

# 3. Reductions

Reducing Community Emissions

# Chapter 3

## Reducing Community Emissions

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### 3.1 Introduction

Climate Action 2020 (CA2020) identifies strategies that will reduce regional (countywide) greenhouse gas (GHG) emissions in the near term and put Sonoma County communities on track toward the long-term goals of reducing emissions by 40% below 1990 levels by 2030 and 80% below by 2050. The reduction measures identified in CA2020 support (and actually substantially exceed) the state's 2020 climate protection goals.

GHG reduction measures in CA2020 will be implemented at three levels.

- **State** measures adopted and implemented by state agencies, including statewide fuel efficiency standards and renewable portfolio standards for electricity generation.
- **Regional** measures implemented by cross-jurisdictional agencies like the Regional Climate Protection Authority (RCPA), Sonoma Clean Power (SCP), transit agencies, and waste management and water supply agencies.
- **Local** actions implemented by the cities and the County. These local measures include voluntary, incentive-based, and regulatory approaches.

This chapter explains how, through the implementation of more than 71 state, regional, and local reduction measures, Sonoma County communities can achieve the regional GHG reduction target of 25% below 1990 levels by 2020. Table 3-1 shows how this combination of state, regional, and local measures will meet the reduction target.

**Table 3-1. Achieving Sonoma County’s 2020 Greenhouse Gas Reduction Target—Summary**

Parameter	Emissions (MTCO <sub>2</sub> e)
2020 Business as Usual (BAU) GHG Emissions Forecast <sup>1</sup>	4,395,200
2020 Community Emissions Reduction Target (25% below 1990 levels)	2,974,700
<b>Total<sub>1</sub> Reductions Needed to Reach Target</b>	<b>1,420,500</b>
2020 Emissions Reductions from State Measures	744,100
2020 Emissions Reductions from Regional Measures	175,900
2020 Emissions Reductions from Local Measures (w/Santa Rosa CAP)	503,300
<b>Total<sub>2</sub> Emissions Reductions Achieved by Climate Action Strategies</b>	<b>1,423,200</b>
2020 Countywide Emissions under CA2020	2,971,900
<i>Emissions Reductions in Excess of Target (Total<sub>2</sub> minus Total<sub>1</sub>)</i>	2,800

In addition to specific measures to achieve the GHG reduction target for 2020, this plan also includes longer-term goals to provide a foundation for even deeper GHG reductions beyond 2020 (see Section 3.2.2). Section 3.2.3 describes several advanced climate initiatives included in this plan to give Sonoma County a head start on achieving those goals.

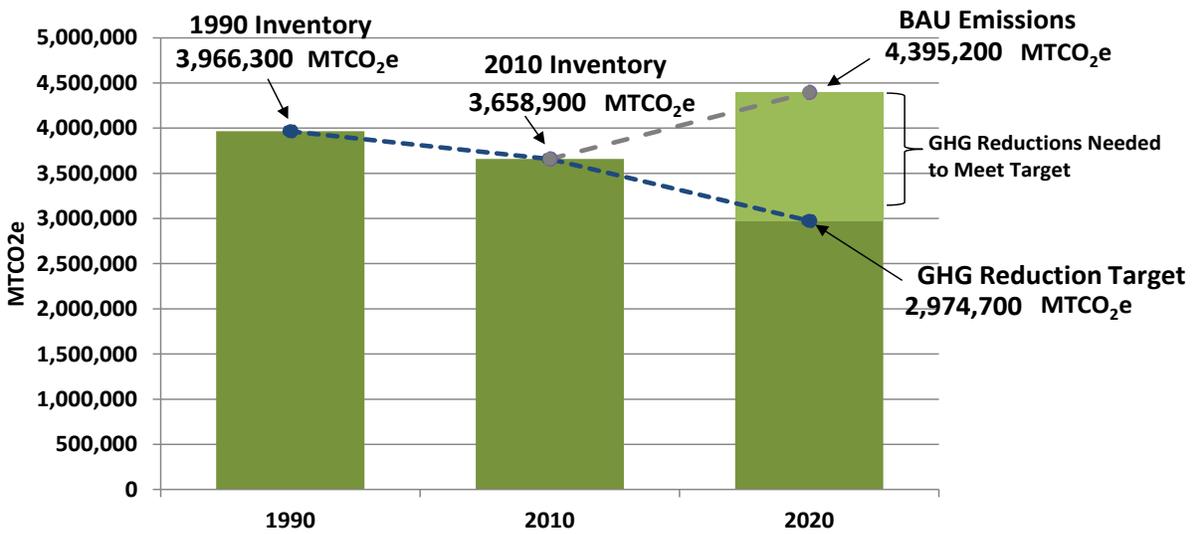
## 3.2 Greenhouse Gas Reduction Target and Goals

