Chapter 4
Community Greenhouse Gas Reduction Goals and Measures

Photo: Jeanne Miche

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4.1 Introduction

The CAP Update includes a variety of regulatory, incentive-based and voluntary strategies that will reduce emissions from both existing and new development in Marin County. Several of the CAP Update strategies build on existing County programs, whereas others provide new opportunities to address climate change. Statewide sustainability efforts will have a substantial impact on future GHG emissions. Local strategies adopted by the County will supplement these state programs and achieve additional GHG emissions reductions. Successful implementation of the local strategies will rely on the combined participation of County staff along with County residents, businesses, and community leaders.

The following sections summarize the state and local strategies included in the CAP Update for Community emissions. Estimated emissions reductions achieved by the CAP Update are presented, indicating that the County will meet and exceed its 2020 Community Emissions Reduction Target. Costs, savings, and community co-benefits are also described. Please refer to Appendix C for additional information on each strategy, including detailed objectives and assumptions used to quantify emissions reductions and costs.

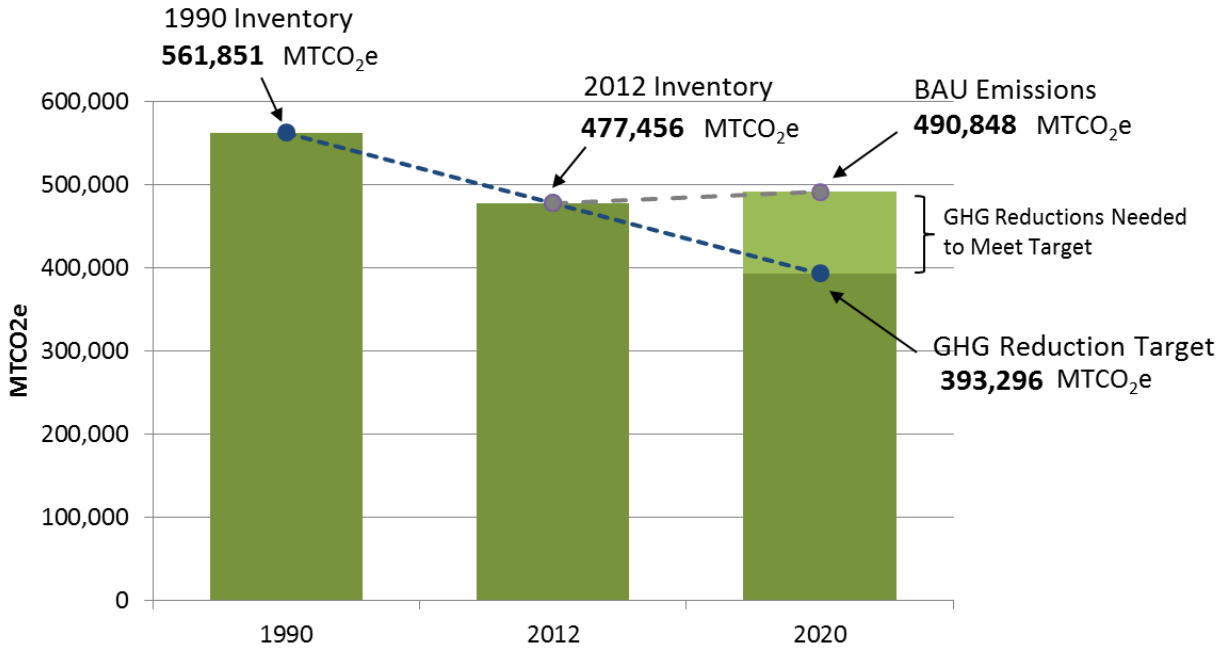
4.2 Marin County Greenhouse Gas Reduction Goals

Establishing a reduction target that is both practical and ambitious is important for guiding future actions that not only contribute to GHG reductions, but also strengthen the community as a whole. In the 2006 GHG Reduction Plan, the County adopted an emissions reduction target for community emissions of 15% below 1990 levels by 2020. From 1990 to 2012, community emissions have been reduced by 15% below 1990 levels. To continue Marin County's progress on reducing emissions and help the County progress toward potential future state targets, this CAP Update sets a new community emissions target for 2020: 30% below 1990 emissions. This target reflects the County's commitment to implement achievable emissions reductions on a timescale that is consistent with major statewide climate change legislation. Meeting the target will depend on a combination of state and local policies, as well as the participation of local residents and businesses. Achieving this goal would avoid the generation of approximately 97,000 $MTCO_2e$ and reduce 2020 Community GHG emissions to approximately 393,000 $MTCO_2e$ from 490,848 $MTCO_2e$ under the BAU scenario. The strategies outlined this chapter represent a combination of local and state initiatives that will collectively lower future community GHG emissions in the county consistent with the County's reduction target (see Figure 4-1).

