MISSION VIEJO SUSTAINABILITY ACTION PLAN

March 2013

Mission Viejo Sustainability Action Plan

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INTRODUCTION

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Mission Viejo residents and businesses have made it clear that sustainability and quality of life for future generations are important issues. Many have contributed thoughts and ideas concerning steps that can improve sustainability while also promoting a healthy lifestyle, improving air quality, restoring habitat, making neighborhoods more walkable, and creating local jobs.

This Sustainability Action Plan (SAP) is unique to Mission Viejo and describes the community's shared interests. With the guidance provided within this plan, city government can make effective changes to everyday operations and community members can make changes to daily habits and lifestyles to improve sustainability. We look forward to working together toward a more sustainable future for Mission Viejo and for all of us!

Purpose

In preparing this SAP, the City of Mission Viejo (City) is contributing to efforts across California and the world to reduce greenhouse gas (GHG) emissions by taking actions in its own community. This SAP is designed to implement the Mission Viejo General Plan. In doing so, the SAP preserves the option for the City to offer streamlining opportunities for future discretionary projects.

Planning Context

A SAP (also known as a Climate Action Plan or GHG Reduction Plan) is a tool that cities throughout California use to help reduce dependency on fossil fuels and nonrenewable energy and to decrease GHG emissions.

In Mission Viejo, most GHG emissions come from gasoline burned in motor vehicles and energy used in buildings, with water-related and solid waste-related emissions contributing relatively smaller proportions. Mission Viejo's SAP examines each of these activities and offers strategies to provide local residents and businesses tools to help them move toward a lower-carbon future.

A SAP does much more than provide strategies to reduce GHG emissions. Many of the strategies included in this document will also continue to make Mission Viejo an attractive place to live—through improved bike paths, better air quality, lower energy and water bills, less solid waste, greener streets, more local amenities, and more local jobs.

Scope and Content of the Sustainability Action Plan

The SAP consists of four chapters: Introduction; Emissions Inventory, Projections, and Goals; GHG Reduction Strategies and Measures; and Implementation and Monitoring. Appendices A, B, and C provide additional detail on topics covered within the SAP. The contents of each chapter and appendix are briefly described below.

+ **Chapter 1, Introduction,** provides a brief description of the need for GHG reduction planning in California, gives an overview of the topics covered in the SAP, and describes state actions related to climate change. Chapter 1 also identifies how the General Plan sets a broad framework for emissions reduction strategies, measures, and actions in the SAP, and how the SAP is intended to implement the General Plan. This chapter also describes the SAP's relationship to the General Plan Environmental Impact Report (EIR), and the SAP's ability to enable a California Environmental Quality Act (CEQA) tool known as "tiering" to allow consistent future discretionary projects to streamline certain steps in the traditional CEQA process.

+ **Chapter 2, Emissions Inventory and Projections,** outlines key steps taken to develop the SAP, including establishing a 2008 baseline GHG inventory, projecting future emissions for 2020 and 2035, quantifying

emissions by GHG strategy areas, and calculating statewide and federal reductions.

- **Chapter 3, GHG Reduction Strategies and Measures,** addresses five main reduction strategies: transportation, energy, water, solid waste, and carbon sequestration. For each strategy, the program identifies the following: specific measures, actions and responsible parties for implementation, progress indicators and metrics, and estimated GHG reductions for 2020 and 2035.
- **Chapter 4, Implementation and Monitoring,** discusses measure implementation, program evolution, and monitoring. It also describes the relationship between the SAP and the state's and South Coast Air Quality Management District's CEQA Guidelines, and establishes criteria staff can use when determining if a proposed discretionary project is consistent with the SAP.
- **Appendix A** provides a list of acronyms commonly used in the SAP.
- **Appendix B** provides a technical description of methods employed to prepare the 2008 emissions inventory and 2020 and 2035 projections.
- **Appendix C** describes assumptions used to determine GHG emissions reductions associated with SAP measures.

California Climate Change Actions

Mission Viejo's strategy for climate protection must be set within the context of the region (Southern California) and the state as a whole, where much of the momentum for local action originates.

California has long been a sustainability leader, as illustrated by then-governor Arnold Schwarzenegger signing Executive Order (EO) S-3-05 in 2005. EO S-3-05 recognizes California's vulnerability to reduced snowpack, exacerbation of air quality problems, and potential sea-level rise due to a changing climate. To address these concerns, the governor established targets to reduce statewide GHG emissions to 2000 levels by 2010, to 1990 levels by 2020, and to 80% below 1990 levels by 2050.

In 2006, California became the first state in the country to adopt a statewide GHG reduction target through California Assembly Bill (AB) 32, also known as the Global Warming Solutions Act of 2006. This law codifies the EO S-3-05 direction to reduce statewide emissions to 1990 levels by 2020. AB 32 resulted in the 2008 adoption by the California Air Resources Board (ARB) of the Climate Change Scoping Plan (Scoping Plan), outlining the state's plan to achieve emissions reductions through a combination of direct regulations, alternative compliance mechanisms, incentives, voluntary actions, market-based mechanisms, and funding. The Scoping Plan addresses similar areas to those contained in the SAP, including transportation, energy efficiency in buildings, water conservation, solid waste reduction, and "green" infrastructure.

AB 32 engendered several companion laws that will assist Mission Viejo in reducing communitywide GHG emissions:

- **AB 1493** established emissions performance standards for motor vehicles.

- **EO S-1-07** established performance standards for the carbon intensity of transportation fuels.
- **Senate Bill (SB) 107** established emissions performance standards for electric utilities.
- **SB 7x7** established a water use reduction target.
- **AB 811** facilitates alternative financing mechanisms for energy efficiency and renewable energy installations.

Additional descriptions of these legislative actions are provided below. At the time of SAP preparation, the City estimated the GHG emissions reductions associated with AB 1493, EO S-1-07, and the Renewable Portfolio Standard (RPS) (see Chapter 3 for GHG emissions reductions associated with these state programs). In the future, as the regulatory framework surrounding AB 32 grows, it may be possible to evaluate a wider range of statewide reductions.

AB 1493

AB 1493, California's mobile-source GHG emissions regulations for passenger vehicles, was signed into law in 2002. AB 1493 requires ARB to develop and adopt regulations that reduce GHG emissions from passenger vehicles, light-duty trucks, and other noncommercial vehicles for personal transportation. In 2004, ARB approved amendments to the California Code of Regulations, adding GHG emissions standards to California's existing standards for motor vehicle emissions.

EO S-1-07

EO S-1-07 aims to reduce the carbon intensity of California's transportation fuels by at least 10% by 2020. Also known as the Low Carbon Fuel Standard (LCFS), this is a performance standard with flexible compliance mechanisms that encourage development of a diverse set of clean, low-carbon transportation fuel options to reduce GHG emissions.

Renewable Portfolio Standard (RPS)

SB 1078, SB 107, EO S-14-08, and SB X1-2 establish increasingly stringent RPS requirements for California utilities. RPS-eligible energy sources are wind, solar, geothermal, biomass, and small-scale hydro.

- **SB 1078** requires investor-owned utilities to provide at least 20% of their electricity from renewable resources by 2020.
- **SB 107** accelerated the SB 1078 timeframe to take effect in 2010.
- **EO S-14-08** increases the RPS further to 33% by 2020. Both of Mission Viejo's electricity providers, Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E), delivered 21% of their electricity from renewable sources in 2011.
- **SB X1-2** codified the 33% RPS by 2020 requirement established by EO S-14-08.

SB 7x7

SB 7x7 requires the state to achieve a 20% reduction in urban per-capita water use by December 31, 2020. The state is required to make incremental progress toward this goal by reducing per-capita water use by at least 10% on or before December 31, 2015. SB 7x7 requires each urban retail water supplier to develop long-term and interim urban water use targets. SB 7x7 also creates a framework for future planning and actions for urban and agricultural users to reduce per-capita water consumption 20% by 2020.

AB 811

AB 811 helps finance the upfront costs of solar and other energy efficiency improvements that are permanent fixtures to a property. AB 811 authorizes cities and counties to establish assessment districts to provide loans to commercial property owners that they pay back through long-term repayments added to their annual property tax bills. This is achieved through the creation of a Property Assessed Clean Energy (PACE) finance program.

Relationship to the General Plan and California Environmental Quality Act

This SAP preserves the City's ability to use a CEQA tool known as "tiering," which allows future development projects that are consistent with the General Plan and that incorporate GHG emissions reduction measures described in this SAP to streamline certain steps in the CEQA process, reducing project costs and simplifying City permit processes.

Relationship to the General Plan

This SAP implements the following goal and policy from the Mission Viejo General Plan Conservation and Open Space Element:

- **Goal 8 –** Cooperate with local, regional, and state agencies to improve air quality and reduce greenhouse gas emissions.
    - ***Policy 8.2:*** Cooperate with the California Air Resources Board in their efforts to prepare and implement plans and programs to address the issue of global warming and climate change.

General Plan goals and policies support all of the GHG emissions reduction strategies included in this SAP; the SAP is an implementation measure for the General Plan. This structure allows the City to update the SAP on an ongoing, as-needed basis to ensure that Mission Viejo's emissions reduction efforts reflect both current legislation and emerging best practices.

Relationship to the California Environmental Quality Act

State CEQA Guidelines Section 15183.5 allows jurisdictions to analyze and mitigate the significant effects of GHGs at a programmatic level by adopting a plan for the reduction of GHG emissions. Later, as individual projects are proposed, project-specific environmental documents may tier from and/or

incorporate by reference that existing programmatic review in the cumulative impacts analysis. Project-specific environmental documents prepared for projects that are consistent with the General Plan and SAP may rely on the programmatic analysis of GHGs contained in the EIR certified for the Mission Viejo General Plan and SAP. Chapter 4 of this SAP provides a discussion of the criteria and processes the City could elect to use to determine if a future project is consistent with the SAP.

