

**Greenhouse Gas Assessment For:**  
**ARMSTRONG RANCH**  
**SPECIFIC PLAN**  
**CITY OF ONTARIO**

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## TABLE OF CONTENTS

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<b>LIST OF TABLES .....</b>	<b>iii</b>
<b>LIST OF FIGURES.....</b>	<b>iii</b>
<b>1.0 Introduction .....</b>	<b>1</b>
1.1 Project Description .....	1
<b>2.0 Existing Setting .....</b>	<b>7</b>
2.1 Greenhouse Gas and Climate Change Background Information .....	7
2.1.1 Greenhouse Gasses.....	7
2.1.2 Impact of Climate Change on California and Human Health.....	10
2.1.3 Adaptation Impact .....	12
2.2 Emission Inventories .....	13
2.3 Sources of Greenhouse Gases in California .....	14
2.4 Regulatory Framework.....	16
2.4.1 Federal Plans, Policies, Regulations, and Laws.....	16
2.4.2 California State Plans, Policies, Regulations, and Laws .....	20
2.4.2.1 Activity Prior to 2005 .....	20
2.4.2.2 Executive Order S-3-05 and California Climate Change Assessments .....	20
2.4.2.3 Subsequent Executive Orders Related to Climate Change .....	21
2.4.2.4 California Global Warming Solutions Act of 2006 (AB 32) .....	22
2.4.2.5 Early Action Plan .....	22
2.4.2.6 Senate Bill 97 and CEQA Guidelines.....	23
2.4.2.7 SB 375 – Sustainable Communities and Climate Protection Act .....	23
2.4.2.8 Statewide Adaptation Strategy and Safeguarding California Plan ....	23
2.4.2.9 Climate Change Scoping Plan .....	24
2.4.3 South Coast Air Quality Management District Plans, Policies, and Regulations.....	37
2.4.4 City of Ontario Plans, Policies, Regulations, and Laws .....	42
<b>3.0 Potential Greenhouse Gas Impacts .....</b>	<b>49</b>
3.1 Significance Thresholds.....	49
3.2 Impacts From Project .....	56
<b>4.0 Mitigation Measures.....</b>	<b>59</b>
<b>5.0 Unavoidable Significant Impacts .....</b>	<b>59</b>
<b>6.0 References.....</b>	<b>60</b>

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## LIST OF TABLES

---

Table 1	Proposed Development By Planning Area .....	2
Table 2	GHG Lifetimes and Global Warming Potentials (GWP) .....	10
Table 3	Top Ten CO <sub>2</sub> Producing Nations in 2011 .....	13
Table 4	First Scoping Plan Measures .....	25
Table 5	CCAP Community GHG Reduction Measures Summary .....	43
Table 6	City of Ontario 2020 Community GHG Emissions (MT CO <sub>2</sub> EQ) .....	47
Table 7	Screening Table for Implementation of GHG Reduction Measures for Residential Development.....	50
Table 8	Residential GHG Reduction Measures to be Incorporated into Project .....	56

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## LIST OF FIGURES

---

Figure 1	Vicinity Map .....	3
Figure 2	Project Boundary .....	4
Figure 3	Project Site Plan .....	5
Figure 4	GHG Emissions by State .....	15
Figure 5	California GHG Emissions by Sector.....	17

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## **1.0 Introduction**

This report analyzes the potential greenhouse gas (GHG) climate change impacts associated with development of the proposed Armstrong Ranch Specific Plan. Background information on GHG and the impacts of climate change are presented along with an assessment of the Project's GHG impact. Section 1.1 presents a detailed description of the proposed project.

Section 0 describes the existing conditions relative to GHGs and climate change and provides background information. The compounds identified as GHGs and their effect is discussed along with the impacts of climate change and the impacts of adapting to climate change are discussed in Section 2.1. Section 2.2 presents inventories of GHG emissions to provide context for the Project's emissions. Sources of GHG emissions in the State of California are discussed in Section 2.3. Federal, state and local plans, policies, regulations, and laws relating to GHGs and climate change are discussed in Section 2.4.

Potential GHG impacts from the proposed project are assessed in Section 3.0. The thresholds of significance used to assess the project's impacts are presented in Section 3.1. The project's potential GHG impacts are discussed in in Section 3.2. Mitigation is discussed in Section 4.0.

### **1.1 Project Description**

The Armstrong Ranch Specific Plan proposes the development of a maximum of 994 single-family dwelling units on approximately 198.8 acres bounded by Riverside Drive to the north, Chino Avenue to the south, Vineyard Avenue to the west, and Cucamonga Creek Channel to the east. The project includes one planning area, Planning Area 7, which is reserved for a 1,000 student elementary school. If the School District selects this site for a future elementary school then the number of residential units developed by the project will be reduced to 944. If the school is not developed, then 50 residential units will be constructed in planning area 7.

Figure 1 presents a vicinity map showing the project location and Figure 2 shows the project boundary overlaid on an aerial photograph of the project site. Figure 3 shows the seven Planning Areas established by the Specific Plan. The size and number of dwelling units proposed for each planning area is presented in Table 1.

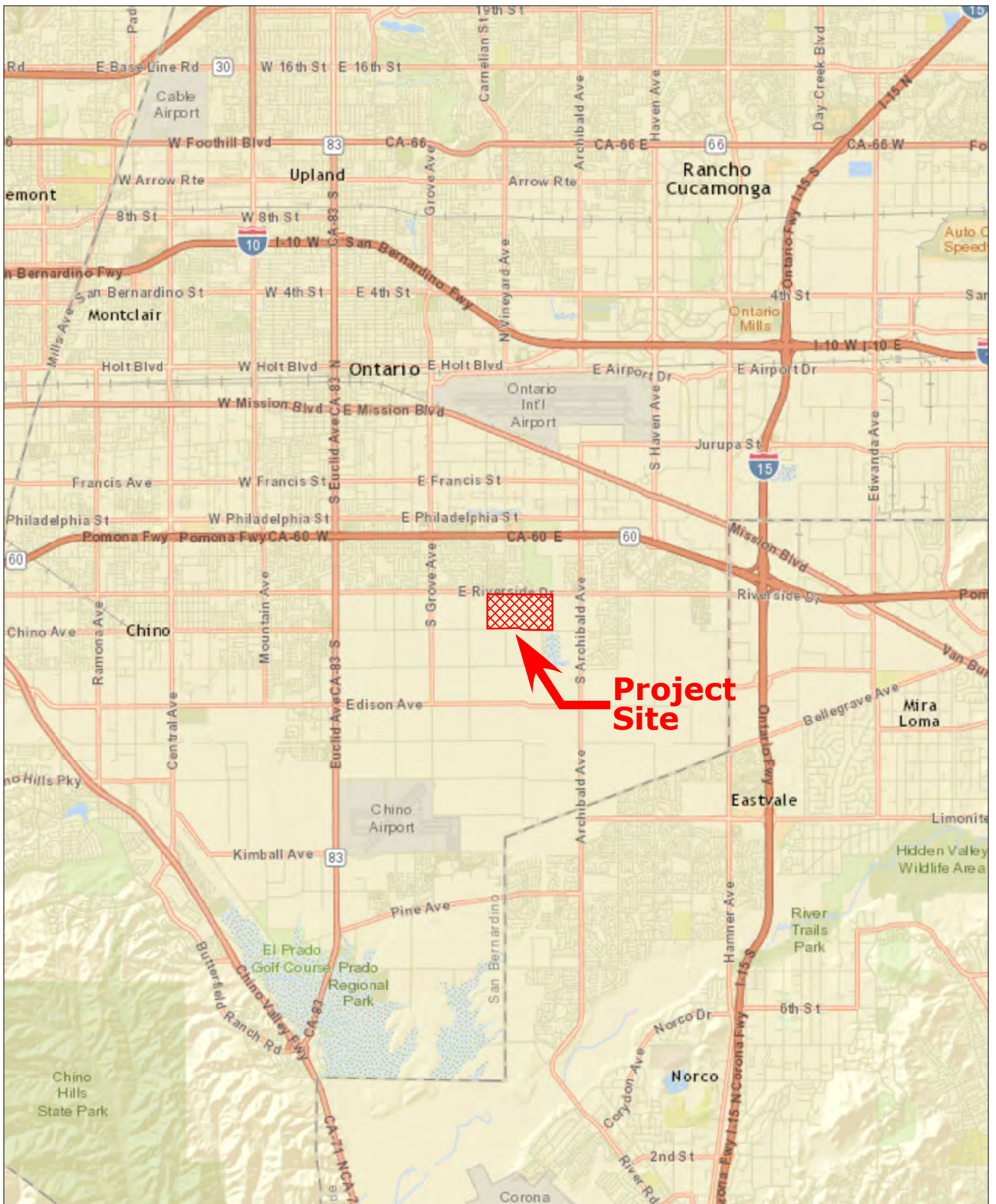
**Table 1**  
**Proposed Development By Planning Area**

<b>Planning Area</b>	<b>Acres</b>	<b>Dwelling Units</b>
1	38.6	193
2	36.2	157
3	26.8	154
4	26.9	148
5	34.2	161
6	24.5	131
7†	11.6	50
<b>Total</b>	<b>198.8</b>	<b>994</b>

†Planning Area 7 is reserved for a 1,000 student elementary school. If the site is not selected for future expansion by the school district, the land will revert to residential with 50 dwelling units.

Existing uses on the project site include agricultural fields, a former dairy site and scattered single-family homes. All existing development would be removed with the implementation of the proposed Specific Plan.





**Project Site**



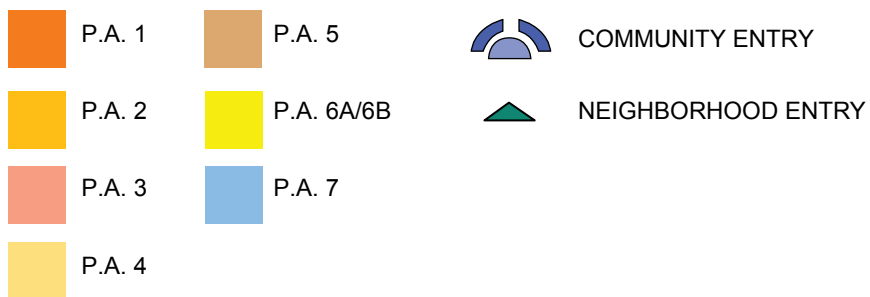
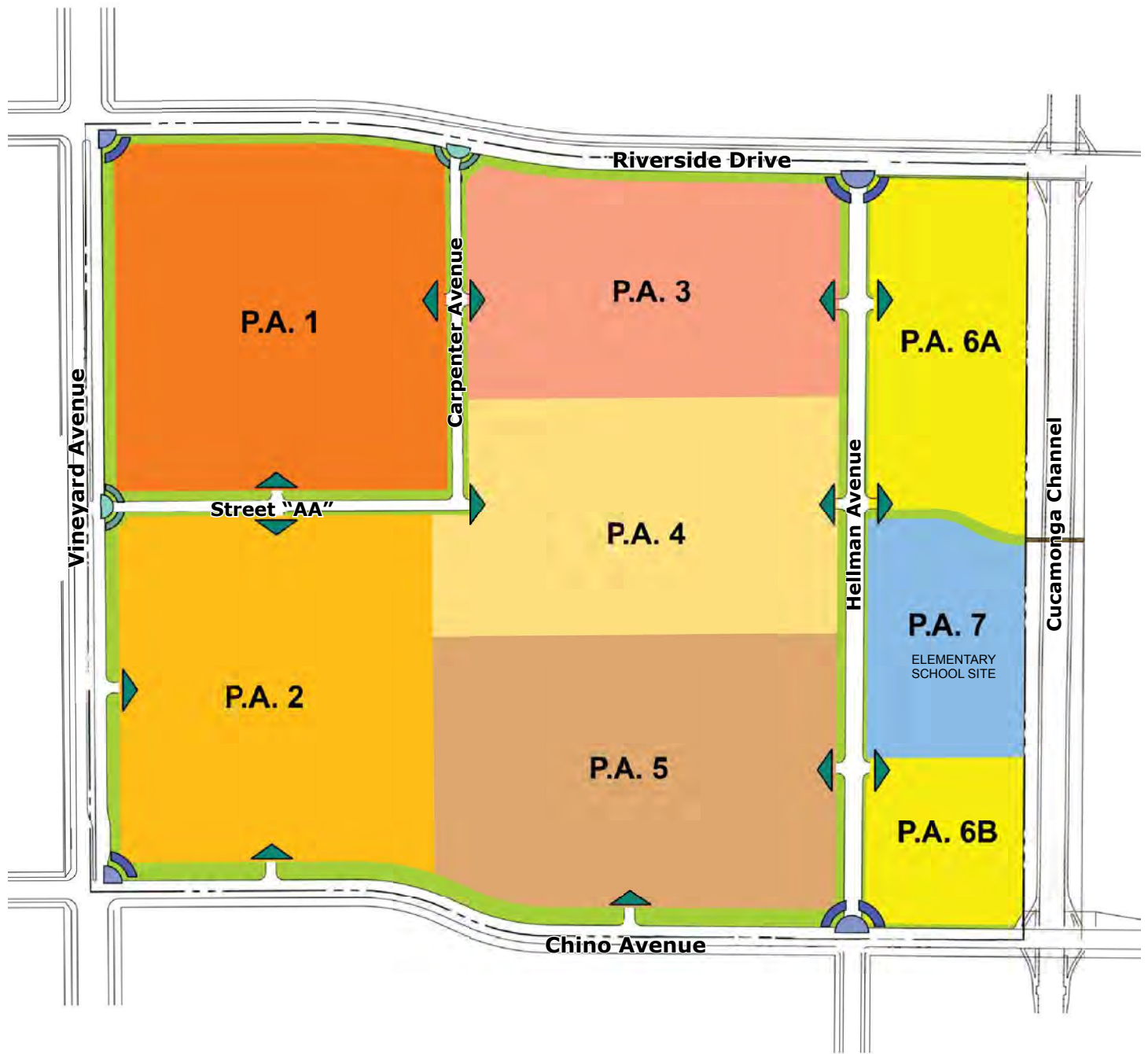
**Figure 1  
Vicinity Map**



**Project Site**



**Figure 2**  
**Project Boundaries**  
**Armstrong Ranch Specific Plan**



**Figure 3  
Project Site Plan**

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## 2.0 Existing Setting

### 2.1 Greenhouse Gas and Climate Change Background Information

The International Panel on Climate Change's (IPCC) Fifth Assessment Report (AR5) affirms that the planet is warming and that humans beings are "extremely likely" (indicating a 95 percent certainty) to be the primary cause. Since global warming and climate change emerged publically as an environmental issue in the 1980s, the scientific evidence has grown even stronger that the climate is changing; the impacts are widespread and occurring now. This evidence includes rising temperatures, shifting snow and rainfall patterns, and increased incidents of extreme weather events.

The global average temperature has increased by approximately 1.6°F (0.9°C) above pre industrial levels due to the release of GHGs. Scientific research indicates that an increase in the global average temperature greater than 3.6°F (2.0°C) poses severe risks to natural systems and human health and well-being. With an additional 2.0°F (1.1°C) increase in temperatures, sea levels are anticipated to rise between 1.3 and 2.6 feet (0.4 to 0.8 meters) over current levels with an upper end estimate of an increase of approximately 3.2 feet (1.0 meters).

#### 2.1.1 Greenhouse Gasses

The "greenhouse effect" is the natural process that retains heat in the troposphere, the bottom layer of the atmosphere. Without the greenhouse effect, thermal energy would "leak" into space resulting in a much colder and inhospitable planet. With the greenhouse effect, the global average temperature is approximately 61°F (16°C). GHGs are the components of the atmosphere responsible for the greenhouse effect. The amount of heat that is retained is proportional to the concentration of GHGs in the atmosphere. As more GHGs are released into the atmosphere, GHG concentrations increase and the atmosphere retains more heat increasing the effects of climate change.

Six gasses were identified by the Kyoto Protocol for emission reduction targets: carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFC), perfluorocarbons (PFC), and sulfur hexafluoride (SF<sub>6</sub>). Chlorofluorocarbons and other chlorine or bromine-containing gasses are also considered GHG's but these are stratospheric ozone (the beneficial kind that blocks ultraviolet rays from the sun) depleting substances that were phased out under the Montreal Protocol. The IPCC's AR5 report identified additional GHGs including the synthetic gases nitrogen trifluoride (NF<sub>3</sub>) and sulfuryl fluoride (SO<sub>2</sub>F<sub>2</sub>). In addition, tropospheric ozone (O<sub>3</sub>) and black carbon have been identified as important climate pollutants.

Water vapor is also a GHG. Water vapor is a highly active component of the climate system that responds rapidly to changes in conditions by either condensing into rain or snow, or evaporating to return to the atmosphere. The water content of the atmosphere is constantly being depleted by precipitation as well as being replenished by evaporation. Since its concentration is controlled by the climate itself, water vapor acts as a fast feedback, reacting to, and amplifying the warming provided by the forcing greenhouse gases. Human activity does not significantly affect water vapor concentrations except at local scales.

Black carbon is considered a GHG as well. Black carbon is the most strongly light-absorbing component of particulate matter (PM) emitted from burning fuels. Black carbon contributes to climate change directly by absorbing sunlight, indirectly by depositing on snow, and by interacting with clouds and cloud formation. Additionally, black carbon deposits on glaciers and snow packs increase the solar radiation absorbed, increasing the melting rate. This is a special concern for California because of its dependence on the Sierra snow pack for water.

Black carbon emissions from anthropogenic sources in California have been reduced considerably, by about 70 percent between 1990 and 2010. A large portion of the black carbon emission reductions are due to measures enacted to meet the particulate ambient air quality standards and to reduce Diesel Particulate Matter (DPM) emissions. DPM has been identified by the State as a toxic air contaminant. Current emission reduction programs are anticipated to eliminate approximately 95% of anthropogenic black carbon emissions by 2020. However, the majority of black carbon emissions in California are natural, not anthropogenic. The greatest source of natural black carbon emissions in the state is wildfires, and one of the consequences of climate change is increased wildfire activity.