### 3.2.1 Climate Action 2020 Target

CA2020 was motivated by a need to identify specific near-term actions to reduce GHG emissions and to establish updated goals for 2020 and beyond. The year 2020 is an important milestone because of California’s Global Warming Solutions Act (Assembly Bill [AB] 32), which seeks to reduce statewide GHG emissions down to 1990 levels by 2020. Sonoma County jurisdictions were significantly more ambitious than the state when, in 2006, they adopted a goal of 25% below 1990 levels by 2015. Even though no formal GHG reduction plan was adopted, that ambition has driven positive results: emissions in 2010 were already 7.5% lower than 1990 levels. However, the County is not expected to meet its goal of 25% below 1990 in 2015.

Therefore, Sonoma County jurisdictions have agreed to an updated countywide target of 25% below 1990 levels by 2020, illustrated in Figure 3-1. This goal is ambitious because it is significantly greater than the state’s AB 32 2020 target, but it is also achievable through the state, regional, and local GHG reduction measures outlined in this chapter.

**Figure 3-1. Achieving Sonoma County’s 2020 Greenhouse Gas Reduction Target**

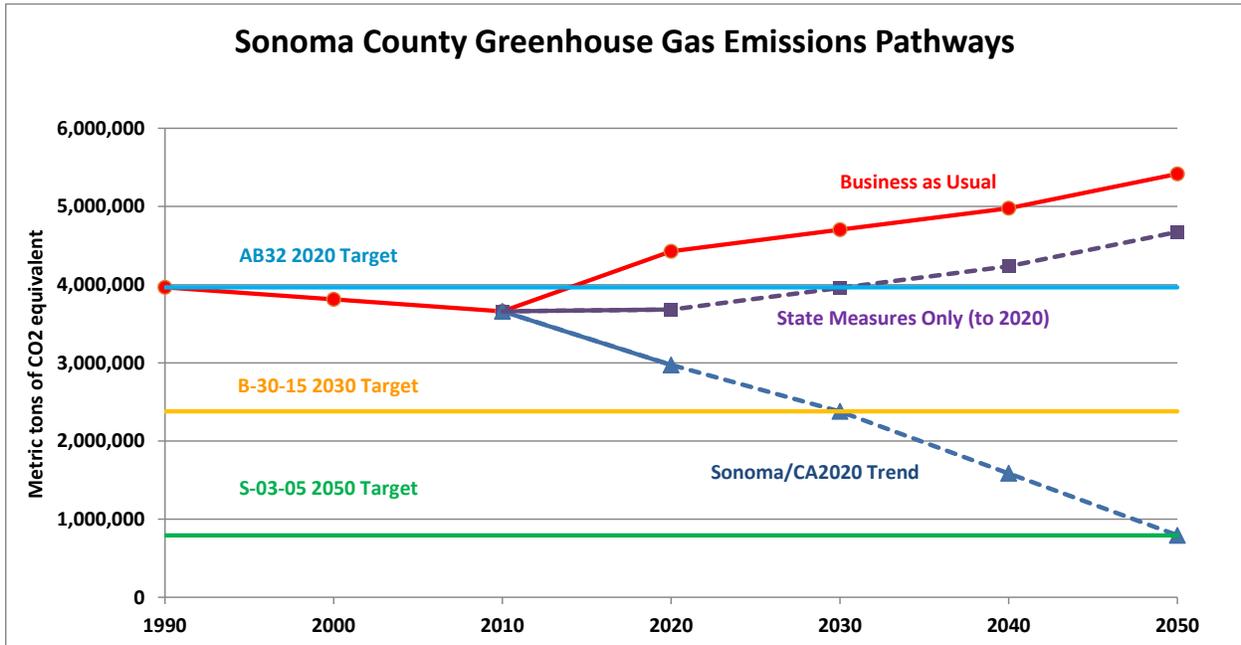


### 3.2.2 Long-Term Goals and Vision

As discussed in Chapter 1, *The Framework for Sonoma County Climate Action*, the scientific consensus about the long-term ramifications of unchecked human-induced climate change has already been integrated into state policy. Governor Schwarzenegger’s 2005 Executive Order (EO S-03-05) sets a