To meet the standards of a plan for the reduction of GHG emissions, Mission Viejo's SAP must achieve the following criteria established in State CEQA Guidelines Section 15183.5(b)(1) for the reduction of GHG emissions:

- Quantify GHG emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area.
- Establish a level, based on substantial evidence, below which the contribution of GHG emissions from activities covered by the plan would not be cumulatively considerable.
- Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area.
- Specify measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level.
- Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendment if the plan is not achieving specific levels.
- Adopt the GHG Reduction Strategy in a public process following environmental review.

This SAP provides quantified baseline and future GHG emissions, identifies GHG reductions that would result from specific actions, and establishes a monitoring mechanism for the City. The EIR provides a threshold below which the contribution of GHG emissions would not be cumulatively considerable, and provides environmental review of the SAP. Together, this SAP, the City of Mission Viejo General Plan, and the EIR prepared and certified for the SAP and General Plan comprise a plan for the reduction of GHG emissions within the meaning of State CEQA Guidelines Section 15183.5.

CHAPTER 2

EMISSIONS INVENTORY, PROJECTIONS, + GOALS

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This chapter examines current and projected GHG emissions for Mission Viejo. The chapter first presents Mission Viejo's current annual emissions using empirical data. Next, future emissions are projected under a business-as-usual (BAU) scenario, which assumes no action is taken to reduce emissions levels. These future emissions are based on projected activity data and land use assumptions that are presented in the 2012 Mission Viejo General Plan.

The second portion of this chapter sets a framework for communitywide GHG emissions reductions. State and federal emissions reduction measures are presented, along with an estimate of projected emissions reductions within the community. Finally, the quantity of reductions originating from the community is discussed.

Baseline Inventory

The purpose of a baseline inventory is to provide a snapshot of communitywide GHG emissions in a given year. The inventory identifies where most emissions originate, which is useful when determining where to focus reduction measures. The City developed a baseline emissions inventory for 2008.

Emissions Sectors

An emissions "sector" is a distinct subset of a market, society, industry, or economy whose components share similar characteristics. For GHG inventories, sectors can be thought of as public or private, with associated subsectors, although the Intergovernmental Panel on Climate Change (IPCC) defines sectors that cut across public and private activities, such as energy, industrial processes, and solid waste. For this GHG inventory and projections, the public and private sectors are separated and further broken down into categories of energy use (residential, commercial, and industrial electricity and natural gas), transportation (on-road mobile sources), solid waste, and water (technically a subset of the energy sector). The inventory addresses the following emission sectors: residential and nonresidential energy use, transportation, solid waste, water use, wastewater treatment, and off-road transportation.

Emissions Factors

An emissions factor is a representative constant that relates the quantity of a pollutant released into the atmosphere to an activity associated with the release of that pollutant. Several reputable sources of information can be used to gather emissions factor information.

The following sources of GHG emissions factors were used in preparing the communitywide inventory:

- ARB: On-Road Mobile-Source Emission Factor Model (EMFAC)
- The California Climate Action Registry: General Reporting Protocol, Version 3.1, 2009
- Intergovernmental Panel on Climate Change: IPCC Guidelines for National Greenhouse Gas Inventories, 2006
- Southern California Edison Annual 2007 Entity Emissions
- U.S. Environmental Protection Agency: Waste Reduction Model (WARM), 2009

These sources for emissions information best represent the carbon-intensity of activities occurring in Mission Viejo. To determine GHG emissions, activity data are multiplied by an emissions factor, and the result is expressed as metric tons of carbon dioxide equivalent (MT CO_2e) emissions. Transportation data from the Mission Viejo travel demand model were used in conjunction with EMFAC to develop on-road mobile-source GHG emissions.

Communitywide Emissions

The baseline emissions inventory was prepared using Citywide electricity and natural gas consumption data provided by SCE and SDG&E, solid waste data from landfill operators, and vehicle travel data from the General Plan transportation model. These empirical data were used, along with emissions factors from the sources identified above, to estimate Mission Viejo's communitywide emissions.

The baseline emissions inventory identified a communitywide emissions total of 725,833 MT CO_2e in 2008. As shown in Figure 2.1 and Table 2.1, transportation emissions constitute more than half of Mission Viejo's communitywide emissions, followed by energy use, water use and wastewater treatment, solid waste, and off-road mobile sources.

Figure 2.1 2008 Baseline Emissions by Sector

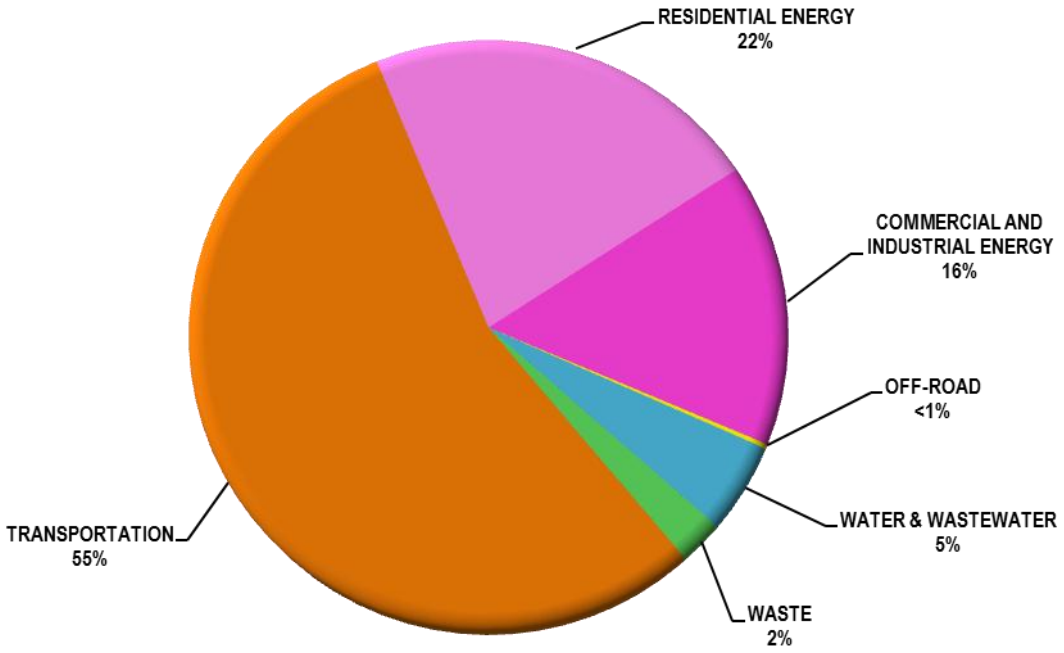


Table 2.1 2008 Communitywide Emissions

Emissions Sector	Subsector	Emissions (MT CO_2e/year)	Communitywide Total (%)
Transportation			
	Subtotal	**397,797**	**55%**
Energy – Residential	Electricity	83,982	12%
	Natural Gas	76,745	11%
Energy – Nonresidential	Electricity	87,628	12%
	Natural Gas	25,227	3%
	Subtotal	**273,582**	**38%**
Water	Water Demand	27,329	4%
	Wastewater Treatment	8,095	1%
	Subtotal	**35,424**	**5%**
Solid Waste			
	Subtotal	**17,296**	**2%**
Off-Road Mobile	Off-Road Equipment	1,407	0.2%
	Recreation	329	0.05%
	Subtotal	**1,737**	**0.25%**
Total		**725,833**	**100%**

Note: MT CO_2e = metric tons of carbon dioxide equivalent

Emissions Projections

Emissions projections provide insight into the scale of reductions needed to achieve the reduction goal. Mission Viejo's GHG emissions were projected for the years 2020 and 2035, assuming that historic trends of energy and water consumption and solid waste generation will remain the same in the future. This BAU scenario estimates emissions assuming that statewide emissions reduction measures included in the SAP would not be adopted or implemented.

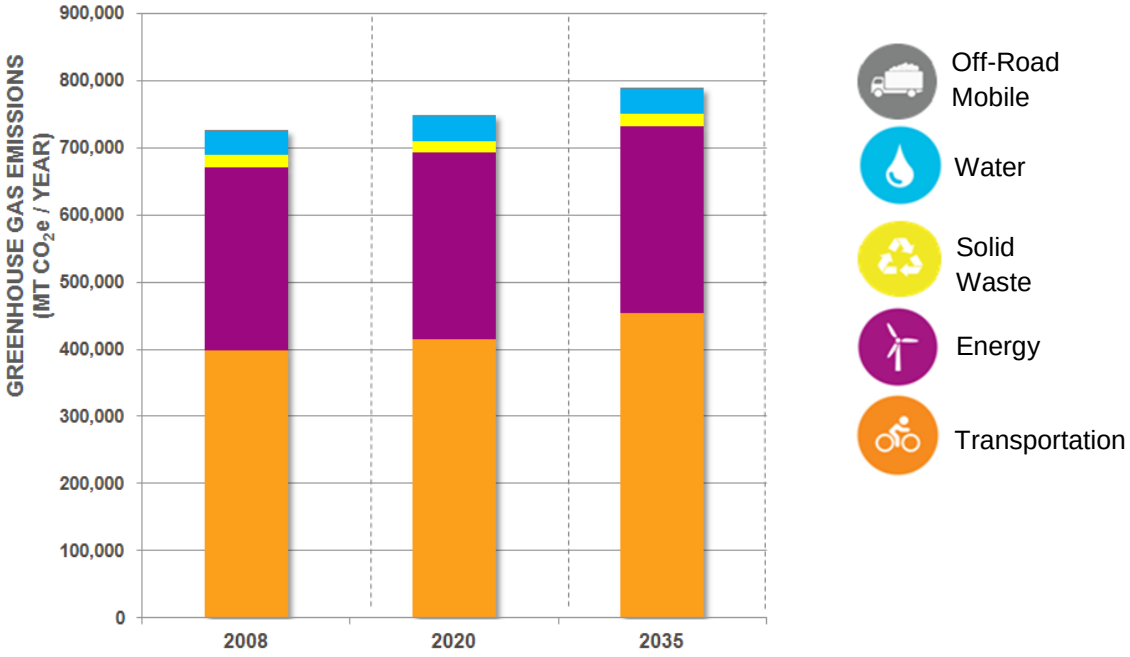
The SAP references both 2020 (the AB 32 target year) and 2035 (the second target year for Southern California Association of Governments [SCAG] Sustainable Communities Strategy) projections when reporting the emissions reduction potential of recommended measures.