The County's 2020 emissions reduction target exceeds statewide goals established by AB 32, which commits to reducing statewide GHG emissions to 1990 levels by 2020. The AB 32 Scoping Plan provides a roadmap for achieving these reductions and recommends a complementary reduction goal for local governments of 15% below current emissions levels, which is roughly equivalent to

1990 emissions levels. The County's community emissions reduction target is 30% below 1990 emissions levels—a far more aggressive target than AB 32. 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 the year 2050. In order to reach this target for 2050, the state will have to go above and beyond what is included in the AB 32 Scoping Plan for 2020. Marin County is attempting to get ahead of the curve and be on-track to meet the S-03-05 statewide target for 2050 by adopting an aggressive community target.

Figure 4-1. Marin County 2020 Community Emissions Reduction Goals



Community Emissions Reductions in Context

Implementation of the CAP Update would avoid the generation of more than 100,000 $MTCO_2e$ for the community, which is equivalent to the following actions (U.S. Environmental Protection Agency 2014a):

- Removing more than 21,000 passenger vehicles from the road each year (assuming average fuel efficiency of 21.4 mpg and 11,318 miles driven per year);
- Reducing gasoline consumption by more than 11 million gallons per year; and
- Providing renewable energy to power over 9,000 homes each year (assuming the average home consumes 12,069 kWh of electricity and 52,372 cubic feet of natural gas per year).

4.3 Climate Action Plan Framework

4.3.1 Reduction Measures

The CAP Update comprises a variety of state and local actions to reduce GHG emissions within the unincorporated areas. Statewide efforts to reduce GHG emissions are a fundamental part of the County's CAP Update. For example, the state's Renewables Portfolio Standard (RPS) will reduce the carbon content of electricity throughout the state, including in Marin County. Electricity provided to the County will therefore be cleaner and less GHG intensive than if the RPS had not been established. The CAP Update includes the local impact of seven state actions to reduce GHG emissions, as discussed further in Section 4.5.1.

The County has identified 15 local community actions to supplement the 7 statewide initiatives. Although identified individually in the CAP Update, these actions will be implemented together as part of a comprehensive GHG emissions reduction program. The local strategies align with the goals and policies outlined in the *Marin Countywide Plan* and are grouped into five strategy areas.

- Energy Efficiency and Renewable Energy.
- Land Use, Transportation, and Off-Road Equipment.
- Waste Reduction, Reuse, and Recycling.
- Water Conservation and Wastewater Treatment.
- Agriculture.

Coordinating GHG reduction programs will streamline CAP implementation and potentially boost GHG reduction outcomes through synergies created among measures. See Chapter 7, *Greenhouse Gas Reduction Measure Implementation Program*, and Appendix C for implementation details.

The majority of the local actions include voluntary, incentive-based programs that will reduce emissions from both existing and new development in the county. Several other actions will be implemented by the County or other agencies within the region. A small subset of actions will establish mandates for development, either pursuant to state regulations or through existing County programs. Together, the CAP Update actions will improve building energy efficiency and renewable energy production, increase alternative modes of transportation, enhance open spaces, and reduce water consumption and waste generation. The actions were selected following a comprehensive review of candidate strategies recommended by the California Attorney General, California Air Pollution Control Officers Association (CAPCOA), existing CAPs throughout California, and the *Marin Countywide Plan*.

A number of the actions build on existing County programs, whereas others provide new opportunities to address climate change. Successful implementation of these actions will require commitment and dedication from the County, its various departments, and its residents. As discussed in Chapter 7, *Greenhouse Gas Reduction Measure Implementation Program*, the County will adaptively manage the implementation of the CAP Update to maximize GHG reductions and operational efficiency for each action. Accordingly, the County may revise actions or add new actions to ensure that the County achieves its 2020 Community Emissions Reduction Target. If adopted and implemented prior to 2020, new federal programs that achieve local GHG reductions beyond state and local mandates may also be added to the County's CAP Update.