long-term statewide goal of 80% below 1990 emissions levels by 2050. In order to reach this target, the state will have to go well beyond the steps included in the AB 32 Scoping Plan for 2020. Accordingly, in April 2015, Governor Brown issued Executive Order EO B-30-15 establishing an interim reduction target of 40% below 1990 levels by 2030 and directing the California Air Resources Board to update the AB 32 Scoping Plan to reflect that target. The updated Scoping Plan is expected in late 2016. The state legislature is also considering Senate Bill (SB) 32, which, if adopted, would establish the 2030 goal as a legislative mandate, thus broadening its legal applicability.

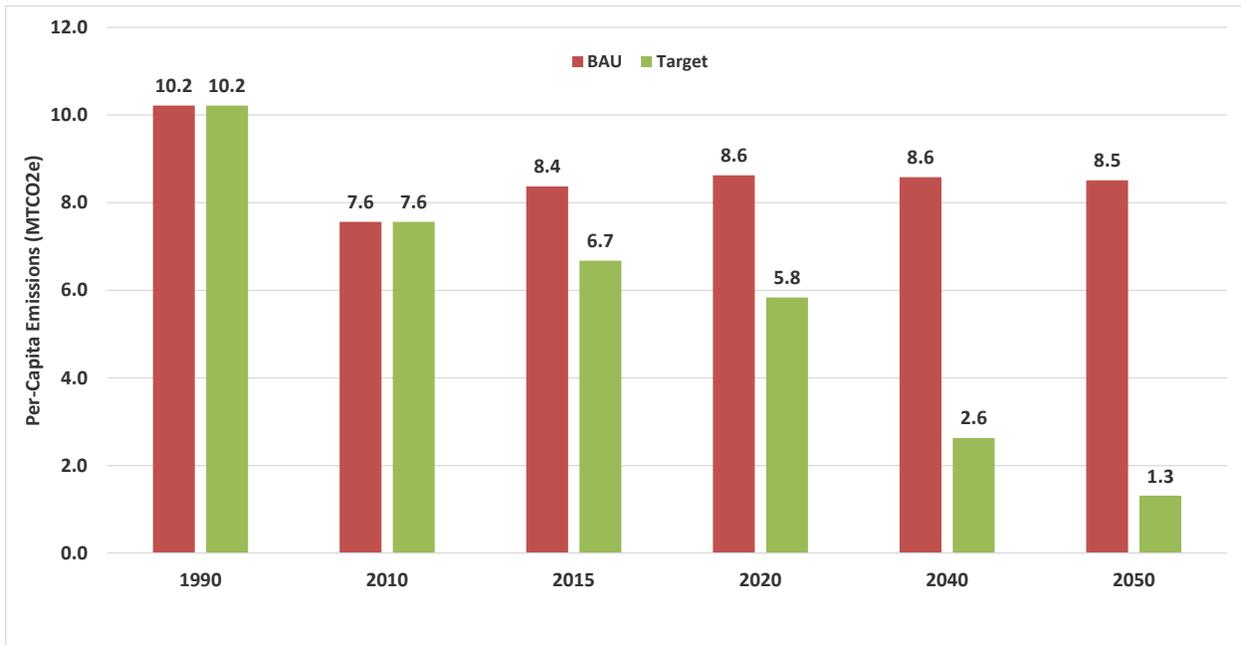
In addition to a near-term target of 25% below 1990 levels by 2020, CA2020 puts the county on a solid trajectory toward meeting the long-term goals of 40% below 1990 levels by 2030 and 80% below by 2050. Although the specific path to reach these goals has not yet been determined—neither locally nor by the State of California—it is clear that pursuing the ambitious 2020 target puts the county on the right path. Figure 3-2 shows that current state GHG reduction measures (e.g., vehicle fuel standards and renewable portfolio standards for electricity) will only achieve a portion of the reductions needed to meet long-term goals. While further state action to reduce emissions is anticipated, success will require scaling up existing local and regional strategies, including those in this Climate Action Plan (CAP), and developing new solutions.