Communitywide Emissions Projections

Future communitywide emissions were projected using population and employment data associated with the land use and transportation analysis completed for the General Plan. As illustrated in Figure 2.2 and Table 2.2, communitywide emissions would increase by approximately 23,487 MT CO_2e per year (3%) from 2008 to 2020, and by approximately 61,468 MT CO_2e per year (8%) from 2008 to 2035. The increases from 2008 to 2020 and 2035 are due primarily to anticipated future population and employment growth (and related consumption activity) in Mission Viejo.

Figure 2.2 and Table 2.2 show projected communitywide emissions by sector for 2020 and 2035. In each year, transportation sources create the most communitywide emissions. Energy is the next largest contributor, followed by solid waste, water, and off-road mobile sources. Transportation accounts for the largest proportional emissions increase for both projection years (5% increase by 2020 and 14% increase by 2035).

Figure 2.2 Mission Viejo Baseline and Projected Emissions



Notes: MT CO_2e = metric tons of carbon dioxide equivalent. Off-Road Mobile Emissions account for <1% of emissions and may be difficult to discern in this figure.

Table 2.2 Communitywide Emissions 2008–2035

Emissions Sector	2008 Emissions (MT CO_2e/yr)	2020 Emissions (MT CO_2e/yr)	Change from 2008 (MT CO_2e/yr)	2035 Emissions (MT CO_2e/yr)	Change from 2008 (MT CO_2e/yr)
Transportation	397,797	415,716	+17,919	452,457	+54,660
Energy	273,582	277,927	+4,345	278,848	+5,266
Solid Waste	17,296	17,899	+603	18,097	+801
Water	35,424	36,008	+584	36,123	+699
Off-Road Mobile	1,737	1,771	+34	1,778	+41
Total	**725,833**	**749,321**	**+23,487**	**787,303**	**+61,468**
% Change from Baseline (2008) Emissions			**+3%**		**+8%**

Note: MT CO_2e = metric tons of carbon dioxide equivalent

State and Federal Emissions Reductions

In determining potential emissions reductions, Mission Viejo's SAP considers both the effect of implementing local measures (see Chapter 3) and the effects of state and federal policies and regulations. Table 2.3 shows the estimated emissions reductions that would result from implementation of state and federal actions in Mission Viejo.

The largest anticipated reductions are from state and federal fuel efficiency improvements to passenger vehicles and light-duty trucks, as residents and businesses replace older vehicles with newer ones that are subject to federal Corporate Average Fuel Economy (CAFE) standards and California's fuel-efficient vehicle standards (Pavley I and II). California's LCFS (described in Chapter 1) will also reduce transportation-related emissions in the community by requiring a 10% decrease in the carbon intensity of transportation fuels. California law also requires utilities to obtain 33% of their electricity from renewable energy sources by 2020. In 2008, about 16% of SCE's and 6% of SDG&E's portfolio was from renewable sources.[1] This increase in renewable electricity will reduce Mission Viejo's energy emissions.

As shown in Table 2.3, with implementation of state and federal actions, communitywide emissions would be 606,762 MT CO_2e per year in 2020 and 543,589 MT CO_2e per year in 2035. These actions would reduce emissions by 19% (in 2020) and 31% (in 2035) from BAU levels for those respective years.

Table 2.3 2020 and 2035 Emissions Reductions from State and Federal Actions

State and Federal (S&F) Actions	2020 GHG Reductions (MT CO_2e/yr)	2035 GHG Reductions (MT CO_2e/yr)
Passenger vehicle and light-duty truck fuel efficiency standards (Pavley I & II)	71,904	184,078
Low Carbon Fuel Standard	29,796	20,260
Renewable Portfolio Standard	40,859	39,376
Total Reductions from S&F Actions	**142,559**	**243,714**
Business-as-Usual Emissions	**749,321**	**787,303**
Net Emissions with S&F Actions	**606,762**	**543,589**

Note: MT CO_2e = metric tons of carbon dioxide equivalent

[1] This percentage has since increased to 21% in 2011 for both SCE and SDG&E.

Local Reductions

State and federal actions have significant influence over GHG reduction potential at all government levels; however, local governments have an important role, too. Communitywide reduction measures and actions designed to supplement state and federal actions are presented in Chapter 3.

CHAPTER 3
REDUCTION MEASURES + ACTIONS

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This chapter describes local measures and actions to reduce communitywide GHG emissions. Each measure is designed to achieve quantifiable GHG reductions. To ensure proper implementation, each measure is accompanied by a description of policy background and implementation details that articulate necessary actions; City departments and government agencies with primary action responsibility; and progress indicator timelines. These measures attempt to leverage existing programs to ensure that emissions reductions take place, but implementation of the measures will be subject to available funding and resources.

Summary of Reductions

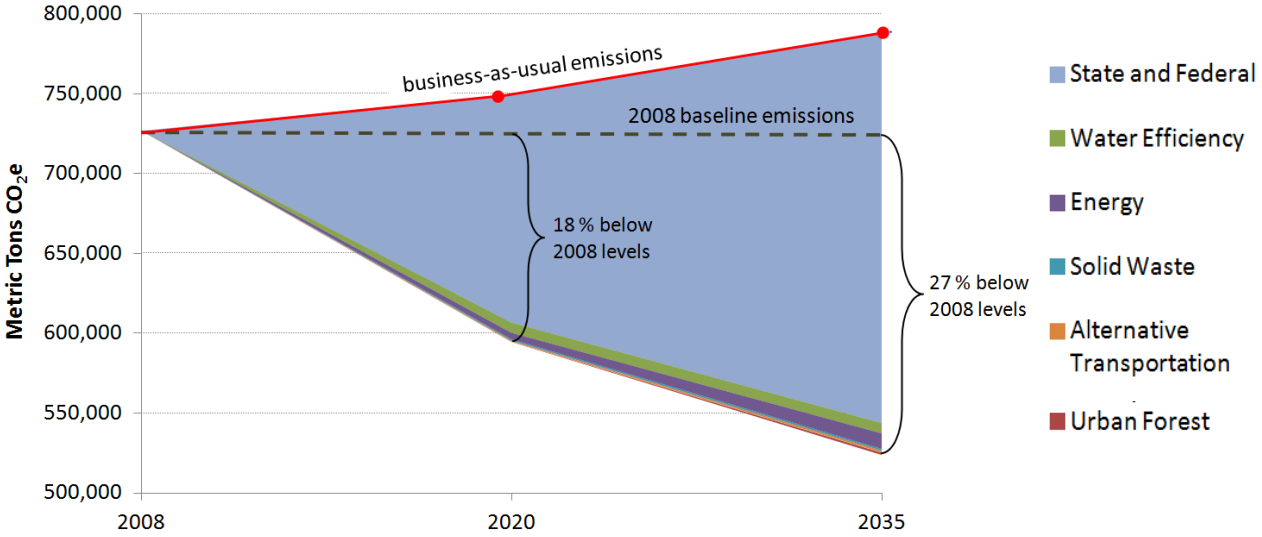
Table 3.1 summarizes GHG emissions reductions anticipated from implementation of the reduction measures and actions presented in this chapter. Figure 3.1 illustrates the GHG reduction potential of the five SAP strategies and statewide reductions.

Table 3.1 Measures and Quantified Reductions

Measure		2020 (MT CO_2e/yr)	% of Total	2035 (MT CO_2e/yr)	% of Total
Measure 1 – Urban Forestry					
Action 1A	Increase Urban Forest	130	0.1%	1,430	0.5%
Subtotal		**130**	**0.1%**	**1,430**	**0.5%**
Measure 2 – Water Efficiency					
Action 2A	Urban Water Management Plan Conservation Strategies (SB 7x7)	2,405	2%	2,476	1%
Subtotal		**2,405**	**2%**	**2,476**	**1%**
Measure 3 – Clean and Efficient Energy					
Action 3A	Energy Efficiency & Renewable Energy	4,025	3%	9,743	4%
Subtotal		**4,025**	**3%**	**9,743**	**4%**
Measure 4 – Solid Waste Reduction					
Action 4A	Enhanced Construction Diversion	869	0.6%	1,043	0.4%
Action 4B	Enhanced Food Waste Diversion	58	0.04%	130	0.05%
Action 4C	On-Site Residential Composting	7	0.004%	20	0.007%
Subtotal		**934**	**0.6%**	**1,193**	**0.5%**
Measure 5 – Alternative Transportation					
Action 5A	Commute Trip Reduction	643	0.4%	1,122	0.4%
Action 5B	Safe Routes to Schools	NA	NA	NA	NA
Subtotal		**643**	**0.4%**	**1,122**	**0.4%**
Measure 6 – Traffic Management					
Action 6A	Traffic Signal Synchronization	NA	NA	NA	NA
Subtotal		NA	NA	NA	NA
SUBTOTAL SAP MEASURES		**8,136**	**5%**	**15,963**	**6%**
State and Federal Measures					
AB 1493	Passenger vehicle and light-duty truck fuel efficiency standards (Pavley I & II)	71,904	48%	184,078	71%
LCFS	Low Carbon Fuel Standard	29,796	20%	20,260	8%
RPS	Renewable Portfolio Standard (33% by 2020)	40,859	27%	39,376	15%
SUBTOTAL STATE AND FEDERAL MEASURES		**142,559**	**95%**	**243,714**	**94%**
TOTAL REDUCTIONS		**150,695**		**259,678**	
BAU EMISSIONS		**749,321**		**787,303**	
NET EMISSIONS (BAU—Reductions)		**598,626**		**527,625**	
PERCENT REDUCTION BELOW 2008 EMISSIONS (725,833 MT CO_2e)		**18%**		**27%**	

Note: Subtotals and totals may not appear to add correctly due to rounding. Reductions estimates are based on business-as-usual (BAU) projected emission scenarios for 2020 and 2035.
NA = accurate reduction estimates are not available for this measure.