The County will develop and lead the implementation of the majority of the 13 local actions. However, for a few of the CAP Update actions, another local agency, such as operators of water treatment facilities, will have primary responsibility for measure development. The County anticipates supporting the lead entities for these actions, as needed, to identify targets and other strategies for implementation. Despite the County's supporting role, these actions are considered a critical component of a comprehensive CAP, as many of the actions build upon and expand existing programs. Please refer to Chapter 7, *Greenhouse Gas Reduction Measure Implementation Program*, and Appendix C for additional information on lead entities for each action.

4.3.2 Emissions Reductions

Emissions reductions for 2020 are estimated for many state and local strategies. Strategies that do not currently support a quantitative reduction analysis are provided as supporting measures that strengthen the quantified measures (see Appendix C). Although emissions reductions have not been quantified for these strategies, they are still an important part of the CAP Update and ensure a comprehensive approach to climate action planning. Further development and implementation of these strategies may result in sufficient data to quantify the GHG reductions in the future. Please refer to Appendix C for additional information on emission reduction quantification methods.

4.3.3 Cost–Effectiveness Analysis

Private residents, businesses, utilities, and other public sector agencies will incur some costs to implement the GHG reduction strategies included in the CAP Update. In some cases, these entities will also realize long-term savings that can help recoup their initial investments. Costs and savings that would be incurred by residents and businesses were quantified for the local emissions reduction strategies. Economic effects are based on the best available data at the time of the CAP Update and represent total annual costs and savings in 2020. Costs and savings for strategies that do not currently support a quantitative analysis are assessed qualitatively.

Cost-Effectiveness Terms Explained

Cost per MT CO_2e: This is the ratio of the net cost of the strategy to the GHG reduction achieved. For this analysis, net costs are annualized, consistent with the GHG reductions achieved in 2020. The approach adjusts for the significant variation in the lifetime of an individual GHG reduction strategy (e.g., from energy-efficient household appliances that last 10 years to solar panels that could last up to 25 years), as well as variations in capital costs and annual cost savings. A negative cost per ton indicates measures that result in net savings.

Simple payback period: The simple payback period represents the estimated number of years before the initial investment is repaid. It is estimated by dividing the total initial capital cost by the annual cost savings.

Net present value: Net present value (NPV) represents the current worth of a stream of costs and savings over the entire lifetime of the GHG reduction measure. To estimate current worth (or "present value"), future costs and savings are discounted to account for interest-earning potential and other considerations. A positive NPV indicates that a measure is cost-saving over its lifetime.

Monetary costs and savings were estimated using information specific to the county, when available, or for similar cities in the region, California, or United States, prioritized in that order. The majority of data was from public sources, including the California Public Utilities Commission, PG&E, United States Department of Energy, California Energy Commission, and EPA. Some cost data were also

based on price quotes provided from suppliers serving the northern California region. Costs estimated include initial capital cost and programmatic costs, whereas savings include reduced costs associated with electricity, natural gas, fuel usage, and required maintenance. Ranges were provided for most strategies due to the uncertainties and variability associated with estimating project costs. In general, ranges reflect differences in price estimates for technologies, based on the use of multiple data sources.

The following metrics are considered in the economic analysis and are reported in Appendix C: net present value (NPV), cost per $MTCO_2e$, and simple payback period. Please refer to Appendix C for cost information and additional information on cost quantification methods.

It is important to note that the cost-effectiveness analysis is reporting financial costs or benefits per ton of $MTCO_2e$ reduced and does not include the full economic/social costs. Since it is commonly recognized that the long-term economic/social costs of GHG emissions are not captured in energy prices or other prices for goods and services, the financial analysis is only telling part of the story. These long-term economic/social costs are commonly referred to as the "social cost of carbon." The social cost of carbon is an estimate of climate change damages and includes changes in net agricultural productivity, human health, property damages from increased flood risk, and changes in energy system costs, such as reduced costs for heating and increased costs for air conditioning. However, given current modeling and data limitations, it does not include all important damages. The USEPA's current estimate (in $2014) of the social cost of carbon, depending on the discount rate and statistic used ranges from approximately $12/$MTCO_2e$ to $117/$MTCO_2e$ for 2012 and between $29/$MTCO_2e$ to $240/$MTCO_2e$ for 2050.[22] If these long-term social costs of carbon were included in the financial analysis, then many of the measures would show greater net savings and/or lower net costs.