Carbon dioxide (CO<sub>2</sub>) is undoubtedly the most important GHG, methane (CH<sub>4</sub>) the second most important, and nitrous oxide (N<sub>2</sub>O) close behind. Approximately 80 percent of the total radiative forcing (i.e., the amount of heat stored in the atmosphere) is caused by these three gasses. Since pre-industrial times (circa 1750) carbon dioxide concentrations have increased by about 40 percent, methane concentrations have increased about 150 percent, and nitrous oxide concentrations have increased about 20 percent. These increases are due the use of fossil fuels, fertilizer usage, and from land use and land use change—in particular, agriculture.

Carbon dioxide, methane, and nitrous oxide are emitted by human activities as well as natural sources. Human sources of carbon dioxide include the burning of fossil fuels, deforestation, and cement production. There are also abundant natural sources of carbon dioxide such as wild fires, decomposition, ocean release, respiration, and volcanoes. In fact, the amount of carbon dioxide emissions from natural sources is much greater than from human sources. However, prior to the industrial revolution the amount of carbon dioxide produced by natural sources was completely offset by natural carbon sinks that remove carbon dioxide from the atmosphere. The additional emissions from human sources have upset the balance of the carbon cycle that has existed near equilibrium for thousands of years. Human emissions of methane are much greater than natural emissions and include landfills, livestock farming, as well as the production, transportation and use of fossil fuels. Natural sources of methane include wetlands, termites and the oceans. The primary human sources of nitrous oxide are agriculture, fossil fuel combustion, and industrial process. The main natural sources are soils under natural vegetation and the oceans.

Methane is the principle component of natural gas. It is also produced biologically under anaerobic decomposition in ruminants (e.g., cows) and landfills. Methane is considered the second most important GHG due to its high Global Warming Potential (GWP)—a measure of a GHG's warming effect relative discussed further below—and the fact that methane concentrations have increased considerably as a

result of human activities related to agriculture, fossil fuel extraction and distribution, and waste generation and processing.

Methane is also important because it contributes to background tropospheric ozone and modeling has shown tropospheric ozone concentrations change almost linearly with changes in methane emissions. Tropospheric ozone (i.e. ground level) concentrations have risen about 30 percent since pre-industrial times and ozone is considered by the IPCC as the third most important GHG after carbon dioxide and methane.

All of the other GHG's are emitted by specific industrial activities, such as aluminum or semiconductor manufacturing, or are used as refrigerants and emitted to the atmosphere from leaks or improper handling of the substances. The three main categories of fluorinated gasses, HFCs, PFCs, and SF<sub>6</sub> have no natural sources and only come from human related activities. However, these GHGs are considered important because their relative effect on the climate even at low concentrations. As shown below, the GWP of these gasses are thousands of times greater than carbon dioxide.

Each of the GHGs affects climate change at different rates and persists in the atmosphere for different lengths of time. For example, because of the way it absorbs infrared heat and the length of time it exists in the atmosphere, one sulfur hexafluoride molecule has the same effect as between 17,500 and 23,500 carbon monoxide molecules. The relative measure of the potential for a GHG to trap heat in the atmosphere is called global warming potential (GWP). GWP accounts for both the difference in the amount of heat that is trapped, and the lifetime of the GHG, the amount of time it remains in the atmosphere. Table 2 presents the lifetimes and GWP for the primary GHGs. The GHG listed at the top of the table are categorized as long-lived as they exist in the atmosphere for long periods of time, 100 years or more. The three GHG's listed at the bottom of the table are classified as short-lived and persist in the atmosphere for less than 20 years.

The distinction between short-lived and long-lived climate pollutants is important because controlling the short-lived pollutants is a promising method for limiting climate change. The First Update to California's Climate Change Scoping Plan, discussed in Section 2.4.2, states that the use of existing best available control technologies to decrease emissions of short-lived GHGs can reduce the probability of exceeding the 2°C global temperature increase barrier before the year 2050 to less than ten percent. These existing technologies can reduce the risk of this temperature increase occurring by the year 2100 to less than 50 percent and reduce sea level rise by 25 percent.

Global GHG emissions are measured in million metric tons of carbon dioxide equivalent ("MMT CO<sub>2</sub>EQ") units. A metric ton, 1,000 kilograms, is approximately 2,205 lbs. The CO<sub>2</sub> equivalent emissions are calculated by multiplying the quantity of emissions from each GHG by its GWP. Typically, CO<sub>2</sub>EQ is based on the 100-year GWP. Emissions of one metric ton of CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub> each, would be equivalent to emissions of 294 MT CO<sub>2</sub>EQ (1 MT from the CO<sub>2</sub>, 28 MT from the N<sub>2</sub>O, and 265 MT from the CH<sub>4</sub>).

**Table 2  
GHG Lifetimes and Global Warming Potentials (GWP)**

Pollutant	Lifetime (years)	Global Warming Potential	
		20-year	100-year <sup>1</sup>
<b>Long-Lived</b>			
Carbon dioxide (CO <sub>2</sub> )	~100 <sup>2</sup>	1	1
Nitrous oxide (N <sub>2</sub> O)	121	264	265
Nitrogen trifluoride (NF <sub>3</sub> )	500	12,800	16,100
Sulfur hexafluoride (SF <sub>6</sub> )	3,200	17,500	23,500
Perfluorocarbons (PFC)	3,000–50,000	5,000–8,000	7,000–11,000
<b>Short-Lived (&lt;20 years)</b>			
Black Carbon <sup>3</sup>	Days to Weeks	270–6,200	100–1,700
Methane (CH <sub>4</sub> )	12	84	28
Hydrofluorocarbons (HFC) <sup>4</sup>	(<1 to >100)	~100–11,000	~100–12,000

1. The 20- and 100-year global warming potential estimates are from the IPCC 2013 Fifth Assessment Report (AR5), which includes the independent scientific assessment of the black carbon radiative forcing published in early 2014.

2. CO<sub>2</sub> has a variable atmospheric lifetime and cannot be readily approximated as a single number.

3. BC climate effects are highly uncertain, in large part because they depend on the conditions under which they are emitted (i.e., location and time of year). This type of uncertainty does not apply to the Kyoto greenhouse gases.

4. HFCs have a wide range of lifetimes—some long, some short by this definition. Correspondingly, they have a wide range of GWPs.

Source: First Update to the Climate Change Scoping Plan, State of California, 2014

### 2.1.2 Impact of Climate Change on California and Human Health

The long term environmental impacts of climate change include sea level rise that could cause devastating erosion and flooding of coastal cities and villages, as well as more intense hurricanes and typhoons worldwide. In California, scientists have identified the early signs of climate change: increased average temperatures, changes in temperature extremes, reduced snowpack in the Sierra Nevada, sea-level rise, and ecological shifts. The State is anticipated to retain its Mediterranean climate with relatively cool wet winters and hot, dry summers. Generally, the State is anticipated to experience overall hotter and drier conditions with a continued reduction in winter snow, with concurrent increases in winter rains. Increased average temperatures and accelerating sea-level rise along with its associated coastal erosion are anticipated as well. In addition, the intensity of extreme weather events, such as heat waves, wildfires, droughts and floods, are likely to be some of the earliest climate impacts experienced.

The State’s 2009 Climate Change Impacts Assessment (the 2009 Scenarios Project) examined future projections of impacts from climate change. A large source of uncertainty in projecting future impacts is how global GHG emissions will change in the future. Future emissions will depend on if the world remains competitive without cooperation in development, a high GHG emissions scenario, or if the world engages in high levels of environmental and social consciousness and engage in global cooperation for sustainable development, a low GHG emissions scenario.



Based on these two emissions scenarios and six global climate models the climate changes anticipated for the State in the 2009 Scenarios Project include:

- Temperature rise between 1.8° and 5.4° F by 2050
- Temperature rise between 3.6° and 9.0° F by 2100
- 10 to 100 times increase in the frequency of extreme temperatures estimated to occur once every 100 years
- Heat waves are expected to increase in frequency, duration, and area affected
- Precipitation decrease by 12% to 35% by 2050
- Longer dry spells interspersed with occasional intense rainfall event
- Sea level rise between 12 and 18 inches by 2050
- Sea level rise between 21 and 55 inches by 2100

Average temperature increases are expected to be more pronounced in the summer than in the winter. Inland areas are expected to experience more pronounced warming than coastal regions. The frequency of large coastal storms and heavy rainfall events are not anticipated to change significantly. However, coastal impacts from storms will increase due to sea level rise.

An increase in the frequency of extreme events may result in more event-related deaths, injuries, infectious diseases, and stress-related disorders. Particular segments of the population such as those with heart problems, asthma, the elderly, the very young and the homeless can be especially vulnerable to extreme heat. In addition, climate change may increase the risk of some infectious diseases; particularly those diseases that appear in warm areas and are spread by mosquitoes and other insects. These "vector-borne" diseases include malaria, dengue fever, yellow fever, and encephalitis. Further, algal blooms could occur more frequently as temperatures warm—particularly in areas with polluted waters—in which case diseases (such as cholera) that tend to accompany algal blooms could become more frequent. The increased temperatures also result in more harmful air pollution levels.

### **2.1.3 Adaptation Impact**

Adaptation is the reduction of harmful impacts on social and biological systems that will occur due to environmental changes caused by global climate change. Coastal communities will need to adapt to rising sea levels. Other areas will need to adapt to more intense extreme weather events and changes to flooding patterns. It also encompasses making the most of beneficial changes such as longer growing seasons and increased crop yields in some areas.

Global warming is already having a profound impact on water resources. Climate change has already altered the weather patterns and water supply in California leading to increased water shortages (i.e., a dwindling snowpack, bigger flood flows, rising sea levels, longer and harsher droughts). Water supplies are also at risk from rising sea levels. Risks may include degradation of California's estuaries, wetlands, and groundwater aquifers, which would threaten the quality and reliability of California's fresh water supply.

Higher temperatures will also likely increase electricity demand due to higher air conditioning use. Even if the population remained unchanged, toward the end of the century annual electricity demand could increase by as much as 20 percent if temperatures rise into the higher warming range.

Adaptation includes the responses to the changing climate and policies to minimize the predicted impacts (e.g., building better coastal defenses to sea level rise). Adaptation is not included in this report. It should be noted that adaptation is not mitigation. Mitigation includes intervention or policies to reduce GHG emissions or to enhance the sinks of GHGs.

In California, adaptation planning has been one of the primary responses to the threat of climate change. The California Natural Resources Agency published the 2009 California Adaptation Strategy in response to Executive Order S-13-08. The adaptation strategy was updated and renamed the Safeguarding California Plan in 2014. Work continues to develop and implement this plan as discussed in Section 2.4.2.8. The State has also published a website <http://cal-adapt.org> which provides interactive maps of anticipated climate change impacts along with other adaptation related information.

## 2.2 Emission Inventories

To put perspective on the emissions generated by a project and to better understand the sources of GHGs, it is important to look at emission inventories. The World Resources Institute has published a website with emission inventories by state and by country (<http://cait2.wri.org>). Table 3 lists the top ten GHG producing countries in 2011 with the quantity of GHG emissions and the percentage of total world emissions. Because total GHG emissions are largely dependent on the size of the country the amount of emissions per dollar of gross domestic product (GDP) and per person are presented as well. The total worldwide GHG emissions and emissions per GDP and per capita are provided as well. GHG emissions for California are presented at the bottom of the table for comparison.

**Table 3**  
**Top Ten CO<sub>2</sub> Producing Nations in 2011**

Country	Total GHG Emissions (MMT CO <sub>2</sub> EQ)	Percent of World Total	GHG Emissions per GDP (MTCO <sub>2</sub> EQ/\$ Million GDP)	GHG Emissions per Capita (MTCO <sub>2</sub> EQ/person)
1. China	10,553	24%	2,516	7.9
2. United States	6,550	15%	473	21.0
3. India	2,486	6%	1,875	2.0
4. Russian Federation	2,374	5%	2,504	16.6
5. Japan	1,307	3%	283	10.2
6. Brazil	1,131	3%	1,004	5.7
7. Germany	883	2%	289	10.8
8. Indonesia	835	2%	2,074	3.4
9. Canada	716	2%	580	20.9
10. Iran	716	2%	2,862	9.5
<i>Rest of World</i>	<i>16,266</i>	<i>37%</i>		
<b>World</b>	<b>43,817</b>		<b>821.5</b>	<b>6.3</b>
18. California	429	1%	253.6	11.4

Source: World Resource Institute's Climate Data Explorer (<http://cait2.wri.org>)

Total world GHG emissions were 43,817 MMT CO<sub>2</sub>EQ in 2011. China generated the highest GHG emissions with 24 percent of the total world emissions. Emissions from top four countries, China, United States, India, and Russian Federation are 50 percent of the world total emissions. China and the United States Account for 39 percent of the world total GHG emissions.

There are only seven countries, including the United States, with larger economies (as measured by GDP) than California and 34 countries with larger populations. There are 169 countries with higher GHG emissions per GDP than California and only 30 lower. Central Africa is highest with 45,083 MT CO<sub>2</sub>EQ emissions per million dollars in GDP. There are 32 countries with higher emissions per capita than

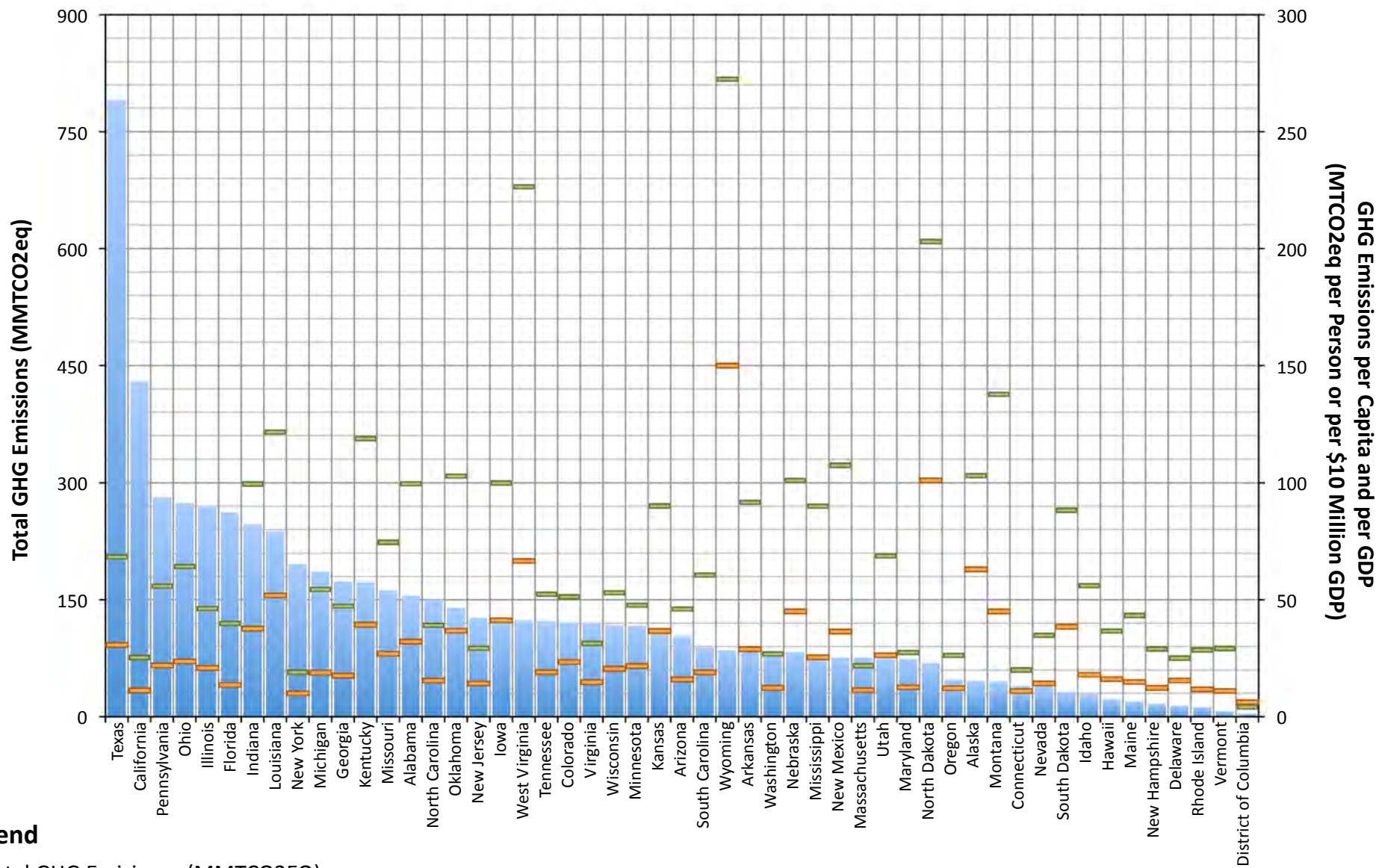
California, and Kuwait has the highest emissions per capita at 62.6 MT CO<sub>2</sub>EQ per person.

Within the United States, California has the second highest level of GHG production with Texas having the highest. Figure 4 shows the total GHG emissions from each state. The exhibit also shows the GHG emissions per person and per GDP. In 2011, only three states, New York, Vermont, Connecticut and the District of Columbia, had lower GHG emissions per person than California. Only four states, New York, Connecticut, Massachusetts, and Delaware, and the District of Columbia had lower GHG emissions per GDP.