Figure 3-2. Sonoma County 1990 to 2050 GHG Emissions Pathways



Another way to look at the long-term challenge is on a per capita basis. As shown in Figure 3-3, countywide GHG emissions were 7.6 metric tons of carbon dioxide equivalent (MTCO<sub>2</sub>e) per person in 2010 and are forecast to increase to 8.4 MTCO<sub>2</sub>e per person by 2015. Projected per-capita business-as-usual (BAU) emissions decrease slightly to 8.6 MTCO<sub>2</sub>e in 2020 and beyond because population is projected to increase somewhat faster than emissions. Nonetheless, given projected population and economic growth, meeting the long-term reduction target requires that per capita emissions in 2050 not exceed 1.3 MTCO<sub>2</sub>e, an even steeper decline than is needed for overall emissions reduction. The County’s 2020 target is equivalent to 5.8 MTCO<sub>2</sub>e per capita, further emphasizing the challenge of meeting the long-term goals and the importance of adopting an aggressive target of 25% below 1990 levels by 2020 to put the county on the right track to meet the long-term goals.

**Figure 3-3. Sonoma County Per-Capita Emission Targets from 1990 to 2050**



The state has begun evaluating the cost and feasibility of strategies to achieve the long-term targets. Projects like the California Pathways Project demonstrate that success is possible based on scaling up the primary strategies in this plan: resource efficiency, zero carbon electricity, and switching away from fossil fuels. Implementing the local measures in CA2020 will complement state efforts and reduce GHG emissions well beyond 2020.

### The California PATHWAYS Project: Long term Greenhouse Gas Reduction Scenarios

To support the 2030 emissions target, the California Air Resources Board, Energy Commission, Public Utilities Commission, and the Independent System Operator commissioned Energy + Environmental Economics (E3) to evaluate the feasibility and cost of potential 2030 targets that would facilitate reaching the state's 2050 goal of 80% below 1990 levels. E3 developed eight emission reduction scenarios described below that demonstrate technically and economically viable scenarios to achieve the 2050 target. E3 conducted the analysis using its California PATHWAYS model, which encompasses the entire California economy with detailed representations of the buildings, industry, transportation, and electricity sectors. The following scenarios would achieve the 2050 target in different ways, with varying costs and benefits.

- 1. Reference:** Current GHG policies continue through 2020 only.
- 2. Straight Line:** Low carbon technologies including energy efficiency, building electrification, renewable electricity, zero emission vehicles, and renewable liquid fuels.
- 3. Early Deployment:** Same technology focus as the Straight Line Scenario with faster deployment of renewable electricity and near term measures with air quality benefits, including zero emission vehicles and electric heat pumps.
- 4. Slower Commercial Adoption:** Same technology focus as the Straight Line Scenario, but with delayed implementation of higher cost measures, primarily zero emission vehicles and electric heat pumps in the commercial sector; adoption is accelerated post 2030 to hit 2050 goal.
- 5. Low Carbon Gas:** Focus on decarbonized pipeline gas, no renewable liquid fuels, and no building electrification.
- 6. Distributed Energy:** Focus on distributed photovoltaic and grid storage.
- 7. Carbon Capture and Non Biological Sequestration:**\* Phase in of natural gas carbon capture and sequestration in electricity generation and hydrogen production post 2030.
- 8. High Battery Electric Vehicles:** Focus on battery electric vehicles instead of fuel cell vehicles.

These eight scenarios demonstrate a range of costs—from \$40 to \$60 billion by 2050—associated with achieving California's emissions goals, illustrating that success in mitigating climate change is possible at reasonable economic costs with proven technologies.