4.3.4 Community Co-Benefits

Implementing the CAP Update will result in environmental and community benefits that supplement the expected GHG emission reductions. For example, many of the actions will reduce criteria air pollutants in the county, including ozone, carbon monoxide, and fine particulates, which will improve public health. Measures to improve mobility and alternative modes of transportation will enhance walkability and mobility throughout the community. Active transport, like walking and biking, has been shown to substantially lower the burden of disease. These strategies can also complement and encourage other, more sustainable modes of transportation, including public transit (Maizlish et al. 2011).

Several actions directly target resource efficiency within the county. Building energy and transportation actions will reduce electricity, natural gas, and gasoline usage, which may help lessen consumer sensitivity to increases in future energy prices. Reducing gasoline consumption has an additional benefit of reducing dependence on foreign oil supplies. Recycling and waste diversion programs will also reduce material consumption and the need for landfill space. Water efficiency improvements and land use measures will conserve natural resources and the long-term viability of the County's natural spaces. Open spaces may also offer aesthetic and recreational benefits for community members, as well as habitat for native wildlife and plants.

[22] See http://www.epa.gov/climatechange/EPAactivities/economics/scc.html.

The combined implementation of the CAP Update actions provides an opportunity to lower carbon emissions and achieve a diverse suite of community co-benefits. Section 4.4 provides additional information on the relevant co-benefits for each community CAP strategy area.

Anticipated community co-benefits associated with the CAP Update are listed in Figure 4-2.

Figure 4-2. Community Co-Benefits

4.4 Meeting Marin County's Greenhouse Gas Reduction Goals

Combined, the state and local strategies included in the CAP Update are expected to reduce 2020 community-wide GHG emissions by approximately 100,000 $MTCO_2e$, which exceeds the 2020 Community Emissions Reduction Target by nearly 3,000 $MTCO_2e$. This is equivalent to removing more than 21,000 passenger vehicles from the road each year (U.S. Environmental Protection Agency 2014a). As shown in Table 4-1, the majority (71%) of emissions reductions are achieved by state programs, such as the Pavley standards and RPS,[23] which is typical of other CAPs throughout

[23] Pavley will reduce GHG emissions from automobiles and light-duty trucks (2009 model years and newer) by 30% from 2002 levels by the year 2016. The RPS obligates certain utilities and electric-service providers to procure at least 33% of retail sales from renewable resources by 2020.

California. Local strategies implemented by the County supplement reductions achieved by the state programs to help meet and exceed the reduction target. Strategies not currently quantified, as well as local effects of the state's cap-and-trade program, will likely contribute additional reductions beyond those estimated by the CAP Update.

Table 4-1. Achieving Marin County's 2020 Community Greenhouse Gas Reduction Target—Sector View

Parameter	Emissions ($MTCO_2e$)
2020 BAU Community GHG Emissions Forecast[a]	490,848
2020 Community Emissions Reduction Target (30% below 1990 levels)[b]	393,296
Total Reductions Needed to Reach Target	***97,552***
2020 Emissions Reductions from State Strategies	71,192
2020 Emissions Reductions from Local Strategies	29,097
Energy Efficiency and Renewable Energy	17,386
Land Use, Transportation, and Off-Road Equipment	1,769
Waste Reduction, Reuse, and Recycling	2,995
Water Conservation and Wastewater Treatment[c]	3,256
Agriculture[d]	3,961
$Total_2$ Emissions Reductions Achieved by the CAP Update	***100,289***
Emissions Reductions in Excess of Target ($Total_2$ minus $Total_1$)	2,736

Notes:

BAU = business as usual.

$MTCO_2e$ = metric tons of carbon dioxide equivalent.

[a] 2020 BAU emissions do not include stationary sources.

[b] Total GHG emissions in 1990 were 561,851 $MTCO_2e$; an 30% reduction equals 393,296 $MTCO_2e$.

[c] Water conveyance measures result in water efficiency improvements to reduce water consumption, which will contribute to reductions in building energy use. For example, efficient faucets that use less water will require less energy for hot water heating. Most of the reductions achieved by Water-1 are associated with reduced hot water heating.

[d] As discussed in Chapter 6, this total includes only quantified reductions from Agriculture-1, which focused on methane digesters. Potential reductions from Agriculture-2 (carbon farming) are not included or relied upon to meet the reduction target for the reasons described in Chapter 6.