### 2.3 Sources of Greenhouse Gases in California

CARB categorizes GHG generation by source into five broad categories. The categories are:

- **Transportation** includes the combustion of gasoline and diesel in automobiles and trucks. Transportation also includes jet fuel consumption and bunker fuel for ships.
- **Agriculture and forestry** GHG emissions are composed mostly of nitrous oxide from agricultural soil management, CO<sub>2</sub> from forestry practice changes, methane from enteric fermentation, and methane and nitrous oxide from manure management.
- **Commercial and residential** uses generate GHG emissions primarily from the combustion of natural gas for space and water heating.
- **Industrial** GHG emissions are produced from many industrial activities. Major contributors include oil and natural gas extraction; crude oil refining; food processing; stone, clay, glass, and cement manufacturing; chemical manufacturing; and cement production. Wastewater treatment plants are also significant contributors to this category.
- **Electric generation** includes both emissions from power plants in California as well as power plants located outside of the state that supply electricity to the state.
- **Recycling and waste** includes primarily landfills.
- **High (GWP)** emissions consist of ozone depleting substance substitutes and electricity grid SF<sub>6</sub> losses.
- **Forestry** emissions are due to wildfires.



**Legend**

- Total GHG Emissions (MMTCO2EQ)
- GHG Emissions per Capita (MTCO2eq per Person)
- GHG Emissions per GDP (MTCO2eq per \$10 Million GDP)

Source: World Resources Institute Climate Data Explore, CAIT 2, Website (<http://cait2.wri.org>)



**Figure 4**  
**GHG Emissions By State**  
 Armstrong Ranch Specific Plan

The relative amount of GHGs released from each of these categories in California in between 2000 and 2012 is shown in Figure 5. Figure 5 shows that most of California's GHGs are emitted by transportation sources, such as automobiles, trucks, and airplanes. In 2012, combustion of fossil fuels in the transportation sector contributed approximately 37 percent of California's GHG emissions. This category was followed by the industrial sector (22 percent) and the electric power sector (including both in-state and out-of-state sources) (23 percent). It should be noted that prior to 2010, emissions from the electrical power sector were 2 to 23 MT CO<sub>2</sub>EQ greater than industrial emissions. However, since 2010 electrical emissions have been 5 to 12 MT CO<sub>2</sub>EQ lower than industrial emissions. This is a result of California's commitment to increasing sources of renewable electricity generation. Residential and commercial activity accounted for approximately nine percent of the emissions.

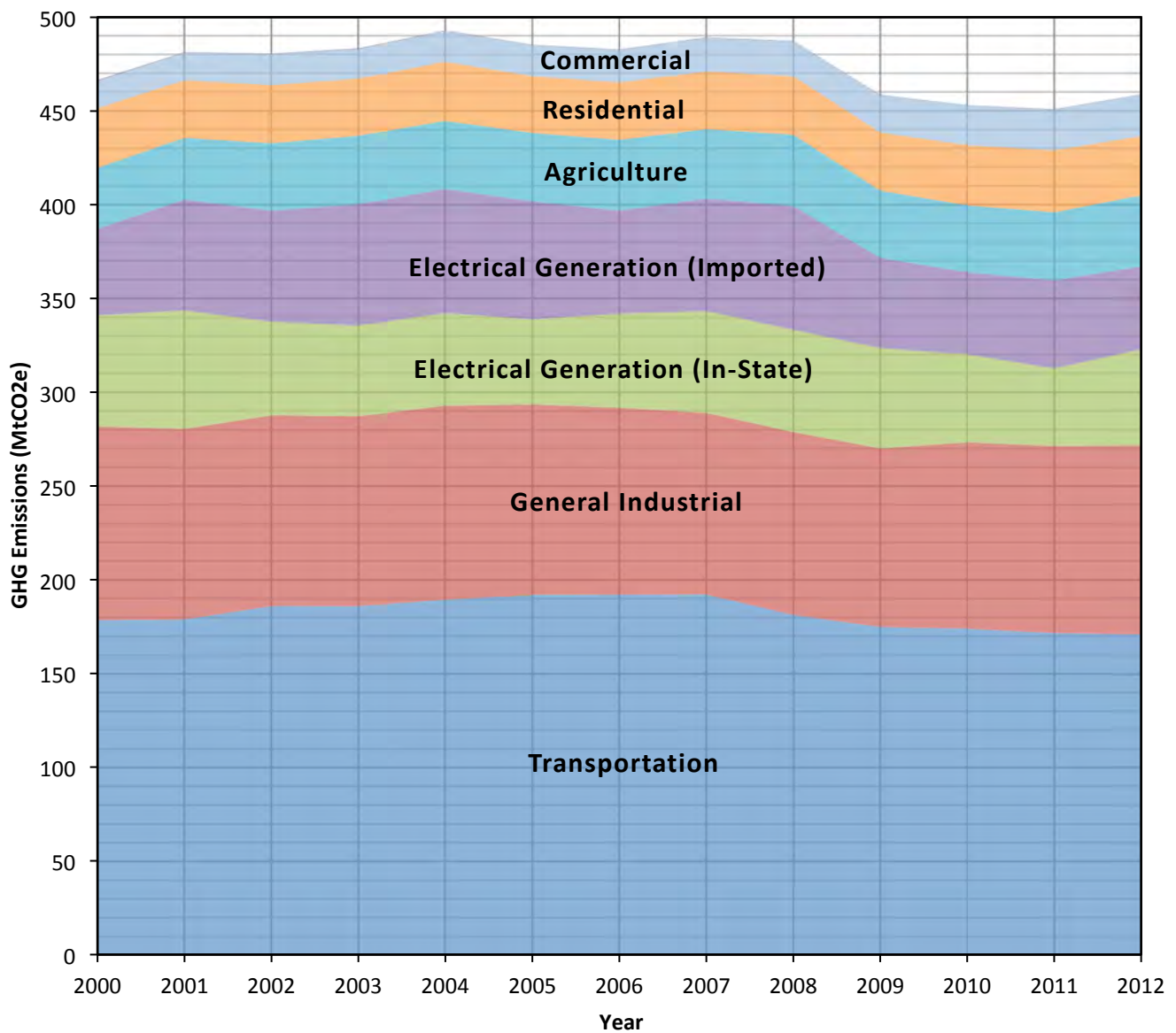
## **2.4 Regulatory Framework**

### **2.4.1 Federal Plans, Policies, Regulations, and Laws**

The federal government began studying the phenomenon of global warming as early as 1978 with the National Climate Protection Act, 92 Stat. 601, which required the President to establish a program to "assist the Nation and the world to understand and respond to natural and man-induced climate processes and their implications." The 1987 Global Climate Protection Act, Title XI of Pub. L. 100-204, directed the U.S. EPA to propose a "coordinated national policy on global climate change," and ordered the Secretary of State to work "through the channels of multilateral diplomacy" to coordinate efforts to address global warming. Further, in 1992, the United States ratified a nonbinding agreement among 154 nations to reduce atmospheric GHGs.

In 1999, a petition requested that EPA begin regulating GHGs. After taking extensive public comment, the EPA denied the petition in 2003. After lower courts denied petitions for review of EPA's decision, twelve states, several cities and environmental organizations sought further review in the Supreme Court. In their decision of *Massachusetts v. EPA* (Supreme Court Case 05-1120, April 2, 2007), the United State Supreme Court held that GHGs fall within the Clean Air Act's definition of an "air pollutant," and directed the EPA to consider whether GHGs are causing climate change. If so, the EPA must regulate GHG emissions from automobiles under the Clean Air Act. In April 2009, the EPA concluded that GHGs are a danger to public health and welfare, establishing a basis for GHG Regulation.

In September 2009, the EPA finalized a GHG reporting and monitoring program. This program requires facilities that emit more than 25,000 MT CO<sub>2</sub>EQ to report their GHG emissions annually. In the most recent reporting year, 2013, 7,879 facilities in nine industry sectors reported direct emissions of 3.18 billion MT CO<sub>2</sub>EQ, about half of the total GHG emissions in the United States.



Source: 2014 Edition California Greenhouse Gas Emission Inventory 2000-2012, CARB, May 2014



**Figure 5**  
**California GHG Emissions by Sector**  
 Armstrong Ranch Specific Plan

In June 2013, the Obama Administration published a Climate Action Plan with three key pillars: cutting carbon pollution emissions, preparing the country for the impacts of climate change, and leading international efforts to combat climate change and prepare for its impacts. The plan proposes cutting emissions under five general categories: (1) power generation, (2) transportation, (3) energy waste in homes, businesses, and factories, (4) specific GHGs (hydrofluorocarbons and methane), and (5) GHG emissions from federal government activities. The plan describes the activities that the administration has already undertaken to prepare for the impacts of climate change and proposes expanding these efforts in three major initiatives: (1) building stronger and safer communities and infrastructure, (2) protecting the economy and natural resources, and (3) using sound science to manage climate change impacts. The two key components to the administration's proposal to lead international efforts include working with other countries to take action to address climate change and international negotiations.

In September 2013, the EPA announced plans to adopt performance standards to limit GHG emissions from new power plants. In June 2014, the EPA announced a plan to reduce GHG emissions from existing power plants by 25 percent below 2005 levels by 2020 and by 30 percent by 2030. In addition, the Plan includes standards to limit emissions from modified and reconstructed power plants. In October 2014, the EPA announced a supplemental proposal to adopt standards for existing power plants. Over 4 million public comments were received regarding these proposals. In January 2015, the EPA announced it would begin the regulatory process for proposing a federal plan to meet goals for cutting carbon pollution from existing power plants. At the same time, the EPA announced plans to issue final rules on a clean power plan for existing power plants and carbon pollution standards for new, modified, and reconstructed power plants in the summer of 2015.

In March 2014, the Obama Administration released its Strategy to Reduce Methane Emissions as a part of its Climate Action Plan. This document describes several actions that the EPA and other federal agencies will take to reduce methane emissions from four source categories, landfills, coalmines, agriculture, and oil and gas. Under this plan, the EPA will propose updated standards to reduce methane emissions from new landfills and take public comment on whether to update standards for existing landfills. The Interior Department's Bureau of Land Management (BLM) will undertake rulemaking to develop a program for the capture and sale, or disposal of, waste methane from mines on lands leased by the Federal government. The U.S. Department of Agriculture (USDA), EPA, and Department of Energy (DOE) in partnership with the dairy industry will release a "Biogas Roadmap" outlining strategies to reduce U.S. dairy sector GHG emissions by 25 percent in 2020.

The Methane Reduction Strategy presents several measures to reduce emissions from oil and natural gas operations. The DOE and EPA will work with states, which are the primary regulators of many aspects of oil and gas production and natural gas distribution, to provide technical assistance in support of state policy actions, and to encourage broad adoption of proven mitigation strategies. The Strategy discusses how EPA regulations to address volatile organic compound (VOC) emissions, an ozone precursor, in natural gas production also reduce methane emissions. Further, the EPA has released a series of white papers on significant



sources of methane emissions from oil and gas operations<sup>1</sup>. The DOE will continue to work with stakeholders to reduce emission from natural gas systems and the EPA will bolster its voluntary Natural Gas STAR Program. The BLM will develop and draft rules to update the agencies requirements for venting and flaring of methane produced from Federal and Indian oil and gas leases. As a part of the Climate Action Plan, the DOE is preparing a Quadrennial Energy Review (QER) that will recommend actions that industry, and Federal and state governments can take to improve energy transmissions, storage, and distribution systems. The QER, slated for publication in spring of 2015, will evaluate methane abatement opportunities from the processing, transmission, storage, and distribution segments of the natural gas supply chain. In addition, the strategy calls for the Pipeline and Hazardous Materials Safety Administration to continue monitoring pipelines and require operators to eliminate leaks and prevent accidental methane releases. Finally, the DOE will support the development of new technologies to enable more cost-effective reductions through \$8 billion of loan guarantees for advanced fossil energy projects and a \$4.7 million DOE program to speed development of technologies for leak detection and monitoring, pipeline leak repair, smart pipeline sensors, and compressor controls.

In August 2014, the USDA, EPA, and DOE jointly released the Biogas Opportunities Roadmap, a voluntary strategy to reduce agriculture sector methane emissions. Biogas systems capture methane from farming operations and use it to generate electricity. Current biogas operations provide power for the equivalent of almost 70,000 average American homes. The report estimates that, with proper support, more than 11,000 additional biogas systems could be deployed in the US. These systems would provide electricity for more than 3 million average American homes and reduce methane emissions between 4 and 54 MMT CO<sub>2</sub>EQ. The roadmap presents a number of steps that USDA, EPA, and DOE will take to accelerate the use of cost-effective methane energy technology to encourage its use.

In January 2015, the Obama administration announced several actions to reduce methane emissions from new or modified oil and gas production facilities. The EPA plans to propose Federal regulations to cut methane emissions from these facilities by 40 to 45 percent from 2012 levels in the next decade. The proposed rules are to be published in the summer of 2015 and completed by 2016. The EPA is expected to rely on mostly voluntary measures to cut methane emissions from existing oil and gas operations.

The federal government has also taken several steps to reduce GHG emissions by increasing automobile fuel economy. In December 2007, Congress increased the corporate average fuel economy (CAFÉ) standards for passenger cars and light trucks to 35 miles per gallon by 2020. In May 2009, the Obama Administration proposed a new national fuel economy program ultimately requiring an average fuel economy standard of 35.5 miles per gallon in 2016. In July 2011, President Obama announced an agreement with thirteen large automakers, representing 90 percent of all vehicles sold in the US, to increase fuel economy to 54.5 miles per gallon for cars and light-duty trucks by model year 2025.

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<sup>1</sup> <http://www.epa.gov/airquality/oilandgas/whitepapers.html>

## **2.4.2 California State Plans, Policies, Regulations, and Laws**

California has distinguished itself as a national and international leader in efforts to address global climate change by enacting several major pieces of legislation, engaging in multi-national and multi-state collaborative efforts, and preparing a wealth of information on the impacts associated with global climate change.

### **2.4.2.1 Activity Prior to 2005**

In 2001, Senate Bills 1771 and 527 created the structure for the California Climate Action Registry. The non-profit Registry assisted organizations to voluntarily establish and record baseline GHG emissions so early action reductions could be considered in future regulations. In 2002, Assembly Bill 1493, Pavely, instructed CARB to develop and adopt GHG emission standards for automobiles. As discussed below, these standards were subject to legal challenges and non-approval by the EPA. However, the regulations that were eventually adopted became the basis of the federal fuel economy standards adopted in 2009. The State established its Renewable Energy Portfolio Standard Program in 2002 with a goal to increase the electricity generated using renewable energy to 20 percent by 2017. The 2005 Energy Action Plan increased this goal to 33 percent by 2020. In December 2004, Governor's Executive Order S-20-04 was issued directing state agencies to reduce energy use in state owned buildings by 20% by 2015 and to increase energy efficiency.

### **2.4.2.2 Executive Order S-3-05 and California Climate Change Assessments**

In June 2005, Governor Arnold Schwarzenegger issued *Executive Order S-3-05*, which set GHG emissions reduction targets for the State of California and laid out responsibilities among the state agencies for implementing the Executive Order and for reporting on progress toward the targets. The Executive Order established GHG emission reduction targets of: 2000 levels by 2010, 1990 levels by 2020, and 80 percent below 1990 levels by 2050.

The Executive Order also established the Climate Change Policy and Climate Action Team, which has completed three Climate Change Assessments and is in the process of completing the fourth. These assessments examine the potential impacts of climate change in California and report potential adaptation impacts. Each assessment consists of a number of reports examining various aspects of climate change and adaptation. Summaries have been prepared for the first and second assessments. All of the reports are available at the State's Climate Change Portal website [http://climatechange.ca.gov/climate\\_action\\_team/reports/climate\\_assessments.html](http://climatechange.ca.gov/climate_action_team/reports/climate_assessments.html).

The *First Climate Change Assessment*, released in 2006, looked at the potential impacts of climate change on key state resources such as the water supply, public health, agriculture, coastal areas, forestry, and electricity production and demand. The assessment influenced the passage of Assembly Bill 32, the *California Global Warming Solutions Act of 2006* discussed below in Section 2.4.2.4

The *Second Climate Change Assessment*, released in 2009, attempted to provide initial estimates of the economic impacts of climate change. It concluded that adaptation—as a complementary approach to mitigation—could substantially reduce

economic impacts of loss and damage from a changing climate. Findings from the Second Assessment were instrumental in preparing California's 2009 Statewide Adaptation Strategy discussed in Section 2.4.2.8.

The *Third Climate Change Assessment*, released in 2012, was shaped by the request for more information on vulnerability and adaptation options discussed in the 2009 California Adaptation Strategy. It made significant progress in projecting climate change impacts, but also in better understanding the interactions of those potential impacts with on the ground exposure, sensitivity, and response capacity of natural and human systems.

California's recently released *Climate Change Research Plan* articulates near-term climate change research needs to ensure that the state stays on track to meet its climate goals. The *Fourth Climate Change Assessment* is the first inter-agency effort to implement a substantial portion of the Plan and is currently being prepared.

#### **2.4.2.3 Subsequent Executive Orders Related to Climate Change**

In April 2006, Governor Schwarzenegger issued Executive Order S-06-06, which directs the Secretary of Cal EPA to participate in the Bio-Energy Interagency Working Group to address biofuels and bioenergy from renewable resources. In October of the same year, Executive Order S-20-06 was issued that establishes the responsibilities and roles of the Secretary of Cal EPA and the state agencies in climate change. In January 2007, Executive Order S-01-07 was issued establishing a goal to reduce the carbon intensity of transportation fuels by at least 10% by 2020 and calls for establishment of a Low Carbon Fuel Standard (LCFS). In November 2008, the Governor issued Executive Order S-13-08 directing state agencies to plan for sea level rise and other climate change impacts. This resulted in the preparation of the State's Adaptation Strategy discussed in Section 2.4.2.8.