Figure 3.1 Reduction Potential of Local Measures and Statewide Regulations



Note: CO_2e = carbon dioxide equivalent

Reductions Relative to 2008

The local reduction measures, together with the effects of state and federal legislation in Mission Viejo, have the potential to reduce communitywide emissions by 150,695 MT CO_2e per year from projected 2020 levels, achieving an 18% decrease in emissions compared to 2008 levels. In 2035, the measures have the potential to reduce communitywide emissions by 259,678MT CO_2e per year from projected emission levels, which equates to 27% below 2008 levels. In addition, advances in energy-efficient or other GHG-reducing technology are likely to be developed, and implementation of additional state and federal regulations may require further GHG reductions. While these are anticipated, they are not known and, therefore, cannot be quantified at this time. As described in Chapter 4, the SAP will be revised periodically to reflect any changes in emissions projections or reduction potential. These additional efforts at the federal, state, or local level will further reduce Mission Viejo's GHG emissions. Monitoring the progress of SAP measures and completing additional GHG inventories are essential to understanding if anticipated reductions are occurring.

Local Measures

The City has long considered preserving the environment a key tenant of its planning and operations. This can be seen within the original 1965 Master Plan, which set development within the context of natural contours instead of grading entire neighborhoods flat as was commonly done at that time. Over the years, the City has increased its commitment to the environment by including a large number of sustainability goals and policies within the City's General Plan Conservation and Open Space, Housing, Public Facilities (this element has been incorporated into the Land Use Element), Circulation, and Growth Management Elements.

Although state measures will provide most of Mission Viejo's anticipated emissions reductions, the local measures identified in this chapter affect issues over which the City has influence, subject to the availability of funding and resources to plan, coordinate, and monitor these measures. Each local measure is subdivided into a series of actions. Measures and actions were developed by evaluating existing community conditions and General Plan policies; identifying emissions reduction opportunities within the community; reviewing best practices from other jurisdictions and organizations; and incorporating state and regional laws, guidelines, and recommendations.

The six emissions reduction measures are as follows:

1. **Urban Forestry.** The urban forestry measure uses street trees to capture and store carbon. It also reduces the cooling load of buildings, which decreases energy consumption.
2. **Water Efficiency.** The water efficiency measure promotes the efficient use and conservation of water in buildings and landscapes.
3. **Clean & Efficient Energy.** The clean and efficient energy measure recommends ways to increase energy efficiency in existing buildings, enhance energy performance for new construction, and increase use of renewable energy.
4. **Solid Waste Reduction.** The solid waste reduction measure aims to increase waste diversion and recycling, and reduce consumption of materials that otherwise end up in landfills.
5. **Alternative Transportation.** The alternative transportation measure encourages carpooling, walking, and bicycling as viable transportation modes to decrease the need to drive.
6. **Traffic Management.** The coordination of signals along arterial roadways will reduce vehicle idling and reduce fuel consumption.

Measure Structure

The six measures above represent the primary ways to reduce communitywide GHG emissions in Mission Viejo. Below is an introduction to each measure, describing the overarching concepts that tie that particular strategy to GHG emissions generation and potential reductions. This introduction is followed by actions and progress indicators that translate the City's vision into on-the-ground implementation.

Actions

Actions define the programs, policies, and projects that the City will undertake to accomplish its GHG emissions reduction goals. The following paragraphs describe the format and content of the actions.

Reduction Potential

Reduction potential values are provided after each action title and identify the estimated annual GHG emissions reductions anticipated in 2020 and 2035 in MT CO_2e per year.

Description

Action descriptions provide important background information and describe the City's rationale and policy direction. Additionally, some descriptions provide guidance that will be used in program implementation or highlight the City's actions to date that relate to a particular action.

Progress Indicators

Progress indicators are provided in a table following each action description. Progress indicators identify specific steps that the City will take to implement each measure and action. The table also identifies responsible departments. Progress indicators also enable staff, the City Council, and the public to track implementation and monitor overall SAP progress. Specific indicators are provided for 2020 and 2035.

General Plan Policies

As the SAP is an implementation document for the Mission Viejo General Plan, General Plan policies that support implementation of each proposed action are identified in a table following the progress indicators.

Measure 1 – Urban Forestry

Mission Viejo recognizes street trees as a valuable asset. Trees beautify neighborhoods, increase property values, reduce noise and air pollution, keep buildings cool in the summer, create privacy, and establish habitat for birds and other species of wildlife. Importantly, the urban forest also captures and stores carbon as the trees grow.

The total GHG emissions reduction potential of the urban forestry measure is 130 MT CO_2e per year in 2020 and 1,430 MT CO_2e per year in 2035, or less than 1% of the total reductions achieved by the SAP in each year.

Action 1A: Enhance the Urban Forest

2020 GHG Reduction Potential: 130 MT CO_2e per year
2035 GHG Reduction Potential: 1,430 MT CO_2e per year

The heat island effect causes temperatures to increase in areas with concentrations of exposed pavement and rooftops; urban forests provide shade, which reduces these effects. Higher temperatures can lead to increased air conditioner use, which increases energy consumption and can strain utility infrastructure at peak hours of the day.

Mission Viejo has been recognized as a "Tree City USA" community for its educational outreach, volunteerism, and urban reforestation. The City is committed to urban reforestation as a means of increasing the appeal of Mission Viejo and for capturing and storing carbon dioxide (CO_2) and reducing energy consumption. The City has taken the following steps, demonstrating this commitment:

+ Establishing a tree board or department
+ Enacting tree care ordinance and policies
+ Funding a community forestry program with an annual budget of at least $2 per capita
+ Celebrating Arbor Day with an observance and proclamation
+ Planting 4,600 new trees by 2035

The City will continue its efforts in urban reforestation in public and private development. The City will also manage outreach programs to encourage tree planting in the community, and will seek funding to support reforestation efforts from various sources, including an Urban Forestry Program.

		Responsibility
A	Continue existing tree planting efforts	Public Services

Progress Indicators	Year
+ Plant 1,600 new trees (2008–2020)	2020
+ Plant 4,600 new trees (2008–2035)	2035

General Plan Policies	
Conservation/Open Space Element	1.1, 3.7, 9.5, 10.1, 10.2, 10.3
Housing Element	Strategy 19
City Municipal Codes	

City Municipal Code	
City Tree Ordinance	14.30.020

Measure 2 – Water Efficiency

Water-related GHG emissions are mainly caused by energy used to pump, transport, and treat water and wastewater. Emissions associated with this energy use accounted for approximately 5% of the communitywide GHG inventory in 2008. With water supplies expected to continue declining over the coming decades, water conservation strategies have the double benefit of reducing GHG emissions and aligning demand with future water availability.

GHG emissions reductions in the water sector are greatly driven by a state-level policy, SB 7x7, also called the California Water Conservation Act of 2009. This policy requires a 20% reduction in per capita water consumption by 2020. The City's water suppliers have already reduced emissions by 12% from baseline levels; therefore, the City will achieve additional reductions through full implementation of this measure by 2020.

Because the strategies to reach the reduction goal will ultimately be developed by individual water districts, they may represent a combination of voluntary programs and ordinances. Given the many simple, cost-effective water conservation strategies available to residents and businesses, the City is anticipating high voluntary participation to help reduce water use.

The total GHG emissions reduction potential of the water efficiency measure will be 4,025 MT CO_2e per year in 2020 and 2,476 MT CO_2e per year in 2035. This represents 1% of the reductions anticipated by all SAP measures in 2020 and 2035.

Action 2A: Urban Water Management Conservation Plan

2020 GHG Reduction Potential: 2,405 MT CO_2e per year
2035 GHG Reduction Potential: 2,476 MT CO_2e per year

The California Water Conservation Act of 2009 requires each urban water retail supplier in California to develop a water use target by 2020 as part of a cooperative effort to help reduce California's statewide per capita water use by 20% from a baseline level. Each retailer's 2020 urban water use target must be reported in its 2010 Urban Water Management Plan (UWMP), along with its baseline daily water use and interim urban water use target for 2015. Retailers that do not meet the water use targets will not be eligible for water management grants or loans unless a viable implementation plan is approved by the funding agency.

Three water districts (Santa Margarita, El Toro, and Moulton Niguel) provide water to Mission Viejo. The City's average water usage baseline from these three water districts was 183 gallons per capita per day in 2010. This represents a reduction in water usage from the baseline levels of 12%; therefore, the City will reduce per capita water usage another 8% by 2020. To achieve the necessary reductions to meet water conservation targets, the water districts will continue to work with the City to implement programs that are already in place, including continued implementation of best management practices and enforcement of water-efficiency landscaping regulations.