*Source: Energy + Environmental Economics 2015*

However, state action will not be enough by itself; further local action to reduce GHG emissions will also be needed. Future local actions will be guided in part by the state's framework for post-AB 32 climate protection, as well as by lessons learned through the adaptive management approach to implementing CA2020. As noted in Chapter 1, CA2020 is part of a much longer-term effort. In adopting this CAP, the RCPA will also adopt long-term GHG reduction goals to achieve a 40% reduction by 2030 and an 80% reduction by 2050 (compared to 1990 levels). To reach these goals, a new phase of climate action planning will be needed after 2020 to build upon the goals and strategies in this plan and take advantage of new technologies and climate protection science that are constantly evolving.

A long-term climate action strategy for Sonoma County will most likely include some or all of the following.

- Sonoma County buildings will be 100% carbon neutral to the maximum extent feasible.
- A fully integrated smart power grid will ensure maximum efficiency of energy use through load balancing will compensate when variable energy sources (such as wind and solar) are not available, advanced batteries and other storage, or fossil fuel generation with carbon capture.
- Building heating and cooking will shift away from natural gas in favor of renewable electricity sources.
- The California Energy Commission will implement its goals for Zero Net Energy in new residential buildings by 2020 and for new commercial buildings by 2030.
- By 2050, the county will have a transportation system with 80% lower GHG emissions per capita compared to 1990 levels, the maximum extent feasible of carbon-free transportation.
- Electric vehicles (EV) and alternative fuel vehicles will exist across all vehicle types by 2050. Self-driving cars will reduce congestion and improve fuel efficiency.
- Vehicle miles traveled (VMT) must still be reduced beyond 2020 through increasingly efficient and electrified public transit systems.
- By 2050, the county would have all commercial agricultural properties enrolled in certified programs that promote sustainability and natural resource conservation.
- Agricultural soil carbon levels will be substantially higher in 2050 through soil management practices supporting crop development and carbon sequestration.
- No fossil-fuel based fertilizer will be in used in the county.
- Agricultural equipment and winery and dairy operations will utilize electricity derived from renewable energy sources and/or sustainable bio fuels.
- By 2050, the county will have zero waste through implementation of diversion, waste reduction, and green energy systems.
- Widespread use of recycled water, greywater, and rainwater catchment will further offset the demand for potable water. Agricultural water users will continue to pioneer lower water use strategies, which may include the use of different crops and/or varieties.
- By 2050, all wastewater treatment plants will have biogas systems to capture nearly 100% of all methane generated from their operations.
- By 2050, carbon sequestration in Sonoma County's working landscapes, natural areas, and urban forests will be tracked annually in a cost-effective manner (likely through the use of remote sensing technology) that allows for effective management of the carbon stock and sequestration potential.
- A consumption-based emissions inventory will be developed and used to guide the actions of public agencies, private businesses and non-governmental entities, and individual county residents to reduce emissions related to consumption of goods and services.

### 3.2.3 Advanced Climate Initiatives

In recognition of the challenges associated with meeting the longer-term GHG reduction goals, CA2020 also includes several advanced climate initiatives that can be started in the near term, but will result in steadily increasing GHG reduction benefits after 2020. These advanced initiatives include reducing emissions related to the consumption of goods and services, including food, as well as land use and sustainable agriculture strategies that focus on retaining and increasing carbon sequestration in soils and vegetation. Although these strategies are known to have GHG benefits, implementation of these strategies will not directly affect the emissions inventoried in CA2020. Moreover, methods to quantify those benefits are still in development and implementation is more complex. For these reasons, CA2020 does not rely on emission reductions from Advanced Climate Initiatives to meet the GHG reduction goal for 2020, and emissions reductions from these initiatives are not quantified at this time. Nonetheless, these advanced initiatives are essential to long-term success and are therefore included in this CAP.

## 3.3 Overall Greenhouse Gas Reduction Strategy

The CA2020 planning process explored a variety of state, regional, and local measures to reduce GHG emissions to achieve the 2020 target and provide a strong foundation for meeting the 2030 and 2050 goals. Public meetings and online engagement tools were used to collect input on community priorities for climate action. In addition, a 2014 report titled *Proven and Promising Climate Measures from U.S. Communities for Possible Application in Sonoma County*, prepared by the Center for Climate Protection, was also used to develop the measures included in CA2020.