In March 2012, Governor Edmund G. Brown Jr. issued Executive Order B-16-12, which orders State agencies to facilitate the rapid commercialization of zero-emission vehicles (ZEVs) and set a target for 1.5 million ZEVs in the state by 2025. The Executive Order also set a target for reducing transportation sector GHG emissions of 80 percent below 1990 levels by 2050. In April 2012, the Governor issued Executive Order B-18-12 that required State agencies to reduce GHG emission by 10% in 2015 and 20% in 2020, as measured against a 2010 baseline. In addition, the order sets requirements and goals for State buildings to be Zero Net Energy facilities and requires state agencies to reduce grid based energy purchases. The Executive Order included a Green Building Action Plan, which provided additional details and specific requirements for the implementation of the Executive Order.

In April 2015, Governor Brown issued Executive Order B-30-15 that established a GHG reduction target of 40 percent below 1990 levels by 2030 in order to meet the 2050 emission reduction target established by Executive Order S-03-05. CARB is directed to update the Climate Change Scoping Plan, discussed in Section 2.4.2.9, to express the 2030 target in terms CO<sub>2</sub>EQ emissions. The Order also directs the California Natural Resources Agency to update the State's climate adaptation strategy, Safeguarding California, Discussed in Section 2.4.2.8 every three years.

#### **2.4.2.4 California Global Warming Solutions Act of 2006 (AB 32)**

In 2006, the State adopted the landmark *California Global Warming Solutions Act of 2006 (AB 32)*. This Act declared that global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The Act directed CARB to take a number of actions: (1) identify and adopt regulations for discrete early actions that could be enforceable on or before January 1, 2010; (2) identify the statewide level of GHG emissions in 1990 to serve as the emissions limit to be achieved by 2020; (3) prepare and approve a Scoping Plan for achieving the maximum technologically feasible and cost-effective reductions in GHG emissions from sources or categories of sources of GHGs by 2020, and update the Scoping Plan every five years; (4) adopt a regulation that establishes a system of market-based declining annual aggregate emission limits for sources or categories of sources that emit GHG emissions; and (5) maintain and continue reductions in emissions of GHG beyond 2020. In addition, CARB was required to appoint and convene an Environmental Justice Advisory Committee and an Economic and Technology Advancement Committee to advise the Board during implementation of the Act.

The Early Action Plan and Scoping Plans required to be prepared under the Act are discussed in Sections 2.4.2.5 and 2.4.2.9 respectively.

In a December 2006 report, CARB estimated that California emitted between 425 and 468 million metric tons of CO<sub>2</sub>EQ in 1990. In December 2007, CARB finalized 1990 emissions at 427 million metric tons of CO<sub>2</sub>EQ, which established the 2020 emissions limit.

In December 2008, CARB enacted regulations under AB 32 to require mandatory reporting of GHG emissions capturing approximately 94 percent of industrial and commercial stationary source emissions. Entities required to report emissions included electricity generating facilities, electricity retail providers, oil refineries, hydrogen plants, cement plants, cogeneration facilities, and industrial sources that emit over 25,000 metric tons of CO<sub>2</sub> from stationary source

#### **2.4.2.5 Early Action Plan**

In October 2007, CARB published the *Early Action Plan* that identified nine discrete early action GHG reduction measures that were subsequently developed into voluntary programs and regulations. The regulations include: a low carbon fuel standard; landfill methane emission reductions; measures to reduce high GWP refrigerant emissions from vehicle air conditioning systems; requiring vehicle service providers to check and maintain proper tire pressures; requiring large semi truck trailers to incorporate aerodynamic features and low rolling resistance tires along with idle reducing technology; and providing dockside electrical service at shipping ports so that docked ships do not need to operate onboard generators. In addition, regulations were adopted to reduce high GWP GHG emissions associated with semiconductor manufacturing, to restrict the use of SF<sub>6</sub>, and to reduce high GWP GHG emissions from consumer products.

#### **2.4.2.6 Senate Bill 97 and CEQA Guidelines**

In 2007, Senate Bill 97 was adopted requiring the Governor's Office of Planning and Research (OPR) to prepare amendments to the CEQA Guidelines for the feasible mitigation of GHG emissions and the effects of climate change. Further, the OPR is required to periodically update these guidelines as CARB implements AB 32.

In June 2008, OPR issued a Technical Advisory on CEQA and Climate Change that provided an outline of the elements needed for a CEQA GHG analysis. The amendments to the CEQA Guidelines implementing SB 97 became effective on March 18, 2010.

Those CEQA Guidelines amendments clarified several points, including:

- Lead agencies must analyze the GHG emissions of proposed projects, and must reach a conclusion regarding the significance of those emissions. (CEQA Guidelines § 15064.4.)
- When a project's GHG emissions may be significant, lead agencies must consider a range of potential mitigation measures to reduce those emissions. (CEQA Guidelines § 15126.4(c).)
- Lead agencies must analyze potentially significant impacts associated with placing projects in hazardous locations, including locations potentially affected by climate change. (CEQA Guidelines § 15126.2(a).)
- Lead agencies may significantly streamline the analysis of GHGs on a project level by using a programmatic GHG emissions reduction plan meeting certain criteria. (CEQA Guidelines § 15183.5(b).)
- CEQA mandates analysis of a proposed project's potential energy use (including transportation-related energy), sources of energy supply, and ways to reduce energy demand, including through the use of efficient transportation alternatives. (CEQA Guidelines, Appendix F.)

#### **2.4.2.7 SB 375 – Sustainable Communities and Climate Protection Act**

In 2008, the legislature passed SB 375, which built upon AB 32 by connecting the reduction of greenhouse gas emissions from cars and light trucks to regional, and local land use and transportation planning. SB 375 requires the California Air Resources Board (ARB) to establish greenhouse gas emission reduction targets for each region, and each metropolitan planning organization (MPO) to create a Sustainable Communities Strategy (SCS) as part of the Regional Transportation Plan (RTP) to meet regional emissions reduction targets.

#### **2.4.2.8 Statewide Adaptation Strategy and Safeguarding California Plan**

Adaptation planning has been one of the primary responses to the threat of climate change in the State of California. In, 2009, the California Natural Resources Agency (CNRA) published the *2009 California Adaptation Strategy* in response to Executive Order S-13-08. A first year progress report was published by the agency in 2010. In April 2012, the California Emergency Management Agency, and CNRA published the *California Climate Change Adaptation Policy Guide* to aid local and regional entities in evaluating vulnerability to climate change impacts and devising

strategies to address these impacts. In July 2014, the CNRA updated the State's adaptation strategy and retitled it *Safeguarding California: Reducing Climate Risk*.

The Safeguarding California Plan provides policy guidance for state decision makers, and is part of continuing efforts to reduce impacts and prepare for climate risks. The Plan highlights climate risks in nine sectors in California: agriculture, biodiversity and habitat, emergency management, energy, forestry, ocean and coastal ecosystems and resources, public health, transportation, and water. The Plan discusses progress to date, and makes realistic specific recommendations for each of these sectors. In October 2014, CRNA published a draft *Safeguarding California: Implementation Action Plans*, which presents ten implementation plans that represent a master blueprint for executing the actions, recommended in the 2014 Plan. Implementation plans are presented for the nine sectors addressed in the initial Safeguarding California Plan as well as land use and community development.

#### **2.4.2.9 Climate Change Scoping Plan**

In December 2008, CARB adopted the first Climate Change Scoping Plan required by AB 32. The Scoping Plan is a comprehensive plan to achieve the GHG Emissions reduction targets called for by AB 32. The primary elements of the plan are: expand and strengthen energy efficiency programs, achieve a statewide renewable energy mix of 33 percent; develop a cap-and-trade program; and establish transportation emissions targets and establish fees. Table 4 provides a summary of the GHG emission reduction actions identified in the Scoping Plan. ARB estimated that the implementation of the Scoping Plan measures would reduce statewide GHG emissions needed to meet the 2020 limit. In September 2010, CARB reported that approximately 40 percent of the reduction measures identified in the Plan have been secured.

In May 2014, CARB adopted the First Update to the Scoping Plan. The Update builds upon the 2008 Scoping Plan defining the State's climate change priorities for the following five years. Existing strategies and recommendations are refined and expanded. Opportunities to leverage existing and new funding to further reduce GHG emissions through strategic planning and targeted low carbon investments are identified. The Plan sets the groundwork to reach the post-2020 reduction goals. It also evaluates how to align the State's long-term GHG reduction strategies with other State policy priorities for water, waste, natural resources, clean energy, transportation, and land use.

The First Update presents an outline of the latest understanding of climate science including increased certainty in humans' role in climate change. The State's approach to climate change is discussed, providing the underlying principles for the recommendations in the Plan. The Plan looks back at the GHG emission reductions that have been accomplished to date and presents the next steps needed to achieve the long-term climate goal of emissions 80 percent below 1990 levels by 2050. The Plan discusses the need for integrated and coordinated planning to achieve the State's GHG emissions reduction goals. The importance of transportation, land use and housing planning development is emphasized. Investments needed to enable these reductions are outlined. The Update also

discusses the monitoring and evaluation that will be needed to ensure successful implementation of the State's GHG emissions reduction policies and programs.

#### **Table 4** **First Scoping Plan Measures**

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**Cap-and-Trade Program:** Implement a broad-based California cap-and-trade program to provide a firm limit on emissions. Link the California cap-and-trade program with other Western Climate Initiative Partner programs to create a regional market system to achieve greater environmental and economic benefits for California. Ensure California's program meets all applicable AB 32 requirements for market-based mechanisms.

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**Light-Duty Vehicle Standards:** Implement adopted Pavley standards and planned second phase of the program. Align zero-emission vehicle, alternative and renewable fuel and vehicle technology programs with long-term climate change goals.

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**Energy Efficiency:** Maximize energy efficiency building and appliance standards, and pursue additional efficiency efforts including new technologies, and new policy and implementation mechanisms. Pursue comparable investment in energy efficiency from all retail providers of electricity in California (including both investor-owned and publicly owned utilities).

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**Renewables Portfolio Standard:** Achieve 33 percent renewable energy mix statewide.

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**Low Carbon Fuel Standard:** Develop and adopt the Low Carbon Fuel Standard.

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**Regional Transportation-Related GHG Targets:** Develop regional GHG emissions reduction targets for passenger vehicles.

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**Vehicle Efficiency Measures:** Implement light-duty vehicle efficiency measures.

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**Goods Movement:** Implement adopted regulations for the use of shore power for ships at berth. Improve efficiency in goods movement activities.

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**Million Solar Roofs Program:** Install 3,000 megawatts of solar-electric capacity under California's existing solar programs.

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**Medium- & Heavy-Duty Vehicles:** Adopt medium- (MD) and heavy-duty (HD) vehicle efficiencies. Aerodynamic efficiency measures for HD trucks pulling trailers 53-feet or longer that include improvements in trailer aerodynamics and use of rolling resistance tires were adopted in 2008 and went into effect in 2010. Future, yet to be determined improvements, includes hybridization of MD and HD trucks.

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**Industrial Emissions:** Require assessment of large industrial sources to determine whether individual sources within a facility can cost-effectively reduce GHG emissions and provide other pollution reduction co-benefits. Reduce GHG emissions from fugitive emissions from oil and gas extraction and gas transmission. Adopt and implement regulations to control fugitive methane emissions and reduce flaring at refineries.

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**High Speed Rail:** Support implementation of a high-speed rail system.

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**Green Building Strategy:** Expand the use of green building practices to reduce the carbon footprint of California's new and existing inventory of buildings.

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**High Global Warming Potential Gases:** Adopt measures to reduce high warming global potential gases.

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**Recycling and Waste:** Reduce methane emissions at landfills. Increase waste diversion, composting and other beneficial uses of organic materials, and mandate commercial recycling. Move toward zero-waste.

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**Sustainable Forests:** Preserve forest sequestration and encourage the use of forest biomass for sustainable energy.

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**Water:** Continue efficiency programs and use cleaner energy sources to move and treat water.

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**Agriculture:** In the near-term, encourage investment in manure digesters and at the five-year Scoping Plan update determine if the program should be made mandatory by 2020.

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While the original Scoping Plan provided specific GHG reduction measures in nine different economic sectors, the Update discusses reductions in six key focus areas (energy, transportation, agriculture, water, wasted management, and natural and working lands). Further, the plan addresses short-lived pollutants, green buildings, and the State's Cap and Trade Program. These focus areas include multiple economic sectors and have overlapping and complementary interests that require careful coordination. The following paragraphs provide summaries for the six key focus areas and three associated areas addressed in the Updated Scoping Plan

**Energy:** Fifty percent of the State's GHG emissions are associated with the energy sector. As discussed below, GHG reductions in other areas, such as transportation, space heating, and industrial processes will involve electrification. This additional demand increases the importance in GHG reductions from the energy sector. The Update calls for State agencies to develop comprehensive and enforceable GHG emission reduction requirements by the end of 2016 that will require the State's electric and energy utilities to achieve near-zero GHG emissions by 2050. This will require emission reductions from generation facilities as well as enhancing transmission and distribution efficiency and general electrical conservation.

Senate Bill 1368 (Perata, Chapter 598, Statutes of 2006) required the California Public Utilities Commission (PUC) to establish the nation's first GHG emissions performance standard for electrical generation applicable to the electricity providers in its jurisdiction including the State's three largest privately owned utilities. These regulations were adopted in 2007.

California's Renewable Portfolio Standard (RPS) was established in 2002 under Senate Bill 1078. This bill required investor owned utilities to generate 20 percent of their electrical from renewable resources by 2017. Senate Bill 107, adopted in 2006, accelerated implementation requiring compliance by 2010. Senate Bill 2 expanded the program in 2011. Currently, the RPS program requires investor-owned utilities (IOUs), electric service providers, and community choice aggregators to increase procurement from eligible renewable energy resources to 33 percent of total procurement by 2020. In 2013, the three largest IOUs procured approximately 23 percent of their electricity from renewable resources.

Due to the variable generation characteristics of renewable resources, such as wind and solar, load-following resources are required to maintain grid stability. This is typically provided using quick-start fossil fuel generation plants. Demand response, actions taken by consumers to adjust the amount or timing of energy consumption, provides a more effective method of load following increasing the potential GHG emission reductions from renewable power generation. In addition, changes to the electricity delivery markets can provide low-cost, low-risk means of providing load balancing. Distributed generation and energy storage are additional demand-side resources that can provide load following.

The Plan calls for the State's energy agencies to develop rules and regulations to allow demand response resources to participate in wholesale markets. In addition, the Plan identifies other market based changes needed for penetration of variable renewable resources. Enhanced energy efficiency and demand response programs, including education/outreach programs are to be developed. The California Public



Utilities Commission (CPUC) and California Energy Commission (CEC) are directed to streamline the interconnection processes to facilitate distributed generation. The CPUC has adopted an energy storage procurement framework and design program that requires investor-owned utilities to procure 1,325 MW of energy storage by 2024.

The Plan also discusses combined heat and power systems (CHP), also known as cogeneration, which generates electricity and steam in a single system for use by industrial, commercial and institutional applications. In addition to the increased efficiency, CHP also provides distributed generation. Despite previous policy actions, incentives, and being included in the First Scoping Plan, significant barriers to installing CHP remain. The Plan calls for CARB to assess these barriers and propose solutions to achieve the CHP system goals from the initial Scoping Plan and the Governor's Clean Energy Jobs Plan.

Energy efficiency is an important component in reducing GHG emissions associated with the energy sector. This is discussed further under the Green Buildings subheading.

The majority of industrial related GHG emissions are energy related and majority of industrial emission reductions will be realized through the State's Cap-and-Trade program, discussed below. CARB has collected fuel and energy usage and air pollutant emission data from the 43 largest industrial sources in the State. Information on energy efficiency and emission reduction projects enacted by these facilities was also collected. This data will be used by CARB to identify best approaches to increase energy efficiency and reduce emissions at large industrial facilities.

Carbon capture and sequestration (CCS) is another option to reduce emissions from industrial sources and electricity generation facilities. With CCS, carbon emissions are captured before they are released into the atmosphere and then stored. While carbon capture is a fairly well developed technology, sequestration is less well understood. CARB is working with researchers from the Lawrence Berkeley National Laboratory to evaluate quantification methodologies for carbon sequestration. The Update calls for CARB, the Division of Oil, Gas & Geothermal Resources, CEC, and CPUC to work together to develop a quantitative carbon sequestration methodology for California GHG emission and sources.

**Transportation, Land Use, Fuels, and Infrastructure:** California's transportation system accounts for approximately 36 percent of the State's GHG emissions. Further, it is the primary source of smog-forming and toxic air pollutants in the State. In order to meet the national ambient air quality standard for ozone in 2032, transportation emissions will need to be reduced on the order of 90 percent below 2010 levels in the South Coast and San Joaquin Valley Air Basins. The Update specifies for strategies to reduce transportation emissions: (1) improve vehicle efficiency and develop zero-emission technologies, (2) reduce the carbon content of fuels, (3) plan and build communities to reduce vehicular GHG emissions and provide more transportation options, and (4) improve the efficiency and throughput of existing transportation systems.

In 2004, California was the first state in the nation to require GHG emissions reductions from motor vehicles. Regulations enacted by CARB under Assembly Bill 1493 (Pavley, Chapter 200, Statutes of 2002) formed the foundation for federal GHG and fuel-economy programs for light duty vehicles in the 2012-2016 model years. The Update calls for future light-duty vehicle standards that achieve five percent per year reductions through at least 2030. Light-duty vehicles will need to be largely electrified by 2050 to achieve the State's long-term GHG reduction goal. Large numbers of zero (ZEV) and near-zero (NZEV) emission medium- and heavy-duty vehicles will be required as well.

