most vulnerable would help demonstrate where coordination and collaboration are most needed.

⁶ For more information, please see: <http://www.marintracker.org/>

Funding Acknowledgement

Funding for the CAP Update was provided in part by the Marin County Energy Watch (MCEW), a joint project of Pacific Gas and Electric (PG&E) and the County of Marin.⁷ MCEW provides resources and incentives to residents, businesses, and public agencies to increase energy efficiency. All public agencies, business, and residences in the county who are PG&E or Marin Clean Energy customers can participate.

⁷ MCEW is funded by California utility ratepayers under the auspices of the California Public Utilities Commission.