The water districts will use five strategies to provide multiple paths for water conservation:

+ **Use catalysts for market transformation.** Water districts will pursue market transformation to affect the market and consumer choices for water-efficient devices and services.
+ **Encourage action through outreach and education.** Water districts will provide outreach, educational workshops, and training classes through a range of media and formats, which are essential to changing public perceptions of the value of water.
+ **Develop regional technical capability.** Water districts will conduct research, facilitate information sharing, and/or provide technical assistance to develop technical capabilities within the region for water budgeting, advanced metering infrastructure, ordinances, retail rate structures, and other conservation measures.

+ **Build strategic alliances.** Water districts will form strategic alliances with partners to leverage resources, opportunities, and existing momentum that support market transformation.

+ **Advance water efficiency standards.** Water districts will work to advance water efficiency codes and standards to increase efficiency and reduce water waste.

These five strategies will be implemented through three program types:

+ **Traditional Program:** A traditional program of incentives, outreach, education, and training will be used to provide a foundation of water savings, establish baseline conditions, provide market data, and help determine devices and services that are primed for market acceleration. Implementation may include regional incentive programs, pilot programs, regional outreach, and research.

+ **Market Acceleration Program:** A portion of the water districts' resources will be used for market acceleration of devices and services that have potential for market change. The districts will use a strategic focus for a specified time period to affect the market for a particular device or service. Tactics may include strategic outreach to manufacturers, retailers, contractors, and consumers; enhanced incentives; and collaboration on implementation.

+ **Legislation and Regulation:** These are important tools and often the primary means for ensuring future water savings from devices and services. Regulation, ordinances, and codes establish conditions that will ensure a minimum level of water efficiency for a particular device or service in the future. Markets are dynamic, and the influences on manufacturers, retailers, and consumers are constantly changing. Progress made on changing consumer preferences is protected through legislation and regulations that require a minimum efficiency standard. This benefits water agencies and manufacturers who invest in bringing water-efficiency technologies to the market.

In addition to the work the water districts have done, the City has adopted a regulation promoting water-use efficiency:

+ **Mission Viejo Landscaping Regulations** reduce water waste in landscaping by promoting the use of regionally appropriate plants that require minimal supplemental irrigation and by establishing irrigation efficiency standards. These regulations apply to new landscapes of 2,500 square feet or greater.

The City has also taken actions toward reducing municipal water consumption. The City is performing water audits of its buildings to monitor its water use and discover where water use can be reduced.

		Responsibility
A	Work with the water districts to implement conservation programs identified within the 2010 UWMPs	Public Works
B	Prioritize public buildings for water fixture upgrades and identify upgrades to be made	Public Works

Progress Indicators		Year
+	Reduce urban water use by 20% per capita below the average baseline of three water districts serving Mission Viejo	2020
+	Reduce urban water use by 20% per capita below the average baseline of three water districts serving Mission Viejo	2035

General Plan Policies	
Conservation/Open Space Element	5.2, 5.3, 5.4, 5.6. 10.1, 10.2

Measure 3 – Clean & Efficient Energy

The consumption of electricity for appliances, lighting, and cooling, and combustion of natural gas for heating, cooking, and other processes within residential, commercial, and industrial buildings generated 38% of Mission Viejo's communitywide GHG emissions in 2008. These emissions can be reduced by improving energy efficiency and increasing the amount of electricity and heat generated from renewable energy sources.

In Mission Viejo, approximately 54% of the housing stock was built before California's energy code, Title 24 Part 6, was implemented in the 1980s. Consequently, this pre-Title 24 building stock offers considerable opportunity for cost-effective energy efficiency retrofits to decrease the use of electricity and natural gas. The City plans to focus on this opportunity to achieve building energy efficiency improvements in existing buildings through a combination of education and incentives.

SCE and SDG&E are Mission Viejo's electricity providers, and Southern California Gas Company provides all of the natural gas for residential, commercial, industrial, and municipal uses. SCE and SDG&E generate electricity at hydroelectric, nuclear, renewable, natural gas, and coal facilities. SCE reported to the California Energy Commission (CEC) that, in 2010, natural gas facilities provided 37% of the total electricity supply by SCE; nuclear plants provided 19%; hydroelectric operations provided 6%; renewable energy facilities, including solar, geothermal, and biomass, provided 18%; and coal provided 7%. The remaining 13% of SCE's electricity cannot be traced to a specific generation sources since it was purchased from a power pool or exchange. This fuel source portfolio is similar for SDG&E based on information provided by the CEC.

Under the provisions of SB 107, investor-owned utilities such as SCE and SDG&E were required to generate 20% of their retail electricity using qualified

renewable energy technologies by the end of 2010. This goal was increased to 33% by 2020 with the passage of the California Renewable Energy Resources Act (SB X1-2) in 2011. In compliance with this mandate, SCE and SDG&E expanded their renewable generation portfolio from 12% and 8%, respectively, in 2008 to 21% in 2011. They will continually increase this percentage until they reach the goal of 33% by 2020.

To further increase the portion of Mission Viejo's energy provided from renewable sources, the City will encourage communitywide installation of rooftop solar photovoltaic (PV) and solar water heater (SWH) systems, both of which are effective technologies in the sunny climate of Mission Viejo. In efforts to reduce electrical bills and GHG emissions and lead by example, the City installed a 12,000-square-foot solar PV system on City Hall in 2010.

The total GHG emissions reduction potential of the Energy Strategy is 4,025 MT CO_2e per year by 2020 and 9,743 MT CO_2e per year by 2035, or about 3% of total 2020 reductions and 4% of total 2035 reductions achieved by the SAP.

Action 3A: Energy Efficiency & Renewable Energy

2020 GHG Reduction Potential: 4,025 MT CO_2e per year
2035 GHG Reduction Potential: 9,743 MT CO_2e per year

Energy Efficiency

According to U.S. Census data, nearly 54% of Mission Viejo's housing stock was constructed prior to implementation of Title 24 standards requiring statewide energy efficiency standards for residential and nonresidential buildings. Residential units constructed prior to 1980 frequently have minimal insulation, antiquated furnace systems, single-pane windows, and gaps in the building envelope. Energy efficiency improvements to residential structures can reduce energy bills for owners and reduce communitywide GHG emissions.

The California Public Utilities Commission (CPUC) set an ambitious goal of reducing the usage of grid-provided energy in 100% of existing homes by 2020. To achieve this goal, the state and federal governments created several programs, such as the Energy Upgrade California program and the PowerSaver Loan program. Energy Upgrade California is a statewide program to help homeowners retrofit and renovate homes with more energy-efficient appliances, heating/cooling systems, and other improvements by offering rebates based on percent increase in energy efficiency to lower the cost barrier of making improvements. Retrofits are generally done as part of a "package" of options, such as sealing leaks in air conditioning/heating systems and installing insulation in walls and ceilings. The PowerSaver Loan program is designed to spur the financing of energy efficiency improvements through the use of federally provided mortgage insurance to lower the interest rate for homeowners who want to make loans with private financial institutions.

The City developed a Green Building Program that provides educational information and incentives, in the form of building permit fee waivers and expedited permit review, to help residents make their homes more energy efficient. The City also offers an income-based housing rehabilitation program that provides interest-free loans and grants for improvements such as duel-pane windows, insulation, weather stripping, and other energy conservation

measures. The City will leverage these existing programs to reach out to residents and encourage them to participate in programs such as Energy Upgrade California and other energy efficiency programs provided by their local utility. These programs include Energy Saving Assistance programs, which provide free energy efficiency improvements to income-qualified customers; Summer Saver programs, which allow SDG&E and SCE to turn off or cycle participants' air conditioning systems in peak demand periods; and other rebate programs designed to help residents upgrade existing appliances and equipments to more energy-efficient models.

The City established a goal of reaching 10% of existing residential homes with an energy efficiency retrofit by 2020. This goal, which is more conservative than the state's goal, is based on investor-owned utility program implementation plans that are more conservative than statewide goals. The City assumed that, as the Energy Upgrade California program is further implemented, it will transform the home improvement and retrofit industries, which will enable existing contractors to produce more retrofits that will reduce energy usage. The City anticipates 25% of existing homes will have completed an energy efficiency retrofit by 2035, with a higher percentage of the retrofits being high-efficiency retrofits.

Along with an older residential building stock, Mission Viejo also has commercial buildings that consume energy. Energy efficiency improvements to nonresidential structures can increase business profits by reducing energy bills, while also reducing GHG emissions. The City will continue to partner with SCE and SDG&E, as well as community organizations, to conduct public education and outreach campaigns that encourage businesses to voluntarily complete energy efficiency improvements and to take advantage of low-cost energy efficiency retrofit and financing programs. Utility programs include a nonresidential audit program, rebate and incentive programs, a direct install program (which works with small businesses to provide energy efficiency improvements at no cost), and a continuous improvement program to help commercial customers create and implement long-term plans to reduce energy usage. According to the program implementation plans submitted to the CPUC by the utilities, these programs will combine to save an estimated 1 billion kilowatt-hours (kWh) in SDG&E and SCE's service territory by 2014. Based on the number of commercial meters in Mission Viejo compared to the entire service territories of the utilities, this would result in an estimated reduction of 5 million kWh by 2014. The state has also set a longer-term goal calling for 50% of existing buildings to be equivalent to zero net energy buildings by 2030.

As part of the City's outreach program, the City will enhance its website by linking to information regarding existing energy efficiency rebates and other financial incentives, including utility incentives to businesses for energy efficiency improvements. The website will also contain or link to local case studies of businesses that have completed cost-effective energy efficiency improvements. Financing is a critical component to ensuring the success of energy efficiency programs; therefore, the City will continue to assess the feasibility of developing an energy efficiency financing program, such as a PACE program, to further promote energy efficiency retrofits, which would allow qualified nonresidential property owners to repay the cost of energy efficiency retrofits on their property tax bills.