California and the EPA have adopted "Phase 1" GHG standards for all medium- and heavy-duty vehicles and engines. This standard will reduce emissions from new Class 8 heavy-duty vehicles by four to five percent per year from 2014 to 2018. CARB and the EPA are planning to finalize "Phase 2" standards in 2016 that will continue these reductions beyond 2018. CARB estimates emissions from these vehicles can be reduced by about five percent per year through 2025 using commercially available technologies. However, these reductions are considerably less than what is needed to meet the State's goals. Many zero emission technologies for trucks have progressed to at least the demonstration phase and smaller battery-powered trucks are available. The Plan calls for CARB to engage the Office of Planning and Research (OPR) to expand upon the 2013 ZEV Action Plan for medium- and heavy-duty ZEVs by 2017.

In addition to reducing heavy-duty truck emissions, the Update calls for emission reductions from the entire freight system including ports, rail, aircraft and distribution facilities. The Plan calls for CARB to complete the first phase of a Sustainable Freight Strategy in 2014. This was anticipated to be a concentrated, one-year effort to produce a document to provide a holistic look at the freight system and identify actionable next steps through 2020. In late 2014, CARB announced a shift from coordinating multiple freight plans to instead integrating the State's freight planning. CARB plans to release a document in the spring of 2015 that will identify regulatory and voluntary levers to accomplish a zero/near-zero emission freight system. The document is anticipated to also articulate outstanding questions on technology, infrastructure, and economics that need to be addressed in 2015.

Reducing the carbon content of fuels is an important component of the States GHG reduction plan. Executive Order S-01-07 called for a reduction of the carbon intensity of the State's transportation fuels by at least 10 percent in 2020. CARB identified a low-carbon fuel standard (LCFS) as one of three early action measures in 2007. California's LCFS, adopted in 2009, requires the carbon intensity of transportation fuels to be reduced by at least 10 percent in 2020. In addition, fuels will come under the State's Cap-and-Trade Program in 2015. These programs provide a structure to ensure necessary emission reductions are achieved. However, achieving GHG and air quality goals will require a portfolio of renewable transportation fuels, including electricity and hydrogen, well beyond current trajectories. The Plan calls for CARB to propose enhancements to strengthen the LCFS and consider extending the standard beyond 2015 with more aggressive long-term targets.

The Plan calls for the CPUC, CEC, California Department of Food and Agriculture (CDFA), and CARB to evaluate and adopt necessary regulations and/or policies to further support commercial markets for low-carbon transportation fuels. These may include: reducing off-peak demand charges for electricity to encouraging off-peak plug in vehicle charging; developing large-scale renewable and low-carbon fuel production facilities through infrastructure funding; developing and adopting performance and quality standards; streamlining permitting and siting for hydrogen fueling and charging infrastructure and utility interconnection; and research.

California has developed a critical, unique policy mechanism for reduction transportation sector GHG emissions as a result of Senate Bill 375 (Steinberg, Chapter 728, Statutes of 2008). This bill requires regional and local planning agencies to develop Sustainable Communities Strategies as part of the federally required Regional Transportation Plan (RTP) as well as preparing the State required general plan housing elements to meet these targets. The goal of SB 375 is to reduce GHG emissions from passenger vehicles through better-integrated regional transportation, land use, and housing planning that provides easier access to jobs, services, public transit, and active transportation options.

The State's role in implementing these strategies is to provide ongoing support through access to financial resources and incentives, guidance documents, housing element certification, planning tools, and other forms of assistance. The Update calls for CARB, Caltrans, Strategic Growth Council (SGC) and Department of Housing and Community Development (HCD) along with other State local and regional agencies to coordinate planning and support to ensure that the expected GHG emission reductions from approved SCS are achieved or exceeded.

In 2010, CARB established initial emission targets for Metropolitan Planning Organizations to meet in their Sustainable Communities Strategies. The Update calls for CARB to review these targets in 2014 considering advancements in data, models, analytical methodologies, and technologies that have occurred since 2010. These revised targets will be used by MPOs when updating their Sustainable Communities Strategies consistent with the time frame for updating the RTP under federal law.

California's High-Speed Rail (HSR) is also an important component of the State's GHG emission reduction efforts. European countries have seen more than half of travelers switch from air travel when a high-speed rail alternative is provided. The Update calls for the HSR Authority to continue construction of the HSR system with completion of the initial operating segment by 2022. The segment from Los Angeles to San Francisco is to be completed by 2029. An important component to realize the full emissions reductions from HSR is its connection to link it seamlessly to local public transit systems. The Plan calls for the HSR Authority to work with other rail and mass transit providers to increase ridership regionally and inter-regionally.

The Initial Scoping Plan identified several strategies for improving transportation system efficiency and reducing associated GHG Emissions. Many of them have been implemented or are still under development including; ship electrification at ports; tire pressure maintenance, fuel-efficient tires, and low-friction motor oils.

These strategies are not limited to treating vehicles. Concrete specifications and alternative asphalt pavements provide opportunities for further reductions. Providing access for all roadway users including, bicyclists, pedestrians, transit vehicles, truckers, and motorists encourages the use of lower emitting transportation modes. A complete street is one that is planned, designed, operated and maintained to provide safe mobility for all users. Caltrans has adopted a *Complete Streets Implementation Action Plan* and revised its *Highway Design Manual* to better provide access for all transportation modes.

Current smart phone and vehicle “apps” can provide real-time travel information along with routing and driving suggestions to reduce emission from existing vehicles. Coordinating signal timing and providing drivers with real-time information about signal status can reduce emissions in urban driving by up to 10 percent. Existing and emerging technologies will lead to an increasingly connected and automated transportation system that could have dramatic efficiency and emissions benefits. These include vehicle-to-vehicle and vehicle-to-infrastructure communications and, ultimately, autonomous vehicles. However, early studies have demonstrated both emission decreases and increases depending on how the systems are implemented and the degree to which they may induce additional vehicle travel.

The Update notes that incentive funding is essential to encourage the use of alternative transportation modes, develop and deploy low-carbon fuels, spur fleet turnover, and continue to develop advanced technologies. The Plan calls for the State to leverage available public money to scale-up clean technology markets and strategies and ensure the necessary infrastructure investments. CARB, CEC, CPUC, and CDFA will support growing markets for clean passenger transportation, advanced technology trucks and equipment, and low-carbon transportation fuels and energy, including any necessary infrastructure. Caltrans will work with local and regional agencies to consider lifecycle benefits and impacts for transportation infrastructure projects. Caltrans and regional transportation agencies will increase investment in expanded transit and rail services, active transportation, and other VMT-reduction strategies in their next regional transportation plans. SGC will support SCS implementation. This will include integration of the regional transportation and Regional Housing Needs Allocation planning as well as providing local assistance for transit, active transportation, and affordable transit-oriented housing development.

**Agriculture:** In 2012, agriculture accounted for about eight percent of the State’s total GHG emissions. Agriculture is the largest water user in the state. Minimizing water usage is one of the primary means for reducing agricultural related GHG emissions by reducing emissions from energy sources required to transport the water. In addition, improved water usage and farming techniques, including precision irrigation may lead to reduced fertilizer use. Fertilizers generate nitrous oxide emissions when they are applied and can increase emissions that occur during tilling. Tilling releases carbon dioxide as well.

Livestock manure is also a significant source of methane emissions as is rice production. Both methane and nitrous oxide are short-lived climate pollutants that are primary targets for GHG reductions due to their high GWP. Agriculture can also

contribute to reducing energy sector GHG emissions by providing biomass feedstock for bioenergy production. Agriculture can also be a carbon sink, where carbon is stored (sequestered) in both crops and soil.

As the state's population increases, pressures to convert agricultural operations to urban and suburban developments increase as well. On a per acre basis, GHG emissions from urban areas are much greater than those from agricultural operations. Therefore, conservation of agricultural lands is important in meeting the state's long-term GHG emission goals. The Plan calls for the Office of Planning and Research (OPR), the California Natural Resources Agency (CNR), the California Environmental Protection Agency (CalEPA), California Department of Food and Agriculture (CDFA) and CARB to convene an interagency workgroup to develop recommendations and targets for incorporating farmland conservation in local and regional land use planning.

The Scoping Plan Update calls for the establishment of mid-term and long-term 2050 GHG emission targets for the agricultural sector. CARB will convene an interagency working group to establish these targets; develop recommendations to reduce water delivery GHG emissions; and develop tools for agricultural facility operators. These tools will allow operators to estimate GHG emissions and sequestration as well as to analyze emission reduction options. The Plan also calls for research to better quantify agriculture GHG emissions and reduction options along with the benefits of highly efficient farming practices. Incentives to employ these farming practices are to be provided. The CDFA is to strengthen technical assistance and financial incentives to help agricultural operators reduce GHG emissions. The plan also calls for evaluating fertilizer usage data collected by Regional Water Quality Boards to improve estimates of fertilizer related emissions.

The First Scoping Plan included a voluntary strategy of the installation of manure digesters at dairies and other livestock operations. Digesters capture the methane from manure storage lagoons and use it to generate electricity. However, economic obstacles have considerably limited the installation of new digesters. The Update calls for CARB to work with federal, state, and local agencies as well as stakeholders, farmers and utilities, to remove these obstacles. Further, CARB's Dairy Digester Workgroup will develop recommendations for methane capture standards by 2016.

The Bioenergy Interagency Working Group (BIWG), composed of state agencies with important biomass connections, prepared a Biomass Action Plan for the state in 2006 that was last updated in 2012. The Update calls for the BIWG to act to promote the input of digester biogas into natural gas pipelines and bioenergy into the electric grid. In addition, the BIWG is to evaluate the state's capacity for biomass energy generation and to develop methods to quantify GHG reductions relative to the biomass life-cycle.

**Water:** GHG emissions from the water sector are primarily due to the energy used to convey, treat, and heat the water. Approximately 19 percent of the State's electricity and 30 percent of non-power plant natural gas consumption is used by the water sector. Water conservation reduces GHG emissions by reducing the amount of energy required to transport and treat the water. Water conservation is

also needed because of the State's ongoing drought. The drought also impacts energy by reducing hydroelectricity production and requiring more groundwater pumping due to reduced surface flows. The Update calls for closer coordination between water and energy managers. Water conservation is also needed to improve the State's resilience to the more frequent and severe droughts anticipated due to climate change.

A key component of California's 2009 Water Conservation Act (Senate Bill x7-7) is a goal to reduce urban per-capita water use by 20 percent by 2020. The State has also set ambitious goals for the development of alternative water sources such as recycled water and storm water. Over \$1.15 billion in grant and loan programs have been provided for recycling and storm water capture infrastructure. The State is also implementing several targeted efficiency, recycling, and conservation programs as part of an integrated water management plan.

The Update calls for a conservation-first policy for water-sector investment. The Department of Water Resources (DWR) and State Water Resources Control Board (SWRCB) are to give priority to funding for integrated water management plans with robust water and energy efficiency and conservation measures. SWRCB and the regional water quality control boards are to incentivize resource-recovering wastewater treatment projects.

The Update discusses cites several measures from California Water Action Plan (CWAP) that will also reduce GHG emissions. The CWAP calls for the DWR, SWRCB, California Public Utilities Commission (CPUC), the California Energy Commission (CEC), California Department of Food and Agriculture (CDFA) and CARB to guide the adoption of policies for water sector investment and action that result in GHG emission reductions. The DWR, SWRCB, CPUC, in consultation with the CDFA, are to implement water rate structures that accurately reflect the economic, social, and environmental value of water while maintaining affordable basic services. Further, the SCRCB are to develop a comprehensive ground water management strategy with the DWR and CDFA providing technical and financial assistance to meet and exceed Senate Bill x7-7 reduction targets. Finally, the CWAP calls for promotion of water-energy conservation outreach and education from the DWR, SWRCB, CPUC, CEC and California Independent System Operator (CAISO).

**Waste Management:** The primary source of GHG emissions from the waste management sector is the direct release of methane from the decomposition of organic materials in landfills. Emissions are also generated by the movement and processing of waste. Recycling, reusing, and reducing waste materials not only reduces waste processing emissions, but also reduces upstream emissions associated with the production and transport of products. In 1989, Assembly Bill 939 required municipalities to reduce the amount of waste going to landfills by 50 percent in 2000. In 2012, the amount of waste was reduced by 66 percent. Assembly Bill 341 (Chesbrow, Chapter 476, Statutes of 2011) sets a goal that 75% of waste be reduced, recycled, or composted by 2020. This goal is anticipated to reduce annual GHG emissions by 20 to 30 MMTCO<sub>2</sub>EQ.

The Update calls for CARB and CalRecycle to identify financing, funding, and incentive mechanisms for infrastructure development to support the Waste

Management Sector Goals. Further, these agencies are to develop methods to estimate GHG emission reduction potential for various recycling and remanufacturing strategies. CalRecycle and the Department of General Services are tasked with taking the lead in improving the State's procurement of recycled-content materials. The Plan also calls for manufacturers to take greater responsibility for end-of-life product management, along with product design changes that minimize environmental impacts.

To address methane emissions, the Update calls for CARB and CalRecycle to develop programs to eliminate the disposal of organic material at landfills. CARB is to identify opportunities for additional methane control at landfills and ways to increase the utilization of captured methane. Methane captured from landfills can also be used to generate electricity. The Plan calls for the consideration of legislation, direct regulation, or inclusion of landfills in the Cap-and-Trade Program. Further, CARB is to lead a process of recommending actions to address permitting and siting challenges with composting and anaerobic digestion to provide destinations for the diverted organic materials. Efforts to divert greenwaste (biomass) from the waste stream complement energy sector goals to further develop resources for renewable biomass electricity generation.

**Natural and Working Lands:** Natural and working lands act as both a source of GHG emissions, from fires and natural decay, and as a carbon sink, with vegetation growth removing CO<sub>2</sub> from the atmosphere. CO<sub>2</sub> sequestration from natural and working lands is a significant opportunity to reduce GHG emissions. However, emissions quantification research undertaken as a result of the First Scoping Plan indicates that loss of forest and other natural lands represents a potentially more significant source of CO<sub>2</sub> than previously estimated. Nonetheless, this new knowledge will help identify the steps needed to reverse adverse trends and inform new efforts to manage natural and working lands for net climate benefits. The Plan calls for continuing this research to reduce uncertainty in GHG emission estimates for natural and working lands. The Update notes the need for early action in this category as activities to increase carbon storage such as reforestation or restoration will require time to fully realize the benefits. For example, trees planted today will reach their maximum sequestration capacity in 20 to 50 years.

The Update calls for the California Natural Resources Agency (CNRA) and CalEPA to prepare a Forest Carbon Plan in 2016, which will set quantitative near-, mid-, and long-term planning targets to ensure a net increase in forest carbon storage. This will include an evaluation of emissions and sequestration from different forestland ownership types and consideration of targets for each type. The Forest Carbon Plan will identify actions to meet the targets and develop recommendations for funding actions to ensure that forests in California provide lasting long-term carbon storage.

The Update calls for the development of a carbon life cycle analysis for wood products by CAL Fire and the Board of Forestry and Fire Protection. This will identify emissions associated with the processing and transport of wood product through the supply chain as well as emission differences due to the location of the source wood. This will allow for the development of guidelines to identify and incentivize the use of wood products with smaller GHG footprints.

As with agricultural lands discussed above, conservation of natural and working lands is important for the State to achieve its GHG goals. The plan calls for the Office of Planning and Research (OPR), CNRA, CalEPA, California Department of Food and Agriculture (CDFA), California Department of Fish and Wildlife (CDFW), CAL FIRE, and CARB to form a workgroup to engage local and regional land use agencies to establish a coordinated land use program. The program will set planning targets that identify, prioritize and incentivize land use conservation, increase urban forestry canopy cover, bolster development of green infrastructure, and limit the conversion of both agricultural croplands and natural and working lands. The Update also calls for the CNRA, CalEPA, CDFA, CDFW, CAL FIRE, and CARB to convene a natural and working lands climate investment working group and prepare a report outlining funding needs, opportunities, and priorities for the Natural and Working Lands Sector

As discussed above, bio-energy production provides a cleaner alternative to fossil fuel energy production. Forest management practices can result in materials being burned in open piles producing both criteria air pollutant and GHG emissions. Diverting these materials to bio-energy production would minimize these emissions and offset fossil fuel emissions. The Update calls for the Bioenergy Interagency Working Group to evaluate the potential biomass energy generation capacity and to develop life cycle emissions estimates for biomass. The Group is also to strengthen, refine, and implement actions contained in its Bioenergy Action Plan related to use of forest biomass.

Urban forests are identified as an opportunity for reducing GHG emissions and can significantly reduce the disproportionate environmental impacts on the State's environmental justice communities. Trees in urban environments provide shading and cooling benefits reducing urban temperatures and energy needs. In addition, they reduce storm water runoff, clean the air, and promote active transportation. The Update calls for the expansion of urban forestry and green infrastructure programs and investments, particularly in environmental justice communities.

**Short-Lived Climate Pollutants:** Short-lived climate pollutants (SLCPs) include black carbon, methane, tropospheric ozone, and some hydrofluorocarbons (HFCs). Black carbon and ozone are already regulated by CARB. In 2020, black carbon levels are anticipated to be 95 percent below late 1960 levels due to diesel controls and burning restrictions. Peak ozone levels have been reduced by more than 75% since the 1960's. Substantial further reductions in peak ozone levels are needed to meet the 2008 Ozone National Ambient Air Quality Standards (NAAQS) by 2032. In the fall of 2014, Governor Jerry Brown signed SB 605, the Short-Lived Climate Pollutant Act of 2014. This Bill mandated that the state complete a comprehensive inventory of SLCPs along with a plan for reducing SLCPs such as methane by the end of 2015. Continuing diesel controls on black carbon emissions, and reducing emissions to achieve the ozone NAAQS, are two measures identified in the Update along with the work completed under SB 605.