Table 4-2 summarizes the community CAP Update strategies, including their estimated GHG reduction in 2020. Many of the local strategies are cost effective, particularly those that target energy efficiency and renewable energy (see Appendix C for details). In addition to reducing GHG emissions, all local strategies will result in community co-benefits, such as improved public health, resource conservation, and better air quality.

Table 4-2. Summary of 2020 Greenhouse Gas Emissions Reductions by Community Measure ($MTCO_2e$)

State Strategy		2020 GHG Reduction	% Total of Reductions	Co-Benefits[a]
State-1. Renewables Portfolio Standard		17,512	17%	
State-2. Title 24 Standards for Commercial and Residential Buildings		1,362	1%	
State-3. Lighting Efficiency and Toxics Reduction Act		6,419	6%	
State-4. Residential Solar Water Heaters		178	0.2%	
State-5. Pavley and Low Carbon Fuel Standard		42,920	43%	
State-6. Advanced Clean Cars		2,226	2%	
State-7. Assembly Bill 32 Vehicle Efficiency Measures		574	0.6%	
Strategy Area	**Local Strategy**	**2020 GHG Reduction**	**% Total of Reductions**	
ENERGY EFFICIENCY AND RENEWABLE ENERGY	Energy-1. Community Choice Aggregation	2,744	3%	
	Energy-2. Energy Efficiency	7,548	8%	
	Energy-3. Solar Energy	7,093	7%	
LAND USE, TRANSPORTATION, AND OFF-ROAD EQUIPMENT	Trans-1. Land Use Design and VMT Reduction	1,554	2%	
	Trans-2. Expand Transit Service	116	0.1%	
	Trans-3. Electric Vehicle Charging Stations	15	0.01%	
	Trans-4. Electric-Powered Landscaping Equipment	84	0.1%	
WASTE REDUCTION, REUSE, AND RECYCLING	Waste-1. Zero Waste by 2025	2,995	3%	
WATER CONSERVATION AND WASTEWATER TREATMENT	Water/Wastewater-1. Water Conservation	1,187	1%	
	Water/Wastewater -2. Increase Pump Efficiency	105	0.1%	
	Wastewater/Wastewater-3. Reduce Wastewater Generation	1,964	2%	
AGRICULTURE	Agriculture-1. Methane Capture and Energy Generation at Dairies	3,691	4%	
	Agriculture-2. Carbon Farming	Not relied upon to meet target (see Chapter 6)		
	Agriculture-3. Promote the Sale of Locally Grown Foods and/or Products	Not quantified		

Notes:
[a] See Figure 4-2 for the key to the co-benefits symbols.

4.5 Measures to Reduce Greenhouse Gas Emissions

4.5.1 State Programs

Programs and initiatives undertaken by the state will contribute to local emissions reductions within the county. For example, the state's RPS will reduce the carbon content of electricity through requirements for increased renewable energy. Renewable resources, such as wind and solar power, produce electricity, just like coal and other traditional sources, but do not emit any GHGs. By generating a greater amount of energy through renewable resources, electricity provided to the County will be cleaner and less GHG-intensive than if the state had not required the RPS.

Seven statewide initiatives will contribute to community emissions reductions. The majority of emissions reductions are gained from building energy efficiency standards and renewable energy generation requirements. For example, Title 24 standards for new residential and nonresidential buildings require building shells and components be designed to conserve energy and water. Additional GHG reductions will be achieved by statewide initiatives to improve vehicle fuel efficiency and reduce the carbon intensity of transportation fuels.

4.5.2 Local Measures

4.5.2.1 Energy Efficiency and Renewable Energy

Residential and nonresidential buildings within the county consume over 350 gigawatt-hours of electricity and 18.5 million therms of natural gas annually. Resources used to generate electricity, as well as the direct combustion of natural gas in buildings, emitted more than 165,000 $MTCO_2e$ in 2012, making building energy use the largest source of community emissions (about 35%). Increases in population and employment, along with rising temperatures and cooling demands, will increase building energy use and associated GHG emissions in the future. By 2020, building energy emissions are forecast to exceed 175,000 $MTCO_2e$ and represent over 36% of total community emissions.