The success of the regional GHG reduction strategy described in this chapter depends on committed implementation by the RCPA, other regional agencies and, most importantly, by the local government partners. This CAP identifies five core elements of plan implementation: coordination across many partners; securing funding; engaging the community; monitoring and reporting; and adaptive management. Please see Chapter 4: *Implementation* for detailed information about CAP implementation.

### 3.3.1 GHG Reduction Goals

As a starting point for developing specific GHG reduction measures, Table 3-2 identifies reduction goals for each sector. Table 3-3 shows the expected emissions reductions from measures adopted to advance each goal.

**Table 3-2. Greenhouse Gas Reduction Goals**

Sector	Key	Goals
<b>Building Energy</b>		<ol style="list-style-type: none"> <li>1. Increase building energy efficiency</li> <li>2. Increase renewable energy use</li> <li>3. Switch equipment from fossil fuel to electricity</li> </ol>
<b>Transportation &amp; Land Use</b>		<ol style="list-style-type: none"> <li>4. Reduce travel demand through focused growth</li> <li>5. Encourage a shift toward low-carbon transportation options</li> <li>6. Increase vehicle and equipment fuel efficiency</li> <li>7. Encourage a shift toward low-carbon fuels in vehicles and equipment</li> <li>8. Reduce idling</li> </ol>
<b>Solid Waste Generation</b>		<ol style="list-style-type: none"> <li>9. Increase solid waste diversion</li> <li>10. Increase capture and use of methane from landfills</li> </ol>
<b>Water Conveyance &amp; Wastewater Treatment</b>		<ol style="list-style-type: none"> <li>11. Reduce water consumption</li> <li>12. Increase recycled water and greywater use</li> <li>13. Increase water and wastewater infrastructure efficiency</li> <li>14. Increase use of renewable energy in water and wastewater systems</li> </ol>
<b>Livestock &amp; Fertilizer</b>		<ol style="list-style-type: none"> <li>15. Reduce emissions from livestock operations</li> <li>16. Reduce emissions from fertilizer use</li> </ol>
<b>Advanced Climate Initiatives</b>		<ol style="list-style-type: none"> <li>17. Protect and enhance the value of open and working lands</li> <li>18. Promote sustainable agriculture</li> <li>19. Increase carbon sequestration</li> <li>20. Reduce emissions from consumption of goods and services, including food</li> </ol>

**Table 3-3. Achieving Sonoma County’s 2020 Greenhouse Gas Reduction Target**

<b>GHG Sector and Goal</b>		<b>GHG Emission Reductions (MTCO<sub>2</sub>e)</b>
<b><i>Building Energy</i></b>		<b>324,000</b>
1	Increase building energy efficiency	53,900
2	Increase renewable energy use	266,890
3	Switch equipment from fossil fuel to electricity	3,240
<b><i>Transportation and Land Use</i></b>		<b>436,900</b>
4	Reduce travel demand through focused growth	4,710
5	Encourage a shift toward low-carbon transportation options	43,060
6	Increase vehicle and equipment fuel efficiency	358,720
7	Encourage a shift toward low-carbon fuels in vehicles and equipment	17,000
8	Reduce idling	13,380
<b><i>Solid Waste Generation</i></b>		<b>65,400</b>
9	Increase solid waste diversion	26,230
10	Increase capture and use of methane from landfills	39,130
<b><i>Water Conveyance and Wastewater Treatment</i></b>		<b>22,600</b>
11	Reduce water consumption	19,120
12	Increase recycled water and greywater use	180
13	Increase water and wastewater infrastructure efficiency	760
14	Increase use of renewable energy in water and wastewater systems	2,560
<b><i>Livestock and Fertilizer</i></b>		<b>16,300</b>
15	Reduce emissions from livestock operations	14,530
16	Reduce emissions from fertilizer use	1,760
<b><i>Advanced Climate Initiatives</i></b>		
17	Protect and enhance the value of open and working lands	NQ
18	Promote sustainable agriculture	NQ
19	Increase carbon sequestration	NQ
20	Reduce emissions from consumption of goods and services	NQ
<b><i>Total CAP Reductions</i></b>		<b>865,170</b>
Santa Rosa CAP Reductions (including applicable state and city reductions)		558,080
<b>Total County 2020 GHG Reductions</b>		<b>1,423,200</b>

These reductions will be achieved through a combination of existing programs (like Title 24 building energy efficiency standards and statewide clean fuel standards) and new local actions that will be taken by cities and the County. These *Local Measures* are the heart of this countywide CAP because they are the actions that Sonoma County jurisdictions can implement through local initiative.