Atmospheric measurements suggest that actual methane emissions are 1.3 to 1.7 times higher than estimated in CARB's emission inventory. State and federal agencies, universities and national laboratories have put into place a comprehensive set of research studies to identify the sources of these emissions



and whether additional controls are feasible and cost effective. In 2014, the federal Climate Action Plan—Strategy to Reduce Methane Emissions was published by the Obama Administration (this is discussed further in Section 2.4.1 above). As discussed previously Methane has 84 times the global warming potential (GWP) of CO<sub>2</sub> over a 20-year span and 28 times the GWP over a 100-year span. Strategies to address methane emissions in the Update are identified in the sector discussions on energy, agriculture, and waste discussed previously.

A subcategory of SLCPs, high GWP gasses (GWP greater than 150), has an even higher significance on climate change than other SLCPs. These gasses are manufactured, have no natural sources, and have been used for decades, primarily in refrigerators, air conditioners, and foam insulation. While emissions of these gases are only three percent of the State's GHG emissions, they are the fastest growing GHG source in the State. This is largely the result of the Montreal Protocol mandates requiring hydrofluorocarbons (HFCs) replace ozone-depleting substances (ODS). HFC emissions are anticipated to increase by about 40 percent between 2012 and 2020. Without controls, HFC emissions are anticipated to double by 2050 and account for approximately half of the State's long-term GHG emission target.

CARB's Refrigerant Management Program, a measure from the First Scoping Plan, is expected to result in the biggest reductions of high GWP gas emissions. The motor vehicle air conditioning credit program part of the Low Emissions Vehicle (LEV III) regulation is also expected to result in considerable reductions of these missions.

The use of Low GWP substitutes for HFCs and ODSs is becoming increasingly feasible and cost-effective. The Update calls for CARB to require the use of low GWP gases where feasible and cost effective. In addition, the State is to work with the US EPA to establish a national standard aligned with the European Union's proposed phase down of HFC production and importation. The plan also calls for an upstream mitigation fee on the sales of high-GWP gasses and equipment pre-charged with high-GWP gasses. This fee would incentivize the transition to low-GWP substitutes and improve refrigerant recovery practices.

By restricting production and consumption, the Montreal Protocol has significantly reduced ODS emissions. However, it appears that end-of-life emissions from legacy equipment are still significant. The Update states that an 80 percent reduction in these end-of-life OSD emissions can be obtained by 2030 by incentivizing recovery and destruction of these OSDs. The Update calls for CARB to incentivize the recovery of OSDs at the end of life through a combination of strategies including adjusting current OSD destruction protocols or implementing mitigation.

**Green Buildings:** Electricity, gas, and water consumed by buildings are the second largest source of statewide GHG emissions. However, this is not a comprehensive accounting of GHG emissions associated with buildings. It does not include the complete lifecycle emissions of building materials and materials consumed for upkeep and maintenance of the buildings. In addition, siting and integration of buildings into communities affect GHG emissions. A better understanding of lifecycle emissions and community effects is needed to identify GHG emission reduction opportunities. The Update calls for CARB to explore methodologies to fully quantify emissions from new and existing buildings.

Green buildings use an integrated process that incorporates GHG emissions and sustainability to improve the design and construction of new buildings, as well as to retrofit, maintain, and operate existing buildings. The California Green Building Standards (CALGreen) Code was adopted for voluntary implementation in 2008. The code became mandatory in 2010, but only for additions and alterations for non-residential buildings and new construction of low-rise residential buildings. In 2014, the scope of the code was expanded to all residential buildings, including high-rise, as well as additions and alterations.

The 2013 triennial revision to the CALGreen standards provides for 25 percent more efficient residential buildings and 30 percent more efficient non-residential buildings. However, 55 percent of residences and 40 percent of commercial buildings were constructed before California's energy efficiency standards were established. Assembly Bill 758 (Skinner, Chapter 470, Statutes of 2009) requires the California Energy Commission (CEC) to develop and implement an energy efficiency program for existing buildings. This program, currently being drafted, will include recommendations for improving Title 24 compliance rates for building upgrades. Increased compliance is to be achieved through enhanced usability for building additions and alterations, energy disclosure approaches, and aggressive but practical solutions to increase the energy efficiency of existing buildings. The CPUC's Big Bold Energy Efficiency Strategies set policy goals to achieve zero-net-energy in all new residential buildings by 2020 and commercial buildings by 2030.

The Update calls for CARB to continue research to better quantify the potential GHG reductions from certified green buildings as well as strengthening the next two triennial editions (2016 and 2019) of the CALGreen code with additional mandatory GHG emission reduction provisions. Further, the update calls for the continued development and implementation of green building retrofit requirements at time-of-sale or other trigger mechanism

Executive Order B-18-12, discussed above, sets environmental requirements for new and renovated state buildings and the Update calls for achieving this order. The order calls for half of all new state facilities designed and constructed after 2020, and all new state buildings and renovations starting design in 2025, to be zero net energy. The Update calls on CARB to build on existing zero net energy building goals and activities. Zero net carbon buildings are key for achieving the State's GHG goal. The Update calls for CARB to establish target dates and pathways towards zero net carbon buildings by 2017 and to develop a mechanism to track progress towards statewide green building goals by 2018.

**Cap-and-Trade Regulation:** The First Scoping Plan recommended development of a State Cap-and-Trade Program. In 2013, CARB launched the second largest GHG Cap-and-Trade Program in the world. The program was linked to the Canadian Province of Québec's Program in 2014. The State's Cap and Trade Program establishes a hard and declining cap on approximately 85 percent of the statewide GHG emissions. CARB distributes allowances equal to the total allowable emissions to regulated entities. Each entity must hold allowances or other compliance instruments equal to its emissions. A portion of the allowances is auctioned by the state and proceeds are used to fund projects that reduce GHG emissions. The

Program also includes an Adaptive Management Plan to track and correct unintended consequences of Regulations that CARB continues to implement.

Initially, electrical generating utilities, electricity importers, and large industrial facilities were subject to the Program. Fuel distributors were brought under the cap in 2015. The hard cap and high percentage of emissions covered provides assurance that the State's 2020 emission limit will be met. The Update calls for CARB to develop a plan for a post-2020 Program. Under the Cap-and-Trade Program, companies can use credits to offset a portion of their emissions. Offset credits are rigorously verified GHG emission reductions from projects outside the scope of the Cap-and-Trade regulation and are provided as a cost-containment mechanism. The current Regulation includes offset protocols for four project areas; forestry, urban forestry, manure digesters, and the destruction of ozone depleting substances. Protocols for the capture and destruction of fugitive methane emissions from mines and rice production are being implemented. The Update notes that there are not enough offsets to meet the demand if every entity chooses to use its maximum offsets and discusses the difficulties in developing such programs in the current regulatory environment. The Update calls for consideration of international sector-based offset programs and identifies carbon-capture and sequestration as another option to reduce emissions and/or provide offsets under the Program.

#### **2.4.3 South Coast Air Quality Management District Plans, Policies, and Regulations.**

The South Coast Air Quality Management District ("SCAQMD") adopted their *Policy on Global Warming and Stratospheric Ozone Depletion* in April 1990. The policy commits the SCAQMD to consider global impacts in rulemaking and in drafting revisions to the Air Quality Management Plan. In March 1992, the SCAQMD Governing Board reaffirmed this policy and adopted amendments to the policy to include the following directives:

- Phase out the use and corresponding emissions of chlorofluorocarbons (CFCs), methyl chloroform (1,1,1-trichloroethane or TCA), carbon tetrachloride, and halons by December 1995;
- Phase out the large quantity use and corresponding emissions of hydrochlorofluorocarbons (HCFCs) by the year 2000;
- Develop recycling regulations for HCFCs (e.g., SCAQMD Rules 1411 and 1415);
- Develop an emissions inventory and control strategy for methyl bromide; and,
- Support the adoption of a California GHG emission reduction goal.

The legislative and regulatory activity detailed above is expected to require significant development and implementation of energy efficient technologies and shifting of energy production to renewable sources.

In September 2008, the SCAQMD adopted a Climate Change Policy that calls on the District to actively seek opportunities to reduce emissions of criteria, toxic, and

climate change pollutants and maximize synergistic effects of strategies that reduce emissions in more than one of these categories. The Agency is to also assist businesses and local governments implementing climate change measures, decrease the agency's footprint, and provide climate change information to the public. The Policy directs ten actions for the District staff to take.

The Policy directs District Staff to work with other entities to develop quantification protocols, rules, and programs related to greenhouse gases and to actively pursue funding opportunities for research and emission reduction projects. Staff is to use its experience and lessons learned from the Regional Clean Air Incentives Market (RECLAIM), a criteria air pollutant emissions cap-and-trade program operated for many years by the SCAQMD, to help assist other agencies develop GHG cap-and-trade programs. Staff is to review and comment on proposed legislation related to climate change and GHGs. When Technology Advancement Office (TAO) projects have equal benefits for criteria and toxic pollutants, priority is to be given to project that also reduce GHGs. Staff is to develop an interim GHG CEQA significance threshold, provide guidance on analyzing GHG emissions and mitigation, consider and mitigate GHG impacts in SCAQMD lead agency documents, and comment on GHG impact and mitigation analyses when SCAQMD is a responsible agency. Staff is to revise SCAQMD's Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning to include information on GHG strategies. The Basin's greenhouse gas inventory is to be updated in conjunction with each Air Quality Management Plan. Staff is to make recommendations to the Board to reduce GHG emissions from District Operations. The District is to develop and distribute multi-lingual educational material concerning climate change and available actions to reduce greenhouse gasses. Staff is to conduct and participate in conferences related to climate change as well.

In December 2008, the SCAQMD Board established Regulation XXVII, *Climate Change*, and adopted Rules 2700, and 2701. Rule 2700 provides definitions for the Regulation. Rule 2701, *SoCal Climate Solutions Exchange*, establishes a voluntary program to encourage, quantify, and certify voluntary, high quality certified GHG emission reductions in the District. This rule establishes procedures and requirements for generating certified GHG emission reductions for CEQA mitigation or other programs. Further, the rule establishes procedures to transfer ownership of certified reduction credits. In February 2009, the Board adopted Rule 2702 of the Regulation, Greenhouse Gas Reduction Program. The Program provides a way for SCAQMD to receive requests for emission reduction credits and to use monies collected with the requests to fund projects that generate certified emission reductions per rule 2701.

On December 5, 2008, the South Coast Air Quality Management District (SCAQMD) adopted CEQA GHG significance threshold for Stationary Sources, Rules and Plans where the SCAQMD is lead agency. The threshold uses a tiered approach. The project is compared with the requirements of each tier sequentially and would not to result in a significant impact if it complies with any tier. Tier 1 excludes projects that are specifically exempt from SB97 from resulting in a significant impact. Tier 2 excludes projects that are consistent with a GHG reduction plan that has a certified final CEQA document and complies with AB 32 GHG reduction goals.

Tier 3 excludes projects with annual emissions lower than a screening threshold. For industrial stationary source projects, the SCAQMD adopted a screening threshold of 10,000 MT CO<sub>2</sub>EQ/year. This threshold was selected to capture 90 percent of the GHG emissions from these types of projects where the combustion of natural gas is the primary source of GHG emissions. SCAQMD concluded that projects with emissions less than the screening threshold would not result in a significant cumulative impact.

Tier 4 consists of three decision tree options. Under the first option, the project would be excluded if design features and/or mitigation measures resulted in emissions 30 percent lower than business as usual emissions. Under the second option, the project would be excluded if it had early compliance with AB 32 through early implementation of CARB's Scoping Plan measures. Under the third option, the project would be excluded if it met sector based performance standards. However, the specifics of the Tier 4 compliance options were not adopted by the SCAQMD board to allow further time to develop the options and coordinate with CARB's GHG significance threshold development efforts.

Tier 5 would exclude projects that implement offsite mitigation (GHG reduction projects) or purchase offsets to reduce GHG emission impacts to less than the proposed screening level

While not adopted by the SCAQMD Board, the guidance document prepared for the stationary source threshold (SCAQMD 2008b) also suggested the same tiered approach for residential and commercial projects with a 3,000 MTCO<sub>2</sub>EQ/year screening threshold. However, at the time of adoption of the industrial stationary source threshold the SCAQMD felt additional analysis was required along with coordination with CARB's GHG significance threshold development efforts.

SCAQMD formed a working group to further develop the GHG significance thresholds. In 2010, the Bay Area Air Quality Management District adopted significance thresholds for both air quality and greenhouse gasses. However, the California Building Industry Association (CBIA) sued the BAAQMD because they did not conduct a CEQA review. The trial court found that the BAAQMD was required to perform the environmental analysis required by CEQA prior to adoption the Significance Thresholds. This decision was overturned by the First District Court of Appeal. The CBIA has appealed the decision to the California Supreme Court. The Supreme Court agreed to hear the case in November 2013 and briefings were filed in 2014. The Court has received briefs and is expected to hear oral arguments and render a decision in 2015. Because of the uncertainty caused by this case, SCAQMD has paused its development of GHG thresholds while awaiting a decision. However, prior to this pause, the SCAQMD GHG working group had made substantial progress on further developing the thresholds.

At the most recent SCAQMD GHG working group meeting (November, 2009), SCAQMD staff presented two options for screening thresholds for residential and commercial projects. The first option would have different thresholds for specific land uses. The proposed threshold for residential projects is 3,500 MT CO<sub>2</sub>EQ/year, the commercial threshold is 1,400 MT CO<sub>2</sub>EQ/year, and the mixed-use threshold is 3,000 MT CO<sub>2</sub>EQ/year. The second option would apply the 3,000 MT CO<sub>2</sub>EQ/year

screening threshold for all commercial/residential projects. Lead agencies would be able to select either option. These thresholds are based on capturing 90 percent of the emissions from projects and requiring them to comply with the higher tiers of the threshold (i.e., performance requirements or GHG reductions outside of the project) to not result in a significant impact.

Staff also presented updated for compliance options for Tier 4 of the significance thresholds. The first option would be a reduction of 23.9 percent in GHG emissions over the base case. This percentage reduction represents the land use sector portion of the CARB Scoping Plan's overall reduction of 28 percent. This target would be updated as the AB 32 Scoping Plan is revised. The base case scenario for this reduction still needs to be defined. Residual emissions would need to be less than 25,000 MT CO<sub>2</sub>EQ/year to comply with the option. Staff-proposed efficiency targets for the third option of 4.6 MT CO<sub>2</sub>EQ/year per service population (population employment) for project level analysis and 6.6 MT CO<sub>2</sub>EQ/year for plan level analyses. For project level analyses, residual emissions would need to be less than 25,000 MT CO<sub>2</sub>EQ/year to comply with this option.

In 2009, the Board adopted a *Green Policy* to help reduce the agency's carbon footprint from building operations, purchases, and employee work-related activities. One aspect of this policy was to establish a "Green Team" to evaluate potential practices, purchases, and other actions that can help to improve the current situation. The "Green Team" is comprised of staff from every SCAQMD department.

In September 2011, the SCAQMD Board adopted the *AQMD Air Quality Energy Policy* that integrates air quality, energy, and climate change issues in a coordinated and holistic manner. The Policy includes a set of ten policies to guide and coordinate AQMD efforts and a set of ten actions that are deemed necessary to support the policies. The Policy is neither a regulatory mandate nor a regulation. It is intended to provide general guidance to direct decisions made by the AQMD to reach air quality goals with full consideration of associated energy goals. The Ten policies established by the Policy are:

- 1) Promote zero and near-zero emission technologies through ultra clean energy strategies, to meet air quality, energy security, and climate change objectives.
- 2) Promote zero and near-zero emission technologies in both stationary and mobile applications to the extent feasible.
- 3) Promote diversification of electricity generation technologies to provide reliable, feasible, affordable, sustainable, and zero or near-zero emission electricity supply for the Basin in partnership with local power producers.
- 4) Promote demand side management programs to manage energy demand growth. Such programs include, but are not limited to, energy conservation, energy efficiency and load-shifting measures.
- 5) Promote in-Basin distributed electricity generation, with emphasis on distributed renewable electricity generation, to reduce reliance on energy imports or central power plants, and to minimize the air quality, climate and cross-media environmental impacts of traditional power generation.

- 6) Promote electricity storage technology to improve the supply reliability, availability, and increased generation technology choices.
- 7) Require any new/repowered in-Basin fossil-fueled generation power plant to incorporate Best Available Control Technology (BACT) as required by District rules, considering energy efficiency for the application. These power plants shall also comply with any requirements adopted by the California Air Resources Board (CARB), California Energy Commission (CEC), Public Utilities Commission (PUC), California Independent System Operator (ISO), or the governing board of a publicly-owned electric utility, as well as state law under the California Environmental Quality Act (CEQA).
- 8) Advocate, within the existing CEQA review process, maximum cost effective mitigation in the communities affected by emission increases resulting from the siting of new or repowered power plants.
- 9) Educate and incentivize the public and businesses to shift toward the lowest emission technologies, considering emissions of criteria pollutants, toxic air contaminants, greenhouse gases, energy efficiency, and the potential to create local jobs.
- 10) Incorporate energy efficiency and conservation as an emissions reductions strategy for stationary and mobile sources through AQMD's planning, rule making, advocacy, and CEQA commenting activities.

The ten actions specified by the Policy to implement the ten policies are:

- 1) Advocate for, conduct, and/or support detailed technical studies to identify viable zero and near-zero emission technologies and associated energy delivery and capacity needs to support these technologies as part of the clean air strategy for the Basin.
- 2) Conduct appropriate internal and third party socioeconomic studies to identify the societal costs and benefits for the implementation of zero and near-zero emissions strategies, including but not limited to, further electrification and impacts on businesses and jobs.
- 3) Where feasible, develop an AQMD action plan to develop and deploy electrification and other zero and near-zero emissions measures for various sectors, including identification of implementation barriers and strategies to overcome such barriers.
- 4) Conduct studies to identify measures to reduce emissions from the transportation sector, including incentivizing early introduction of zero and near-zero emission measures and identify potential new transportation funding mechanisms to support substantial penetration of such technologies within the transportation sector.
- 5) Further develop and demonstrate low emitting biogas technologies and other clean energy sources from biomass.
- 6) Coordinate this Energy Policy with California state energy policy as promulgated by the California Energy Commission (CEC), California Public Utilities Commission (PUC), and the California Air Resources Board (CARB), and assure that rules and regulations adopted by the Board are

not in conflict with state and federal laws. Actively participate in CEC, PUC, and CARB proceedings to promote policies and regulatory actions that further clean air objectives, consistent with state and federal law.