The CAP Update includes strategies that target both energy efficiency and renewable energy generation. Energy efficiency strategies reduce actual building energy consumption through efficient design, whereas renewable energy strategies directly reduce carbon emissions from electricity generation. Energy efficiency and renewable energy strategies both have upfront costs, but they usually result in long-term savings through reduced utility bills. The building energy strategies also achieve a diverse suite of community co-benefits, including reduced regional non-GHG pollutant emissions (such as carbon monoxide, nitrogen oxides, and particulate matter), improved home values, enhanced energy security, and job creation.

One strategy is focused on increasing the renewable portion of the County's energy mix. Energy-1, *Community Choice Aggregation*, represents Marin Clean Energy's growth and expansion to new County customers. As Marin Clean Energy obtains new customers for both its Light Green (50% renewable) and Deep Green (100% renewable) electricity options, building energy emissions in the county will decrease.

The building energy strategies include a combination of regulatory and incentive-based approaches to reduce GHG emissions. Most of the strategies provide incentives to encourage voluntary improvements in energy efficiency and increased renewable energy generation. For example,

Energy-2, *Energy Efficiency,* includes residential and nonresidential energy efficiency improvements in existing buildings. These strategies will reduce building energy consumption by providing rebates, low-interest financing, and other support for homeowners and businesses that can be used to complete energy efficiency retrofits. Similar support will be provided through Energy-3, *Solar Energy,* which promotes solar energy installations in both existing and new buildings. Public participation is essential to these incentive-based strategies.

In addition to voluntary and incentive-based approaches, the CAP Update includes strategies that establish new regulatory procedures for construction. For example, Energy-3, *Solar Power*, identifies solar installation requirements for a variety of land uses, including new single-family homes, and multi-family and commercial developments. The County will support project developers with implementation of this strategy by identifying grants and incentives and providing education and outreach.

4.5.2.2 Land Use, Transportation, and Off-Road Equipment

Vehicle trips made by residents and employees are expected to increase slightly as new housing units are developed, new businesses are created or expanded, and new services are provided. By 2020, GHG emissions generated by transportation activities are expected to exceed 167,000 $MTCO_2e$ and represent about 34% of the 2020 BAU Community Forecast.[24] Strategies to support alternative modes of transportation, improve transportation efficiency, and reduce VMT are therefore an essential part of the CAP Update. These strategies can also have far-reaching community co-benefits, including reduced formation of smog and toxic air containments. Alternative modes of transportation such as walking and biking may also help increase physical activity levels and improve public health.

The CAP Update includes four general strategies to reduce GHG emissions from on-road vehicles and off-road equipment (e.g., construction equipment). The CAP Update does not propose any new land use strategies or programs. All land use strategies are adapted from the approved Marin Countywide Plan. The CAP Update just quantifies these strategies (as feasible) in terms of GHG reductions.

The first strategy promotes reduced vehicle travel and improvements to the existing efficiency of the transportation network. Trans-1, *Land Use Design and VMT Reduction,* integrates a variety of actions such as promoting the longstanding Countywide Plan growth control strategy of focusing new development in the city-centered corridor; supporting regional carpool and vanpool programs; and implementing transportation demand management programs. This strategy directly targets land use patterns to allow appropriate densities and improve the diversity of new housing types (as noted above, the CAP Update does not propose any new land use strategies or programs). It will support shorter trips that can be accommodated by non-motorized and alternative transportation. Trans-1 will also reduce vehicle trips by encouraging ride-sharing and car-sharing programs along with employer-sponsored commuting programs.

[24] Per standard inventory forecast protocols, the 2020 BAU forecast only includes the assumed vehicle improvement over time due to the Low Emissions Vehicle (LEV) and Zero Emissions Vehicle (ZEV) initiatives from CARB that are reflected in the EMFAC 2011 model. The BAU forecast does not include any assumed improvement in the fuel efficiency of Marin's vehicle fleet due to the Pavley requirements (AB 1493) or the Advanced Clear Car Initiative, nor changes in fuel GHG intensity due to the Low Carbon Fuel Standard.

In addition to supporting smart land use and trip reduction, alternative transportation, Trans-2, *Public Transportation,* promotes an integrated bus transit transportation network that will support alternative forms of transportation and help reduce VMT. Under this strategy, the County will work with transit providers to identify where increases in transit service could be beneficial, will reduce GHG emissions, and be cost-effective for transit providers.[25]

The third strategy, Trans-3, *Electric Vehicles*, is to encourage the use of electric vehicles (EVs) in the county by installing 20 new EV charging stations by 2020. The availability of additional charging stations is expected to increase the purchase and use of EVs in Marin County.