The following sections describe the specific GHG reduction measures that will accomplish the goals outlined above, organized according to the entity taking action (i.e., state, regional, or local).

### **3.4 State GHG Reduction Measures**

Measures implemented by the state of California will address CA2020 goals in two sectors: building energy and transportation and land use. State measures for these two sectors are listed in Tables 3-4 and 3-5. These measures have already been adopted by state agencies and are under way. A full description of each measure, including the assumptions and methodology used to calculate GHG reductions, is included in Appendix C.

**Table 3-4. State Measures to Reduce Building Energy Emissions**

Number	Name	Description	Responsible Entities	2020 GHG Reductions (MTCO <sub>2</sub> e/year)
<b>Goal 1: Increase building energy efficiency</b>				
<b>1-S1</b>	Title 24 Standards for Commercial and Residential Buildings	Requires that new and remodeled buildings be designed to conserve energy and water.	<i>Developed by:</i> California Energy Commission (CEC); <i>Enforced by:</i> local building departments and the California Building Standards Commission	14,440
<b>1-S2</b>	Lighting Efficiency and Toxics Reduction Act (AB 1109)	Will decrease electricity used for lighting in new buildings through regulation and lighting standards.	<i>Developed by:</i> CEC <i>Enforced by:</i> CEC	21,085
<b>1-S3</b>	Industrial Boiler Efficiency	Requires an annual tuning of all boilers, or the installation of controls and systems to maximize efficiency.	<i>Developed by:</i> California Air Resources Board (ARB) <i>Enforced by:</i> ARB and local air districts	345
<b>Goal 2: Increase renewable energy use</b>				
<b>2-S1</b>	Renewables Portfolio Standard (RPS)	Requires electric utilities (including Pacific Gas & Electric Company [PG&E], Healdsburg, and Sonoma Clean Power [SCP]) to procure an increasing amount of their electricity from eligible renewable sources up to 33% by 2020.	<i>Developed by:</i> California Public Utilities Commission (CPUC) <i>Enforced by:</i> CPUC	181,793
<b>2-S2</b>	Residential Solar Water Heater Program (AB 1470)	Provides incentives to encourage the installation of solar water heating systems.	<i>Developed by:</i> CPUC <i>Enforced by:</i> CPUC	800

**Table 3-5. State Measures to Reduce On-Road Transportation and Off-Road Equipment Emissions**

Number	Name	Description	Responsible Entities	2020 GHG Reductions (MTCO <sub>2</sub> e/year)
<b>Goal 6: Increase vehicle and equipment fuel efficiency</b>				
<b>6-S1</b>	Pavley Emissions Standards for Passenger Vehicles and the Low-Carbon Fuel Standard	Will increase the efficiency of automobiles and light-duty trucks by 30%, compared with 2002 efficiency, by 2016. This also includes the Low-Carbon Fuel Standard for on-road vehicles.	<i>Enforced by:</i> ARB <i>Implemented by:</i> ARB, vehicle manufacturers, and fuel producers	333,030
<b>6-S2</b>	Advanced Clean Cars	Requires that vehicle manufacturers increase the average fuel efficiency of their new vehicles, beyond the Pavley requirements.	<i>Enforced by:</i> ARB <i>Implemented by:</i> ARB and vehicle manufacturers	9,679
<b>6-S3</b>	AB 32 Vehicle Efficiency Measures	Increases the efficiency of vehicles through proper tire inflation, aerodynamic efficiency for heavy-duty vehicles, hybrid technology for heavy-duty vehicles, and other measures.	<i>Enforced by:</i> ARB <i>Implemented by:</i> ARB, vehicle service facilities, and vehicle manufacturers	16,010
<b>Goal 7: Encourage a shift toward low-carbon fuels</b>				
<b>7-S1</b>	Low-Carbon Fuel Standard: Off-Road	Requires a minimum 10% reduction in the carbon intensity of transportation fuels sold in California by 2020.	<i>Enforced by:</i> ARB <i>Implemented by:</i> ARB and fuel producers	5,182