- 7) Convene a stakeholder working group (including, but not limited to, representatives from the building industry, local fire departments and building departments, and utilities) to develop and recommend standardized installations of electricity recharging, natural gas refueling, and other zero/near-zero emission refueling equipment for residential and commercial building applications to facilitate greater plug-in electric vehicle (PEV), natural gas vehicle (NGV), fuel cell vehicle, and other zero or near-zero emission vehicle market penetration.
- 8) Advocate for electricity rate structures that incentivize off-peak charging for PEVs through the Statewide PEV Collaborative (comprised of CEC, PUC, CARB, local air districts and utilities) while remaining sensitive to potential impacts on rates for existing customers.
- 9) Partner with local utilities and local government stakeholders to promote energy conservation and efficiency.
- 10) Compile and track Basin-wide energy usage and supply profiles in conjunction with each Air Quality Management Plan (AQMP) update

#### **2.4.4 City of Ontario Plans, Policies, Regulations, and Laws**

The City of Ontario adopted a Municipal Climate Action Plan (MCAP) in July 2012. The purpose of the MCAP was to design a feasible strategy to reduce GHG emissions generated by the City's municipal operations (e.g.; City-owned facilities, vehicle fleets) in 2020 by 30%. The MCAP established a 2020 emissions reduction target of approximately 8,500 MT CO<sub>2</sub>EQ. When combined with State efforts, the reduction measure's described in the MCAP would result in reducing municipal GHG emissions in 2020 by an estimated 10,000 MT CO<sub>2</sub>EQ.

In November 2014, the City of Ontario adopted a Community Climate Action Plan (CCAP) that presents a feasible strategy to reduce GHG emissions generated from community activities that is consistent with statewide Scoping Plan GHG reduction efforts. The CCAP provides measures to reduce GHG emissions in 2020 to 30% below business-as-usual conditions (i.e., what emissions would be in 2020 without any additional efficiency measures, e.g., Cal Greencode, Title 24 revisions, etc.). The plan is anticipated will reduce emissions in 2020 to approximately 13% below 2008 levels. While the Scoping Plan called for a reduction target of 15% below "current" (2005-2008) levels, recent CARB inventory data have indicated that the state would need to reduce emissions by 10 to 11% to meet 1990 levels, the reduction goal specified in AB32.

Approximately 64% of the reductions needed to achieve the CCAP's GHG reduction goal are achieved through state- and county-level programs, and 36% are achieved through City-level programs. Table 5 presents a summary of the City Level GHG Reduction Measures presented the CCAP. The measures are described in detail in the CCAP and, where appropriate, estimates of the reductions provided by the measures are provided. In some cases, the reductions are not quantifiable. This



results in the actual anticipated reductions being greater than the quantified reductions presented in the Plan.

**Table 5  
CCAP Community GHG Reduction Measures Summary**

<b>Measure Name</b>	<b>Measure Description</b>
<b>Performance Standard For New Development</b>	
PS-1	<b>Performance Standard for New Development:</b> New projects emitting more than 3,000 MT CO <sub>2</sub> e per year need to reduce emissions by 25%.
BMP-1	<b>Performance Standard for New Development; Best Management Practices:</b> New projects emitting less than 3,000 MT CO <sub>2</sub> e per year to exceed Title 24 Energy Efficiency Standards by at least 5%, or equivalent level of GHG emission reduction.
<b>Building Energy</b>	
Energy-1	<b>CAP Consistency:</b> Ensure that the City's local Climate Action, Land Use, Housing, and Transportation Plans are aligned with, support, and enhance any regional plans that have been developed consistent with state guidance to achieve reductions in GHG emissions.
Energy-2	<b>Regional Cooperation:</b> Coordinate with special districts, nonprofits, and other public organizations to share resources, achieve economies of scale, and develop green building policies and programs that are optimized on a regional scale
Energy-3	<b>Energy Efficiency Funding for Existing Low-Income Residents:</b> Partner with community services agencies to fund energy efficiency projects, including heating, ventilation, air conditioning, lighting, water heating equipment, insulation, and weatherization, for low income residents. Provide permitting-related and other incentives for energy efficient building project.
Energy-4	<b>Energy Efficiency Incentives and Programs to Promote Retrofits for Existing Residential Buildings:</b> Incentivize, or otherwise support, voluntary energy efficiency retrofits of existing residential buildings to achieve reductions in natural gas and electricity usage. Adopt standards and/or promote voluntary programs that retrofit indoor lights, electric clothes dryers, energy-star thermostats, window seals, duct sealing, air sealing, and attic insulation.
Energy-5	<b>Energy Efficiency Incentives and Programs to Promote Retrofits for Existing Non- Residential Buildings:</b> Voluntary programs for existing non-residential facilities improve building wide energy efficiency by 20% by 2020
Energy-6	<b>Streetlights:</b> Adopt outdoor lighting standards to reduce electricity consumption. Require 40% reduction in energy use from traffic signals and streetlights by 2020.
<b>Renewable Energy</b>	
Renewable Energy-1	<b>Solar Installation for Existing Non-Residential for Major Rehabilitations or Expansions:</b> Install solar photovoltaic panels on nonresidential buildings greater or equal to 25,000 square feet in size requiring discretionary permits for major rehabilitations or expansions (additions of 25,000 square feet of office/retail/commercial or 100,000 square feet of industrial/warehouse floor area)

*(Table Continued on Next Page)*

**Table 5 (Continued)**  
**CCAP Community GHG Reduction Measures Summary**

<b>Measure Name</b>	<b>Measure Description</b>
Renewable Energy-2	<b>Solar Installation in Existing Single Family Housing:</b> Install solar panels on 22% of existing single-family homes by 2020.
Renewable Energy-3	<b>Solar Installation in Existing Nonresidential Buildings:</b> Install solar panels on 32% of existing nonresidential buildings by 2020.
<b>Wastewater Treatment</b>	
Wastewater-1	<b>Recycled Water:</b> Require 50% of all water used for non-potable sources to be recycled water by 2020. Require all new parks and schools to use 100% recycled water for non-potable outdoor uses, as feasible. Develop public educational materials that support and encourage the use of recycled water. Adopt a City Municipal facility goal of 50% use of recycled water for non-potable sources.
Wastewater-2	<b>Waste-to-energy/Methane Recovery:</b> Encourage Inland Empire Utilities Agency (IEUA) to implement waste-to-energy projects at the JEUA RP-1 wastewater treatment plant by 2020, and to utilize collected gas to fuel onsite stationary sources.
<b>Solid Waste Management</b>	
Waste-1	<b>Waste Diversion:</b> Divert 75% of city-generated waste from landfills.
Waste-2	<b>Construction and Demolition Waste Recovery Ordinance:</b> Implement an ordinance requiring building projects to recycle or reuse at least 50% of unused or leftover building materials.
<b>On Road Transportation</b>	
Trans-1	<b>Expand Public Transportation Infrastructure:</b> Work with appropriate agencies to create an interconnected transportation system that allows a shift in travel from private passenger vehicles to alternative modes, including public transit, ride sharing, car-sharing, bicycling, and walking
Trans-2	<b>Transit Frequency and Speed:</b> To the extent feasible, support shorter transit passenger travel time through reduced headways and increased speed. Support regional transit operator to reduce average fleet travel time by 5 minutes.
Trans-3	<b>"Smart Bus" Technology:</b> Collaborate with LA Metro, Metrolink, and Omnitrans to implement "Smart Bus" technology.
Trans-4	<b>Expand Public Transportation Participation:</b> Collaborate with regional transit operator on programs to increase use of the City's public transportation system.
Trans-5	<b>Low- and Zero- Emission Vehicles:</b> Support and promote the use of low- and zero- emission vehicles in the City.
Trans-6	<b>Vehicle Idling:</b> Prohibit idling of Heavy Duty Trucks (greater than 26,000 gross vehicle weight) for longer than 3 minutes.
Trans-7	<b>Parking Policy:</b> Adopt a comprehensive parking policy that encourages carpooling and the use of alternative transportation, including providing parking spaces for car-share vehicles at convenient locations accessible by public transportation. Consider requirements for the following to reduce vehicle miles traveled (VMT) within the City by 2%. Designate 5% of downtown parking spaces for ride-sharing vehicles.

(Table Continued on Next Page)

**Table 5 (Continued)**  
**CCAP Community GHG Reduction Measures Summary**

Trans-8	<b>Event Parking:</b> Consider establishing policies and programs to reduce onsite parking demand and promote ride sharing during events at the Ontario Convention Center and other event venues. Consider a goal to reduce VMT at major events by 2%.
Trans-9	<b>Roadway Management:</b> Implement traffic and roadway management strategies to improve mobility and efficiency, and reduce associated emissions. Consider a goal to reduce community vehicle fuel consumption by 2%.
Trans-10	<b>Signal Synchronization:</b> Evaluate potential efficiency gains from further signal synchronization. Synchronize traffic signals throughout the City and with adjoining cities while allowing free flow of mass transit systems. Require continuous maintenance of the synchronization system. Consider a goal to reduce Citywide vehicle fuel consumption by 2%.
Trans-11	<b>School Transit Plan:</b> Encourage local school districts to develop school transit plans to substantially reduce automobile trips to, and congestion surrounding, schools. (According to some estimates, parents driving their children to school account for 20- 25% of the morning commute.) Plans may address, e.g., necessary infrastructure improvements and potential funding sources, replacing older diesel buses with low or zero-emission vehicles, mitigation fees to expand school bus service, Safe Routes to School programs, and other formal efforts to increase walking and biking by students. Although this measure is not within the City's authority, Ontario can work with local school districts to develop these plans.
Trans-12	<b>Ridesharing Programs:</b> Coordinate with local agencies to promote ride-sharing programs in Ontario (CAPCOA 2010). Although the City does not have the legal authority to impose trip demand management programs on project applicants or employers, Ontario can work with local agencies to develop these programs. Consider a goal to reduce City-wide VMT by 2% through mode-shifts from single-occupancy vehicles to carpools. Facilitate employment opportunities that minimize the need for private vehicle trips. The City could also work with the County to participate in their rideshare measure, which includes exploring financial programs for the purchase or lease of rideshare vehicles, encouraging community car sharing through city employers, and encouraging creation of community rideshare incentives (gas cards, commuter-tax benefits, guaranteed ride home programs, etc.).
Trans-13	<b>Bicycle and Pedestrian Infrastructure Plan:</b> Adopt a comprehensive bicycle and pedestrian infrastructure plan to expand the City's bicycle and pedestrian network. This plan would encourage residents and employees to use bicycles and walking as a method of transportation. Consider a goal to reduce City-wide VMT by 2% through mode-shifts from single-occupancy vehicles to bicycles.
Trans-14	<b>Development Standards for Bicycles:</b> Establish standards for new development and redevelopment projects to support bicycle use. Consider a goal to reduce VMT resulting from new development by 4% through mode-shifts from single-occupancy vehicles to bicycles.

*(Table Continued on Next Page)*

**Table 5 (Continued)**  
**CCAP Community GHG Reduction Measures Summary**

Measure Name	Measure Description
Trans-15	<b>Smart Growth and Infill:</b> Encourage high-density, mixed-use, infill development and creative reuse of brownfield, under-utilized and/or defunct properties within the urban core. Consider a goal to reduce VMT resulting from new development by 5%.
Trans-16	<b>Transit-Oriented Development:</b> Identify transit centers appropriate for mixed-use development, and promote transit-oriented, mixed-use development within these targeted areas. Consider a goal to reduce VMT resulting from new development by 2%.
<b>Off-Road Equipment</b>	
OffRoad-1	<b>Idling Ordinance:</b> Prohibit idling of heavy-duty off-road construction vehicles to no more than 3 minutes.
OffRoad-2	<b>Landscaping Equipment:</b> Support landscape equipment replacement programs to replace 75% of all landscaping equipment with electric equipment (945 total pieces of landscaping equipment replaced).
<b>Agriculture</b>	
Agriculture-1	<b>Methane Emissions Reduction for Animal Operations:</b> Support dairies (and other animal operations) to consider existing and new technologies and methods to control emissions from enteric fermentation and manure management, and assess the feasibility and cost effectiveness of these technologies. Animal operations should strive to capture as much methane from manure management as feasible. Captured biogas can also be used in place of natural gas for heating, converted to vehicle fuel, used to replace gasoline and diesel, or combusted in a generator to produce renewable electricity.
<b>Water Transport, Distribution, and Treatment</b>	
Water-1	<b>Water Conservation for Existing Buildings:</b> Implement a program to renovate existing buildings to a higher level of water efficiency. Require 25% of existing buildings within the community to achieve a 25% reduction in water use. This measure will reduce both indoor and outdoor water use.
Water-2	<b>Irrigation Monitoring and Management System (Outdoor):</b> Install water monitoring and management systems (Smart controllers, etc.) across the community to reduce irrigation water needs and reduce the City's total community-wide water consumption by 10% in 2020. This measure will reduce outdoor water use.
Water-3	<b>Water System Efficiency:</b> Maximize efficiency at drinking water treatment, pumping, and distribution facilities, including development of off-peak demand schedules for heavy commercial and industrial users. Design and implement peak load management and demand response programs for water supply, treatment, and distribution, including interface with existing automated systems for building energy management and supervisory control and data acquisition (SCADA) systems.

*(Table Continued on Next Page)*

**Table 5 (Continued)  
CCAP Community GHG Reduction Measures Summary**

<b>Measure Name</b>	<b>Measure Description</b>
Water-4	<b>SB X7:</b> Urban water agencies throughout California are required to increase water conservation to achieve a statewide goal of a 20% reduction in urban per capita use by 2020 per SB X7. The Ontario 2010 Urban Water Management Plan outlines the approaches to achieving that reduction.
<b>Miscellaneous</b>	
Misc-1	<b>Climate Change Awareness:</b> Utilize a variety of media outlets to promote climate change awareness and GHG reduction.
Misc-2	<b>Carbon Sequestration:</b> Establish a City-wide carbon sequestration project and sequestration goal of 1,000 metric tons of CO <sub>2</sub> per year.
Misc-3	<b>Shade Tree Planting:</b> Plant 1,000 trees per year from 2012-2020 for a total of 9,000 trees by 2020.
Misc-4	<b>Refrigeration and Air Conditioning Disposal:</b> Institute an ordinance requiring residences, businesses, and city facilities to practice responsible appliance disposal (RAD) for all decommissioned units, including refrigerators/freezers, window air conditioning units, and dehumidifiers.
Misc-5	<b>Pervious Paving:</b> Promote the use of pervious concrete for pavement projects. Explore grant funding opportunities for pervious concrete.
Misc-6	<b>Infiltration:</b> Promote onsite infiltration, as required by the National Pollutant Discharge Elimination System (NPDES) Permit. Promote the use of pervious concrete and asphalt for pavement and parking lot projects.

Table 6 presents the City of Ontario’s 2020 GHG emissions under business-as-usual (BAU) conditions, the quantified emission reductions from the CCAP, and the anticipated emissions with the implementation of the CCAP. Emissions in the year 2008 were estimated to be 2,503,816 MT CO<sub>2</sub>EQ.

**Table 6  
City of Ontario 2020 Community GHG Emissions (MT CO<sub>2</sub>EQ)**

<b>Source</b>	<b>BAU</b>	<b>Reduction</b>	<b>%</b>	<b>With CCAP</b>
Building Energy Use	1,237,006	433,069	35%	803,937
On-Road Transportation	1,219,767	365,212	30%	854,555
Off-Road Transportation	229,069	28,166	12%	200,903
Agriculture	323,390	80,352	25%	243,038
Solid Waste Management	64,326	26,265	41%	38,061
Wastewater Treatment	8,781	649	7%	8,132
Water Transport, Distribution, and Treatment	38,575	6,511	17%	32,064
SF6 from Electricity Consumption	7,072	1,678	24%	5,394
<b>Total</b>	<b>3,127,987</b>	<b>941,902</b>	<b>30%</b>	<b>2,186,076</b>

The environmental impacts of the CCAP were analyzed and potential significant impacts reduced to the extent feasible in compliance with the California Environmental Quality Act (CEQA). The environmental review of the CCAP was tiered from the previously adopted Final Environmental Impact Report (FEIR) for The Ontario Plan (TOP) (The City's most recent General Plan Update). The FEIR for the TOP included a programmatic analysis of GHG impacts with six GHG mitigation measures (Mitigation Measures 6-1 through 6-6). A review of potential secondary environmental impacts of implementation of the CCAP did not indicate that it would result in any new significant environmental impacts or substantial more severe environmental impacts than already disclosed in the TOP FEIR.

## 3.0 Potential Greenhouse Gas Impacts

### 3.1 Significance Thresholds

CEQA Guidelines Section 15183.5 sets forth requirements for comprehensive greenhouse gas reduction plans and tiering of analysis for CEQA compliance of future projects. This allows projects to demonstrate that they will not result in significant GHG impacts by demonstrating compliance with the City's Climate Action Plan, rather than having produce the traditional analysis of all GHG emissions associated with the proposed project and demonstrating project compliance with all relevant policies and regulations.

Appendix B of the City of Ontario's CCAP, "Greenhouse Gas Emissions CEQA Thresholds and Screening Tables," provides two methodologies for a project, not otherwise exempt from CEQA, to demonstrate compliance with the CCAP and result in a less than significant individual and cumulative GHG impact. The first method is applicable to small project with annual GHG emission of less than 3,000 MT CO<sub>2</sub>EQ. These projects are considered less than significant if the energy efficiency of the project is at least five percent greater than Title 24 requirements, or other equivalent levels of GHG reductions, and water conservation levels match the California Green Building Code or equivalent levels of reductions.