Renewable Energy

Once residents and businesses have completed energy efficiency retrofits, the next step in reducing their carbon footprint is generating renewable energy. The most prevalent form of renewable generation on residential and commercial buildings in California is solar PV and SWH systems. These systems allow residents and businesses to prevent energy bills from increasing when energy rates go up. In fact, studies show that SWH systems have a quick payback period. However, the high capital cost of water heater upgrades and PV installation can pose a financial burden to building owners. To overcome this barrier, the City will continue to actively promote and facilitate, through its Green Building Program, the installation of SWH and PV systems on residential and commercial buildings. The City will use this existing outreach program to provide information about the benefits of SWH and PV systems, as well as incentives and financing that make them economically feasible to install.

One of the main programs that the City will leverage in its outreach will be the California Solar Initiative program, which has a goal of retrofitting 300,000 homes with SWHs and installing 2,000 megawatts (MW) of solar PV panels on residential and commercial buildings across California. The 2020 goal for this measure was developed using a population-based proportion of the statewide goal for the City. By participating in this program, residents can receive incentives of up to $3,750 for installing SWHs on a single-family home and up to $500,000 per system on a multi-family or commercial building. Residents and businesses have already received or reserved almost $2.5 million in incentive payments for installing solar PV systems, and will continue to use this program to bring down the cost of installing solar systems. Additionally, according to the National Renewable Energy Laboratory, the price of installing solar PV panels in California has decreased by 39% since 1998. This decrease in price will make solar PV systems more economically feasible.

To further promote PV and SWH installations, the City will collaborate with SCE, SDG&E, and nonprofit organizations to identify various local, state, and national financing options that will be promoted in City outreach efforts. These financing programs will allow residents and businesses to overcome the high up-front cost of installing renewable energy systems. Options could include on-bill financing, low-interest loans, energy efficiency mortgages, or an energy efficiency Local Improvement District.

		Responsibility
A	Maximize existing outreach efforts that encourage residents and businesses to participate in existing energy efficiency retrofit programs and renewable energy systems	Community Development
B	Consider funding to continue, or update and expand if funding is available, the Green Building Program and income-based rehabilitation programs as technology, policies, and programs change	Community Development

Progress Indicators	Year
+ Retrofit 2% of existing residential units with a "high" energy efficiency retrofit (1% reduction in electricity and 10% reduction in natural gas usage) and 8% of residential units with "low" energy efficiency retrofits (3% reduction in natural gas)	2020
+ Install SWHs on 2% of single-family residential units and 1% of commercial and multi-family properties	2020
+ Install solar PV systems on 3% of existing residential homes, and install 2 MW or 100,000 square feet of solar PV panels on nonresidential properties communitywide (total)	2020
+ Retrofit 5% of existing residential units with a "high" energy efficiency retrofit (1% reduction in electricity and 10% reduction in natural gas usage) and 20% of existing residential units with "low" energy efficiency retrofits (3% reduction in natural gas)	2035
+ Install SWHs on 5% of single-family residential units and 3% of commercial and multi-family properties	2035
+ Install solar PV systems on 7% of existing residential homes and install 5 MW or 250,000 square feet of solar PV panels on nonresidential properties communitywide (total)	2035

General Plan Policies	
Conservation/Open Space Element	9.1, 9.2, 9.3, 9.4, 9.5, 9.6, 9.7, 10.1, 10.2, 10.3
Housing Element	Policy 4.3; Strategies 2, 19

Measure 4 – Solid Waste Reduction

Solid-waste-related GHG emissions result from product consumption and disposal, and from pre-consumer commercial and industrial processes. In Mission Viejo, only 2% of GHG emissions are associated with solid waste generation and disposal in landfills. Solid waste disposal creates emissions when organic waste (e.g., food scraps, yard clippings, paper, and wood) is buried in landfills and anaerobic digestion takes place, emitting methane. Additionally, extracting and processing raw materials for consumer products, distributing them to consumers, and disposing of them creates GHG emissions.

The City currently contracts with a private contractor to provide citywide waste and recycling collection. Presently, most solid waste-reduction practices focus on diverting solid waste products from landfills through recycling.

However, it is also important to consider programs that reduce overall solid waste generation and to consider reuse options.

Action 4A: Enhanced Construction Diversion

2020 GHG Reduction Potential: 869 MT CO_2e per year
2035 GHG Reduction Potential: 1,043 MT CO_2e per year

The City currently offers convenient residential and commercial recycling programs, in addition to backyard composting workshops, public education, and hazardous waste programs. These current programs enable the City to divert communitywide solid waste from landfills. The City is also currently pursuing a Green Business program.

In September 2004, the City Council adopted a Construction and Demolition Ordinance, requiring demolition and construction projects greater than 250 square feet to divert a minimum of 75% of debris from the landfill. One of the main solid waste products from construction and demolition operations is lumber, which is being diverted and recycled. The City will continue to enforce this ordinance. Another source of organic waste that is sent to landfills is landscaping waste from residential properties. This waste is often used as alternative daily cover (ADC), which is placed on top of waste at night and covered with waste in the morning. This process traps the organic waste in the landfill and creates methane. As a way to reduce this waste stream, the City will leverage its existing home composting workshop program to educate residents to use organic waste to produce compost. Additionally, to show home owners the many benefits that composting can provide, the City and Waste Management of Orange County also offer free compost during the City's Earth Month celebrations.

		Responsibility
A	Increase the percentage of solid waste that is required to be diverted in the mandatory Construction and Demolition Ordinance	Public Works

Progress Indicators		Year
+	Divert 75% of lumber from 90% of total construction waste (divert 3,008 tons per year)	2020
+	Divert 90% of lumber from 90% of total construction waste (divert 3,609 tons per year)	2035

General Plan Policies	
Conservation/Open Space Element	8.9, 10.1
Land Use Element	11.1, 11.2, 11.3, 11.4

Action 4B: Enhanced Food-Waste Diversion

2020 GHG Reduction Potential: 58 MT CO_2e per year
2035 GHG Reduction Potential: 130 MT CO_2e per year

Through a grant provided by the County of Orange, the City partnered with Waste Management of Orange County, the cities of Irvine and Laguna Beach, and unincorporated areas of the county to target food waste that is sent to landfills by installing food dehydrators at local restaurants and other businesses that dispose of high volumes of food waste. This equipment allows the facilities to turn food scraps into valuable compost. When organic waste decomposes in landfills, it produces methane, a GHG 21 times as powerful as CO_2. Leveraging the current food-scrap diversion pilot programs to divert food scraps from the landfill presents a key opportunity to reduce the community's landfill methane emissions.

		Responsibility
A	Continue, and increase where funding is available, the Food-Waste Diversion program	Public Works

Progress Indicators		Year
+	Increase food-scrap diversion rate to 80% for 5% of commercial business (divert 156 tons per year)	2020
+	Increase food scrap diversion rate to 90% for 10% of commercial business (divert 350 tons per year)	2035

General Plan Policies	
Conservation/Open Space Element	8.9, 10.1
Land Use Element	11.1, 11.2, 11.3, 11.4

Action 4C: On-Site Residential Composting

2020 GHG Reduction Potential: 7 MT CO_2e per year
2035 GHG Reduction Potential: 20 MT CO_2e per year

Another source of organic waste that is sent to the landfill is landscaping waste from residential properties. This waste is often used as ADC, which is placed on top of waste at night and covered with waste in the morning. This process traps the organic waste in the landfill and creates methane. As a way to reduce this waste stream, the City will leverage its existing home composting workshop program to educate residents to use organic waste to produce compost. Additionally, to show home owners the many benefits that composting can provide, the City and Waste Management of Orange County offer free compost during the City's Earth Month celebrations.

		Responsibility
A	Educate residents by promoting the benefits of on-site backyard composting to decrease the amount of landscape waste collected by the waste hauler or used as ADC[1]	Public Works

Progress Indicators		Year
+	Increase on-site composting of yard waste (grass, leaves, and branches); achieve a 25% diversion rate in 5% of single-family units[2]	2020
+	Increase on-site composting of yard waste (grass, leaves, and branches); achieve a 25% diversion rate for 15% of single-family units	2035

General Plan Policies	
Conservation/Open Space Element	8.9, 10.1
Land Use Element	11.1, 11.2, 11.3, 11.4

Measure 5 – Alternative Transportation

Transportation-related emissions made up the largest component (55%) of Mission Viejo's 2008 emissions inventory. These emissions were determined largely by the number of vehicle miles traveled by residents and employees. Long vehicle trips and high numbers of trips create high emissions. Successfully reducing vehicle emissions relies on reducing or shortening vehicle trips, making alternative modes of transportation (such as transit, bicycling, or walking) more viable, reducing the use of single-occupancy vehicles through carpooling and vanpooling, and increasing proximity of diverse land uses. Technological advancements in vehicle fuel efficiency and reduction of vehicle fuel carbon content at a statewide level will also reduce vehicular GHG emissions.

The transportation measure relies on implementation of goals and policies in the General Plan Circulation Element, including the following:

+ Parking provisions as part of Transportation Demand Management (TDM) plans
+ Bike system improvements
+ Pedestrian system improvements
+ Transit system improvements

[1] Diversion rate is the percentage of solid waste diverted from traditional disposal such as landfill or incineration to be recycled, composted, or re-used.

[2] It cannot be determined with certainty that future reductions in the diversion rate are due to residential on-site composting. Outside factors, including curb-side green waste service, are not accounted for.

+ Carpooling
+ Telecommuting and alternative work schedules
+ TDM

The total GHG reduction for the transportation measure is 643 MT CO_2e per year in 2020 and 1,122 MT CO_2e per year by 2035.