The final strategy, Trans-4, *Off-Road Equipment*, is intended to reduce GHG emissions generated by off-road equipment. This strategy proposes an incentive program for electric landscaping equipment.

4.5.2.3 Waste Reduction, Reuse, and Recycling

In 2012, County residents and businesses generated an estimated 180,000 tons of waste, 46,000 tons of which is landfilled, generating about 9,300 $MTCO_2e$ in 2012 (about 2% of the total 2012 Community Inventory). Marin County has a comprehensive waste collection system that currently includes many recycling and composting programs. These programs are designed to reduce the amount of trash that is sent to regional landfills. The programs collectively divert about 75% of all waste generated to recycling centers and other end uses (Marin County Civil Grand Jury 2014).

The Marin Hazardous and Solid Waste JPA seeks to send zero tons of waste to landfills by the year 2025. This program is supported by the County's existing recycling programs, the food waste collection program, the construction and demolition (C&D) waste ordinance, the plastic bag ban, and the polystyrene ban. The County recognizes that residents and businesses will play a vital role in achieving the waste diversion goals. Accordingly, Waste-1, *Zero Waste by 2025,* outlines a number of local recycling and composting initiatives that the County will implement in conjunction with the Marin Hazardous and Solid Waste JPA. This strategy aims for an 83% target diversion rate by 2020 to support the 2025 zero waste goal. Increased outreach and education are important tools that the County will use to help encourage participation in recycling and diversion programs. The County will promote financing to support increased waste diversion, as well as provide food waste and other green waste receptacles at County facilities visited by the public.

4.5.2.4 Water Conservation and Wastewater Treatment

Water conveyance represents less than 1% of the County's 2012 Community Inventory. Although it is a relatively small component of the County's GHG portfolio, homes and businesses throughout the county consume a significant amount of water through indoor plumbing and outdoor irrigation. It is estimated that an average three-bedroom California home uses 174,000 gallons of water each year (ConSol 2010). Water resources are an important part of the Marin County community and economy—local surface and groundwater provide the majority of water to the county, which is supplied by several water agencies including the Marin Municipal Water District, North Marin Water District, and Stinson Beach County Water District. Given the potential for future reductions in water supplies as a result of climate change, Water Conservation and Wastewater Treatment is a critical strategy area for the CAP Update.

[25] Not all transit service expansions may result in net GHG reductions. For example, low ridership routes may provide non-vehicle populations with mobility options during off-peak hours, but may not result in net GHG reductions, whereas expansion of commute or other higher ridership routes can often result in net GHG reductions.

Wastewater treatment emissions represent about 1% of the County's 2012 Community Inventory. Wastewater treatment results in fugitive emissions of methane and nitrous oxide through the treatment process. Reducing potable water use will reduce the amount of wastewater generated by businesses and residents, which will reduce treatment-related GHG emissions.

The County has identified two strategies to enhance community water conservation and management. Water/Wastewater-1, *Water Conservation*, outlines strategies to reduce water consumption consistent with SB X7-7.[26] The strategy is supported by a number of *Marin Countywide Plan* policies, requires new development to achieve Tier 1 Voluntary CALGreen water efficiency standards, and encourages existing development to achieve the Tier 1 standards. This program may also incorporate free water audits in conjunction with the three local water providers. Water efficiency training, education, and outreach will also be provided. Water reductions achieved by Water/Wastewater-1 will not only help conserve water, but also contribute to building energy savings through reduced electricity and natural gas for hot water heating. Through Water/Wastewater-2, *Increase Pump Efficiency*, the County will work with water agencies to maximize water pump efficiency to achieve a 20% reduction in water pumping energy use by 2020.

The County has identified one strategy to reduce wastewater generation. Water conservation efforts can greatly decrease the need for wastewater treatment. Accordingly, Water/Wastewater-3, *Reduce Wastewater Generation,* endeavors to reduce residential and nonresidential wastewater generation by 10–15% by 2020. This would be supported by water conservation measures that seek to reduce indoor water use in buildings along with the County's Graywater Systems Ordinance. This program is also supported by a number of *Marin Countywide Plan* policies.

4.5.2.5 Agriculture

Agricultural reduction measures are discussed separately in Chapter 6.

[26] SB X7-7 requires urban water agencies throughout California to help achieve the statewide goal of a 20% per capita water use reduction by 2020.