Projects with emissions exceeding 3,000 MT CO<sub>2</sub>EQ may demonstrate compliance by implementing measures from the Screening Tables presented in Appendix B of the CCAP. One table is provided for residential projects and one table is provided for commercial projects. The purpose of the Screening Tables is to provide guidance in measuring the reduction of greenhouse gas emissions attributable to certain design and construction measures incorporated into development projects. The analysis methodology, and significance determination are based upon the CCAP, along with the Addendum prepared for the CAP. The methodology for the development and application of the Screening Tables are presented in Appendix D of the CCAP.

The Screening Tables assign points for each feature incorporated into a project as a project design feature or mitigation measure. The point values correspond to the minimum emissions reduction expected from each feature. Projects that garner at least 100 points are considered consistent with the reduction quantities anticipated in the City's CCAP. Such projects would be determined to have a less than significant individual and cumulative impact for GHG emissions consistent with the CEQA Guidelines.

Table 1 of Appendix B of the CCAP presents the Screening Table for Residential Projects and Table 2 presents the Screening Table for Commercial Projects. The proposed Armstrong Ranch Specific Plan proposes development of residential uses and therefore, only Table 1 of Appendix B of the CCAP is applicable to the Project. This table is presented below as Table 7

**Table 7  
Screening Table for Implementation of GHG Reduction Measures for Residential Development**

<b>Feature</b>	<b>Description</b>	<b>Points</b>
<b>Building Envelope</b>		
<b>Insulation</b>		
	2008 Baseline (walls: R-13, roof/attic: R-30)	0
	Modestly Enhanced Insulation (walls R-13:, roof/attic: R-38)	12
	Enhanced Insulation (rigid wall insulation R-13, roof/attic: R-38)	15
	Greatly Enhanced Insulation (spray foam wall insulated walls R-15 or higher, roof/attic R-38 or higher)	18
<b>Windows</b>		
	2008 Baseline Windows (0.57 U-factor, 0.4 solar heat gain coefficient (SHGC))	0
	Modestly Enhanced Window Insulation (0.4 U-Factor, 0.32 SHGC)	6
	Enhanced Window Insulation (0.32 U-Factor, 0.25 SHGC)	7
	Greatly Enhanced Window Insulation (0.28 or less U-Factor, 0.22 or less SHGC)	9
<b>Cool Roof</b>		
	Modest Cool Roof (CRRC Rated 0.15 aged solar reflectance, 0.75 thermal emittance)	10
	Enhanced Cool Roof (CRRC Rated 0.2 aged solar reflectance, 0.75 thermal emittance)	12
	Greatly Enhanced Cool Roof (CRRC Rated 0.35 aged solar reflectance, 0.75 thermal emittance)	14
<b>Air Infiltration</b>		
	Air barrier applied to exterior walls, caulking, and visual inspection such as the HERS Verified Quality Insulation Installation (QII or equivalent)	10
	Blower Door HERS Verified Envelope Leakage or equivalent	8
<b>Building Thermal Storage</b>		
	Modest Thermal Mass (10% of floor or 10% of walls: 12" or more thick exposed concrete or masonry. No permanently installed floor covering such as carpet, linoleum, wood or other insulating materials)	2
	Enhanced Thermal Mass (20% of floor or 20% of walls: 12" or more thick exposed concrete or masonry. No permanently installed floor covering such as carpet, linoleum, wood or other insulating materials)	4
<b>Indoor Space Efficiencies</b>		
<b>Heating/Cooling Distribution System</b>		
	Modest Duct insulation (R-6)	7
	Enhanced Duct Insulation (R-8)	8
	Distribution loss reduction with inspection (HERS Verified Duct Leakage or equivalent)	12

(Table Continued on Next Page)



**Table 7 (Continued)**  
**Screening Table for Implementation of GHG Reduction Measures for Residential Development**

<b>Feature</b>	<b>Description</b>	<b>Points</b>
<b>Space Heating/Cooling Equipment</b>		
	Improved Efficiency HVAC (SEER 14/ 65% AFUE or 8 HSPF)	12
	High Efficiency HVAC (SEER 15/72% AFUE or 8.5 HSPF)	15
	Very High Efficiency HVAC (SEER 16/80% AFUE or 9 HSPF)	18
	Solar Pre-heat System (0.2 Net Solar Fraction)	4
	Enhanced Solar Pre-heat System (0.35 Net Solar Fraction)	8
<b>Daylighting</b>		
	All peripheral rooms within the living space have at least one window (required)	0
	All rooms within the living space have daylight (through use of windows, solar tubes, skylights, etc.)	1
	All rooms daylighted	2
<b>Artificial Lighting</b>		
High efficacy is defined as 40 lumens/watt for 15 watt or less fixtures; 50 lumens/watt for 15-40 watt fixtures, 60 lumens/watt for fixtures >40watt		
	2008 Minimum (required)	0
	Efficient Lights (25% of in-unit fixtures considered high efficacy)	8
	High Efficiency Lights (50% of in-unit fixtures are high efficacy)	10
	Very High Efficiency Lights {100% of in-unit fixtures are high efficacy)	12
<b>Appliances</b>		
	Energy Star Refrigerator (new)	1
	Energy Star Dish Washer (new)	1
	Energy Star Washing Machine (new)	1
<b>Miscellaneous Residential Building Efficiencies</b>		
<b>Building Placement</b>		
	North/South alignment of building or other building placement such that the orientation of the buildings optimizes natural heating, cooling, and lighting.	5
<b>Shading</b>		
	At least 90% of south-facing glazing will be shaded by vegetation or overhangs at noon on Jun 21st.	4
<b>Energy Star Homes</b>		
	EPA Energy Star for Homes (version 3 or above)	25
<b>Independent Energy Efficiency Calculations</b>		
	Provide point values based upon energy efficiency modeling of the Project. Note that engineering data will be required documenting the energy efficiency and point values based upon the proven efficiency beyond Title 24 Energy Efficiency Standards.	TBD

(Table Continued on Next Page)

**Table 7 (Continued)**  
**Screening Table for Implementation of GHG Reduction Measures for Residential Development**

<b>Feature</b>	<b>Description</b>	<b>Points</b>
<b>Other</b>		
	This allows innovation by the applicant to provide design features that increases the energy efficiency of the project not provided in the table. Note that engineering data will be required documenting the energy efficiency of innovative designs and point values given based upon the proven efficiency beyond Title 24 Energy Efficiency Standards.	TBD
<b>Existing Residential Retrofits</b>		
	The applicant may wish to provide energy efficiency retrofit projects to Residential existing residential dwelling units to further the point value of their project. Retrofitting existing residential dwelling units within the City is a key reduction measure that is needed to reach the reduction goal. The potential for an applicant to take advantage of this program will be decided on a case-by-case basis and must have the approval of the Ontario Planning Department. The decision to allow applicants to ability to participate in this program will be evaluated based upon, but not limited to the following; Will the energy efficiency retrofit project benefit low income or disadvantaged residents? Does the energy efficiency retrofit project fit within the overall assumptions in reduction measures associated with existing residential retrofits? Does the energy efficiency retrofit project provide co-benefits important to the City? Point value will be determined based upon engineering and design criteria of the energy efficiency retrofit project.	TBD
<b>Residential Renewable Energy Generation</b>		
<b>Photovoltaic</b>		
	Solar Ready Homes (sturdy roof and solar read service panel	2
	10 percent of power needs of the project	10
	20 percent of power needs of the project	15
	30 percent of power needs of the project	20
	40 percent of power needs of the project	28
	50 percent of power needs of the project	35
	60 percent of power needs of the project	38
	70 percent of power needs of the project	42
	80 percent of power needs of the project	46
	90 percent of power needs of the project	52
	100 percent of power needs of the project	58

(Table Continued on Next Page)

**Table 7 (Continued)**  
**Screening Table for Implementation of GHG Reduction Measures for Residential Development**

<b>Feature</b>	<b>Description</b>	<b>Points</b>
<b>Wind Turbines</b>		
	10 percent of power needs of the project	10
	20 percent of power needs of the project	15
	30 percent of power needs of the project	20
	40 percent of power needs of the project	28
	50 percent of power needs of the project	35
	60 percent of power needs of the project	38
	70 percent of power needs of the project	42
	80 percent of power needs of the project	46
	90 percent of power needs of the project	52
	100 percent of power needs of the project	58
<b>Off-site renewable energy project</b>		
	The applicant may submit a proposal to supply an off-site renewable energy project such as renewable energy retrofits of existing homes that will help implement renewable energy within the City. These off-site renewable energy retrofit project proposals will be determined on a case by case basis and must be accompanied by a detailed plan that documents the quantity of renewable energy the proposal will generate. Point values will be determined based upon the energy generated by the proposal.	TBD
<b>Other Renewable Energy Generation</b>		
	The applicant may have innovative designs or unique site circumstances (such as geothermal) that allow the project to generate electricity from renewable energy not provided in the table. The ability to supply other renewable energy and the point values allowed will be decided based upon engineering data documenting the ability to generate electricity.	TBD
<b>Residential Water Conservation</b>		
<b>Water Efficient Landscaping</b>		
	Limit conventional turf to < 50% of required landscape area	0
	Limit conventional turf to < 25% of required landscape area	4
	No conventional turf (warm season turf to < 50% of required landscape area and/or low water using plants are allowed)	6
	Only California Native Plants that requires no irrigation or some supplemental irrigation	8
<b>Water Efficient Irrigation Systems</b>		
	Low precipitation spray heads < 0.75 in/hr or drip irrigation	2
	Weather based irrigation control systems or moisture sensors (demonstrate 20% reduced water use}	3
<b>Recycled Water</b>		
	Recycled connections (purple pipe} to irrigation system on site	6

(Table Continued on Next Page)

**Table 7 (Continued)**  
**Screening Table for Implementation of GHG Reduction Measures for Residential Development**

<b>Feature</b>	<b>Description</b>	<b>Points</b>
<b>Water Reuse</b>		
	Gray water Reuse System collects Gray water from clothes washers, showers and faucets for irrigation use,	12
<b>Storm Water Reuse Systems</b>		
	Innovative on-site storm water collection, filtration and reuse systems are Reuse Systems being developed that provide supplemental irrigation water and provide vector control. These systems can greatly reduce the irrigation needs of a project. Point values for these types of systems will be determined based upon design and engineering data documenting the water savings.	TBD
<b>Potable Water</b>		
<b>Showers</b>		
	Water Efficient Showerheads (2.0 gpm)	3
<b>Toilets</b>		
	Water Efficient Toilets (1.5 gpm)	3
<b>Faucets</b>		
	Water Efficient Faucets (1.28 gpm)	3
<b>Dishwasher</b>		
	Water Efficient Dishwasher (6 gallons per cycle or less)	1
<b>Washing Machine</b>		
	Water Efficient Washing Machine (Water Factor <5.5)	1
<b>WaterSense</b>		
	EPA WaterSense Certification	12
<b>Land Use Based Trips and VMT Reduction</b>		
<b>Mixed Use</b>		
	Mixes of land uses that complement one another in a way that reduces the need for vehicle trips can greatly reduce GHG emissions. The point value of mixed use projects will be determined based upon a Transportation Impact Analysis (TIA) demonstrating trip reductions and/or reductions in vehicle miles traveled. Suggested ranges: Diversity of land uses complementing each other (2-28 points} Increased destination accessibility other than transit (1-18 points} Increased transit accessibility (1-25 points} Infill location that reduces vehicle trips or VMT beyond the measures described above (points TBD based on traffic data}.	TBD

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**Table 7 (Continued)**  
**Screening Table for Implementation of GHG Reduction Measures for Residential Development**

<b>Feature</b>	<b>Description</b>	<b>Points</b>
<b>Residential Near Local Retail (Residential Only Projects)</b>		
	Having residential developments within walking and biking distance of local retail helps to reduce vehicle trips and/or vehicle miles traveled. The point value of residential projects in close proximity to local retail will be determined based upon traffic studies that demonstrate trip reductions and/or reductions in vehicle miles traveled (VMT)	TBD
<b>Other Trip Reduction Measures</b>		
	Other trip or VMT reduction measures not listed above with TIA and/or other traffic data supporting the trip and/or VMT for the project.	TBD
<b>Bicycle Master Plan</b>		
<b>Bicycle Infrastructure</b>		
	Provide bicycle paths within project boundaries.	TBD
	Provide bicycle path linkages between residential and other land uses.	2
	Provide bicycle path linkages between residential and transit.	5
<b>Neighborhood Electric Vehicle Infrastructure</b>		
<b>Electric Vehicle Recharging</b>		
	Provide circuit and capacity in garages of residential units for use by a recharging electric vehicle. Charging stations are for on-road electric vehicles legally able to drive on all roadways including Interstate Highways and freeways.	1
	Install electric vehicle charging stations in the garages of residential units	8

### 3.2 Impacts from Project

The proposed development of 994 single-family homes or 944 homes and a 1,000 student elementary school is not a small project and will generate more than 3,000 MT CO<sub>2</sub>EQ per year. Per Appendix B of the City of Ontario Community Climate Action Plan (CCAP), the project will not result in a significant individual or cumulative impact if it implements 100 points worth of GHG reduction measures from Table 1 of Appendix B presented above as Table 7. Table 8 presents the GHG reduction measures that the project applicant has agreed to incorporate into the project and the points value for each measure. The total points from all measures incorporated is 100. Therefore, the project will not result in a significant individual or cumulative impact. In order to ensure that these measures are incorporated into the final products of the project, their implementation should be specified as a mitigation measure as discussed in Section 4.0.

**Table 8  
Residential GHG Reduction Measures to be Incorporated into Project**

Feature	Description	Points
<b>Building Envelope</b>		
<b>Insulation</b>		
	Modestly Enhanced Insulation (walls R-13:, roof/attic: R-38)	12
<b>Windows</b>		
	Modestly Enhanced Window Insulation (0.4 U-Factor, 0.32 SHGC)	6
<b>Cool Roof</b>		
	Modest Cool Roof (CRRC Rated 0.15 aged solar reflectance, 0.75 thermal emittance)	10
<b>Indoor Space Efficiencies</b>		
<b>Heating/Cooling Distribution System</b>		
	Distribution loss reduction with inspection (HERS Verified Duct Leakage or equivalent)	12
<b>Space Heating/Cooling Equipment</b>		
	High Efficiency HVAC (SEER 15/72% AFUE or 8.5 HSPF)	15
<b>Daylighting</b>		
	All rooms within the living space have daylight (through use of windows, solar tubes, skylights, etc.)	1
<b>Artificial Lighting</b>		
	High efficacy is defined as 40 lumens/watt for 15 watt or less fixtures; 50 lumens/watt for 15-40 watt fixtures, 60 lumens/watt for fixtures >40watt	
	Efficient Lights (25% of in-unit fixtures considered high efficacy)	8
<b>Appliances</b>		
	Energy Star Refrigerator (new)	1
	Energy Star Dish Washer (new)	1
	Energy Star Washing Machine (new)	1
<b>Residential Renewable Energy Generation</b>		
<b>Photovoltaic</b>		
	Solar Ready Homes (sturdy roof and solar read service panel)	2

(Table Continued on Next Page)

**Table 8 (Continued)**  
**Residential GHG Reduction Measures to be Incorporated into Project**

<b>Feature</b>	<b>Description</b>	<b>Points</b>
<b>Residential Water Conservation</b>		
<b>Water Efficient Landscaping</b>		
	Limit conventional turf to < 25% of required landscape area	4
<b>Water Efficient Irrigation Systems</b>		
	Low precipitation spray heads <0.75 in/hr or drip irrigation	2
<b>Recycled Water</b>		
	Recycled connections (purple pipe) to irrigation system on site	6
<b>Potable Water</b>		
<b>Showers</b>		
	Water Efficient Showerheads (2.0 gpm)	3
<b>Toilets</b>		
	Water Efficient Toilets (1.5 gpm)	3
<b>Faucets</b>		
	Water Efficient Faucets (1.28 gpm)	3
<b>Dishwasher</b>		
	Water Efficient Dishwasher (6 gallons per cycle or less)	1
<b>Washing Machine</b>		
	Water Efficient Washing Machine (Water Factor <5.5)	1
<b>Bicycle Master Plan</b>		
<b>Bicycle Infrastructure</b>		
	Provide bicycle path linkages between residential and other land uses.	2
	Provide bicycle path linkages between residential and transit.	5
<b>Neighborhood Electric Vehicle Infrastructure</b>		
<b>Electric Vehicle Recharging</b>		
	Provide circuit and capacity in garages of residential units for use by a recharging electric vehicle. Charging stations are for on-road electric vehicles legally able to drive on all roadways including Interstate Highways and freeways.	1
<b>Total Points</b>		<b>100</b>

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## 4.0 Mitigation Measures

The analysis of project impacts presented in Section 3.2 discussed how the project would not result in a significant individual or cumulative GHG impact with the implementation of the GHG reduction measures specified in Table 8 above. In order to ensure that all of the measures are implemented by the final product, they should be specified as a mitigation measure.

**Mitigation Measure GHG-1:** All GHG reduction measures presented in Table 8 above shall be incorporated into the project. Approval of Tentative Tract Maps, Grading Plans, and Tract Maps shall be contingent on incorporation of the Recycled Water and Bicycle Infrastructure measures. Approval of Building Permits and Certificates of Occupancy shall be contingent on incorporation of all other measures shown in the table. At the City's discretion, alternative reduction measures from the list presented above in Table 7 may be substituted for any of the measures shown in Table 8, or any future measures approved by the City, with the same or greater points value

## 5.0 Unavoidable Significant Impacts

With the mitigation measures described in Section 4.0, all significant impacts will be reduced to a level of insignificance and the project will not result in any unavoidable significant impacts.

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