Action 5A: Commute Trip Reduction

2020 GHG Reduction Potential: 643 MT CO_2e per year
2035 GHG Reduction Potential: 1,122 MT CO_2e per year

TDM is a series of strategies that aim to reduce single-occupancy automobile trips. These strategies frequently target commute trips associated with employment. Private industry employs the majority of employees who work within Mission Viejo. To facilitate a change in commuting patterns for new development, the City has mandated that new commercial, business park/ industrial, mixed use, institutional, or other nonresidential uses that are expected to employ 100 or more persons be required to prepare, adopt, and implement a TDM-facility design program. This requirement is supported by the updated General Plan Circulation Element, which specifically states that new development will need to comply with the TDM ordinance. The City will continue to enforce this development requirement.

The City will also participate in regional programs identified in the SCAG Regional Transportation Plan, which has allocated $4.5 billion to support TDM strategies aimed at increasing carpooling; increasing the use of transit, bicycling, and walking; and redistributing vehicle trips from peak demand periods to non-peak periods by shifting work times/days/locations. Shifting vehicle trips can be achieved by offering alternative work schedules such as a 9/80 or 4/10 schedule, telecommuting, and home-based businesses, and also within daily operations by encouraging teleconferencing as a replacement for traveling to meetings.

		Responsibility
A	Promote the use of transportation demand management (TDM) methods	Public Works/ Community Development
B	Enforce compliance with TDM plan requirements	Public Works/ Community Development

Progress Indicators	Year
+ 15% of employed residents use commute modes other than driving alone	2020
+ 25% of employed residents use commute modes other than driving alone	2035

General Plan Policies	
Circulation Element	12.3, 12.4, 12.7
Growth Management Element	1.5

Action 5B: Safe-Routes-to-School Program

2020 GHG Reduction Potential: Supporting measure
2035 GHG Reduction Potential: Supporting measure

In 2008, Mission Viejo received a $492,000 non-infrastructure Safe-Routes-to-School grant. The City will continue to work with the Saddleback Valley Unified and Capistrano Unified School Districts to increase biking and walking as a transportation mode for students by promoting participation in Safe-Routes-to-School programs and improving walking and biking infrastructure conditions near schools. Many schools report existing barriers to walking and bicycling such as heavy traffic, frequent speeding, and unsafe street crossings. The City created and distributed maps of safe routes for all elementary and middle schools. The emissions reductions from this measure could not be quantified, but it will support the other transportation measures. As identified in Measure 5B, the City will invest in improving the walking and bicycling infrastructure throughout Mission Viejo. These investments are especially important near the City's schools.

In 2011, Mission Viejo was awarded a second Safe-Routes-to-School grant in the amount of $141,400. The Safe-Routes-to-School Infrastructure Grant provided funds to construct a 350-foot-long sidewalk on Napoli Way in front of Bathgate Elementary School and 31 curb ramps throughout the City. The new sidewalk improves walkability in the neighborhood and provides a safer pedestrian path for students attending Bathgate Elementary School by eliminating the need to cross the intersection of Napoli Way and San Rafael Drive. The 31 new curb ramps also improve pedestrian infrastructure along the designated safe routes to other schools. Construction was completed in December 2012. These improvements are consistent with the City's support of transportation measures that offer GHG-reduction potential.

		Responsibility
A	Work with school districts to pursue additional Safe-Routes-to-School grants and funding	Public Works

Progress Indicators		Year
	+ Increase percentage of students who walk or bike to school	2020, 2035

General Plan Policies	
Circulation Element	16.1, 16.2

Measure 6 – Traffic Management

Traffic signal synchronization on arterial routes improves signal timing to reduce overall vehicle stops and delays. Traffic signal synchronization calculates the arrival time for a platoon of vehicles at each intersection traveling at a specified speed and traffic signals are strategically timed to turn green as the platoon of vehicles arrives at each intersection. This measure has already been funded through AB 2766 and from the Orange County Transportation Authority. GHG emissions reductions are realized through lower fuel use. Emissions reductions may be evaluated by comparing pre- and post-implementation average speeds in the affected segments.

Action 6A: Traffic Signal Synchronization

2020 GHG Reduction Potential: NA
2035 GHG Reduction Potential: NA

		Responsibility
A	Improve the monitoring, timing, controlling, and communication of traffic conditions on arterial corridors	Public Works/ Community Development

Progress Indicators		Year
+	Implement traffic signal coordination in 43 miles of arterial corridors	2020
+	Assess opportunities for additional traffic flow improvements	2035

General Plan Policies	
Circulation Element	6.1, 6.2, 7.6, 10.1, 11.1, 11.2

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CHAPTER 4

IMPLEMENTATION + MONITORING

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4

This chapter describes how the City would implement the SAP's GHG reduction measures and actions, subject to the availability of funding and resources to plan, coordinate, monitor, evaluate, and report on these measures. The chapter contains the following three sections:

- **Measure Implementation**. Describes how City staff would implement SAP measures and their related actions. It also describes the role of the progress indicators.
- **Program Evaluation and Evolution**. Discusses the need to evaluate, update, and amend the SAP over time so that the program remains effective and current.
- **Relationship to the California Environmental Quality Act**. Describes the relationship between the SAP and CEQA, and establishes criteria for City staff when determining if a project is consistent with the SAP.

Measure Implementation

Ensuring that SAP measures translate from policy language into on-the-ground results is critical to the success of the SAP. To facilitate this future effort, each action described in Chapter 3 contains a table that identifies specific steps the City could execute, subject to the availability of resources and funding to plan, coordinate, monitor, and evaluate any implementation activities of the SAP. The table also identifies responsible departments for each action. The second section of each table provides progress indicators to enable City staff, City Council, and the public to track measure implementation and monitor overall SAP progress.

The tables provide both 2020 and 2035 progress indicators where possible. Indicators will help the City evaluate if a measure is on the right path to achieving anticipated 2020 and 2035 GHG reductions.

Upon adoption of the SAP, the City departments identified in Chapter 3 would be responsible for implementing assigned actions. Key staff in each department would facilitate and oversee this work. To assess the status of City efforts, SAP implementation meetings should take place several times a year. Some actions will require interdepartmental or interagency cooperation, and appropriate partnerships will need to be established.

Program Evaluation and Evolution

The SAP represents the City's initial attempt to create an organized, communitywide strategy to reduce GHG emissions. Staff will need to evaluate the program's performance over time, and be ready to alter or amend the plan if it is not achieving the anticipated reductions or as new relevant information and technology becomes available.

Program Evaluation

Two types of performance evaluations are important: evaluation of the community's overall ability to reduce GHG emissions, and evaluation of the performance of individual SAP measures. Communitywide GHG emissions inventories will provide the best indication of SAP effectiveness. Conducting communitywide GHG emissions inventories periodically will enable direct comparison to the 2008 baseline inventory and will demonstrate whether the City is on track to achieve the anticipated GHG reductions.

Evaluating the emissions reduction capacity of individual measures will improve the ability of City staff and decision makers to manage and implement the SAP. The City can reinforce successful measures and reevaluate or replace under-performing measures. Evaluating measure performance will require data on actual community participation rates and measurement of GHG reductions.

The Community Development Department would coordinate measure evaluation on the same schedule as the communitywide inventories, and summarize progress toward meeting the GHG reduction goals in a report that describes achievement of progress indicators and remaining barriers to implementation.

Program Evolution

The City must be prepared to adapt and transform the SAP over time. It is likely that new information will emerge, new GHG reduction technologies and innovative municipal strategies will be developed, new financing will become available, and state and federal legislation will change. As part of the evaluations identified above, the City would assess the implications of new scientific findings and technology, explore new opportunities for GHG reductions, respond to changes in climate policy, and incorporate these changes into future updates of the SAP to ensure an effective and efficient program.

Relationship to the California Environmental Quality Act

CEQA Guidelines, Section 15183.5, describe the requirements for a GHG reduction plan to provide tiering and streamlining benefits to future development projects. Section 15183.5(b)(1)(D) specifically states that the GHG reduction plan must contain measures that, if implemented on a project-by-project basis, would collectively achieve the plan's established emissions reduction level. This guidance essentially means that each future project seeking to use CEQA tiering will need to demonstrate compliance with the SAP, as described below.

Project Consistency with the SAP

The SAP identifies only voluntary GHG reduction measures that would apply to different types of future projects. All SAP measures are essentially voluntary, relying on assumed levels of community participation to create communitywide GHG reductions. There is one measure that has a mandatory requirement, Measure 5A, which enforces the City's current development code that requires new developments to build TDM facilities. Measure 5A uses that ordinance to estimate TDM participation; it does not mandate participation in a TDM program. All of the SAP measures would be tracked to monitor participatory rates.

To use these GHG reduction measures to enable CEQA streamlining for GHG environmental assessment, the City must incorporate them as mitigation measures on future discretionary projects found to be consistent with the General Plan.

If the City elects to facilitate this process, the City may develop a checklist of potential mitigation measures based on voluntary SAP measures. The City would use this checklist to evaluate applications for discretionary entitlements and identify binding and enforceable mitigation measures for future projects seeking to use CEQA tiering provisions, in accordance with CEQA Guidelines Section 15183.5(b)(2). Such mitigation measures may be identified in a Mitigated Negative Declaration, EIR, or EIR Addendum prepared for the subsequent project, and incorporated as conditions of approval. The project may then rely on consistency with the SAP and General Plan EIR to identify a less-than-significant impact to GHG emissions in its environmental document.

If substantial evidence indicates that the GHG emissions of a proposed project may be cumulatively considerable, notwithstanding the project's compliance with specific measures in this SAP, an EIR must be prepared for the project. This provision would also apply to any project seeking to amend the General Plan.

Summary

This SAP uses a framework similar to that established by the Scoping Plan, which details measures that aim to reduce emissions by 2020. The Scoping Plan and the City's SAP include measures and actions that represent an expandable framework for additional future reductions. The Scoping Plan discusses the need to look beyond 2020, but states that measures to achieve the 2050 goal are "too far in the future to define in detail" at this time. Similarly, the SAP focuses on reductions by 2020, but also provides programs that can be augmented in the future to achieve additional reductions.

This SAP represents the City of Mission Viejo's initial commitment to complying with state and federal legislative mandates by reducing GHG emissions from community activities, recognizing that the City's implementation efforts will be contingent upon available funding and resources that can be dedicated toward this effort. The City recognizes that there are local benefits to these actions, and Mission Viejo residents and businesses will benefit from improved public health related to reduced air and water pollution and increased physical activity from the improved urban forest and bike system, among other benefits.

APPENDIX A
ACRONYM LIST

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A

Acronym List

This appendix lists the acronyms that are used in the SAP.

AB	Assembly Bill
ADC	alternative daily cover
ARB	California Air Resources Board
BAU	business as usual
CAFE	Corporate Average Fuel Economy
CCAR	California Climate Action Registry
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH_4	methane
City	City of Mission Viejo
CO_2	carbon dioxide

CO_2e	CO_2 equivalent
CPUC	California Public Utilities Commission
EIR	Environmental Impact Report
EMFAC	ARB On-Road Mobile-Source Emission Factor Model
EO	Executive Order
EPA	Environmental Protection Agency
GHG	greenhouse gas
GWP	global warming potential
IPCC	International Panel on Climate Change
kWh	kilowatt hour
kWh/yr	kilowatt-hours per year
LCFS	Low Carbon Fuel Standard
LGOP	Local Government Operations Protocol
MT	metric tons
MW	megawatt
N_2O	nitrous oxide
PACE	Property Assessed Clean Energy
PV	photovoltaic
RPS	Renewable Portfolio Standard
SAP	Sustainability Action Plan
SB	Senate Bill
SCAG	Southern California Association of Governments
SCE	Southern California Edison
SDG&E	San Diego Gas & Electric
SOCWA	South Orange County Wastewater Authority
SWH	solar water heater
TDM	Transportation Demand Management
UMWP	Urban Water Management Plan
VMT	vehicle miles traveled
WARM	EPA Waste Reduction Model

APPENDIX B

GREENHOUSE GAS EMISSIONS INVENTORY AND PROJECTIONS

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B

This appendix summarizes the methodologies and assumptions contained within the greenhouse gas (GHG) emissions inventory and projections.

Introduction

The purpose of a GHG emissions inventory is to identify sources and levels of GHG emissions to enable policy makers to implement cost-effective GHG-reduction strategies in policy areas over which they have operational or discretionary control.

AECOM developed a GHG emissions inventory (inventory) for community and municipal GHG emissions sources for the 2008 baseline year as the first step in the development of the Sustainability Action Plan (SAP).

GREENHOUSE GAS EMISSIONS INVENTORY

Overview

A GHG emissions inventory is an accounting of the amount of GHGs emitted by various sources over a specific period of time. The inventory is often developed by local governments and used in sustainability plans that estimate emissions over time and establish measures that can reduce emissions, generally in conformance with the Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32).

An inventory for the community and local government operations was developed for the City of Mission Viejo (City) by emissions sector. An emissions sector is a distinct subset of a market, society, industry, or economy whose components share similar characteristics. The 2008 inventory addresses the following emissions sectors: energy consumption (electricity and natural gas use), on-road transportation, solid waste, water and wastewater treatment, and non-road fuel consumption (e.g., emergency generators, off-road recreational vehicles, lawn equipment). Government-related GHG emissions are considered a subset of the communitywide emissions inventory.

This inventory focuses on the three GHGs most relevant to local government policymaking: carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Converting non-CO_2 gases to units of carbon dioxide equivalent (CO_2e) emissions allows GHGs to be compared on a common basis (i.e., on the ability of each GHG to trap heat in the atmosphere). Non-CO_2 gases are converted to CO_2e using internationally recognized global warming potential (GWP) factors. GWPs were developed by the Intergovernmental Panel on Climate Change (IPCC) to represent the heat-trapping ability of each GHG relative to that of CO_2, and are consistent with the GWPs used by the California Air Resources Board (ARB) for California statewide emissions. For example, the GWP of CH_4 is 21 because 1 metric ton of CH_4 has 21 times more ability to trap heat in the atmosphere than 1 metric ton of CO_2. The GWP of N_2O is 310.

Baseline Year

Reporting GHG inventories on a calendar-year basis is considered an international standard. The United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol, European Union Emission Trading System (EU ETS), Climate Registry, California Climate Action Registry (CCAR), the state of California's mandatory reporting regulation under AB 32, and the Environmental Protection Agency's (EPA) GHG reporting program all require GHG inventories to be tracked and reported on a calendar-year basis. The community and municipal inventories for Mission Viejo were prepared for the year 2008.

Inventory Approach

The municipal inventory was prepared using the Local Government Operations Protocol (LGOP), which was developed by ARB, CCAR, and ICLEI – Local Governments for Sustainability (ICLEI), in collaboration with The Climate Registry (ARB 2010). The LGOP provides a standardized set of guidelines to assist local governments to quantify and report GHG emissions associated with their government operations. The LGOP strongly encourages local

governments to use operational control when defining their organizational boundary. Operational control describes the emissions sources that local governments can influence, and is the consolidation approach required under AB 32's mandatory reporting program. It is also consistent with the requirements of many other types of environmental and air quality reporting. This inventory was prepared using the operational control approach.

Currently, there is no standard community emissions protocol; however, many documents have been developed to guide development of community inventories. Specific sources and methodologies are outlined in each of the sectors below. The boundary for defining community emissions is generally the physical geographic boundary of the community. This community inventory, then, will include governmental, residential, industrial, and commercial activities. While the geographic definition of a community's boundary works well for stationary sources, mobile source emissions are more challenging, and the methodology used for mobile-source emissions is detailed below.

Methodology

City staff and AECOM collected data from various sources, including City departments, public utilities, and private entities that provide services within the community. Data collection included activities specific to City/municipal operations (e.g., building energy uses and vehicle fuel usage) and community-wide activities (e.g., total tons of solid waste collected) that occurred in 2008.

AECOM used emissions factors recommended by the LGOP and IPCC to estimate CO_2e emissions for municipal operations and communitywide activities. Emissions factors are continually being refined and improved to reflect better measurement technology and research.

Energy Consumption – Electricity and Natural Gas

The energy consumption sector includes the use of electricity and natural gas in residential, commercial, and industrial land uses within the legal boundaries of the City. Although emissions associated with electricity production are likely to occur in a different jurisdiction, consumers are considered accountable for the generation of those emissions. Electricity-related GHG emissions are considered indirect emissions. Indirect emissions are those generated as a result of activities within the jurisdiction, but that occur in different geographic areas. For example, a resident may consume electricity within the City, but the electricity may be generated in a different region. Direct emissions are emissions where the activity directly generates the emissions (e.g., natural gas combustion for heating or cooling).

Southern California Edison (SCE) and San Diego Gas & Electric (SDG&E) provided electricity consumption data in kilowatt-hours per year (kWh/yr). Sempra Energy/Southern California Gas Company provided natural gas consumption data in decatherms per year (decatherms/yr). These three entities provide all electricity and natural gas to Mission Viejo.

Electricity-related GHG emissions were quantified using utility-specific emissions factors from CCAR's public reports, including SDG&E's reported 2008 emissions factor and SCE's reported 2007 emissions factor (SCE did not report an emissions factor for 2008). Emissions factors for CH_4 and N_2O were obtained from the LGOP, which provided a statewide average emissions factor. Emissions factors for CO_2, CH_4, and N_2O for natural gas were also obtained from the LGOP.

Transportation

The transportation sector in this inventory includes the operation of on-road vehicles, including passenger cars, light trucks, and heavy-duty vehicles. This differs from transportation sector definitions applicable to Senate Bill (SB) 375, which focuses solely on reducing emissions from passenger cars and light trucks. Emissions from mobile combustion can be estimated based on vehicle fuel use and miles traveled. CO_2 emissions account for the majority of emissions from mobile sources, and are directly related to the quantity of fuel combusted. Thus, they can be calculated using fuel consumption data. CH_4 and N_2O emissions depend more on the emissions control technologies employed in the vehicle and the distance traveled. Calculating CH_4 and N_2O emissions requires data describing vehicle characteristics (which takes into account emissions control technologies) and vehicle miles traveled (VMT).

Communitywide daily VMT data was provided by Iteris and based on the Mission Viejo Traffic Analysis Model. Based on guidance from the Regional Targets Advisory Committee, which was appointed by ARB to provide recommendations on factors to be considered and methodologies to be used in the ARB target setting process, daily VMT data for internal-to-external and external-to-internal trips were discounted by 50% to reflect that some of these emissions will occur outside of Mission Viejo's jurisdictional boundaries. A factor of 347 was applied to the VMT data to convert it from daily to annual VMT; this conversion factor was also identified by ARB. For the municipal VMT analysis, the City provided total fuel consumption data for fiscal year 2010/2011, which was used as a proxy year for calendar year 2008 for municipal operations. The City also administered an employee commute survey, which was used to estimate municipal transportation emissions.

Emissions factors for the transportation sector were derived from ARB's vehicle emissions model, EMFAC2007. EMFAC2007 is a mobile source emissions model for California that provides vehicle emissions factors by county and vehicle class. For the emissions inventory, Orange County emissions factors were used. Pursuant to EPA guidance, CO_2e emissions were calculated by dividing CO_2 emissions by 0.95, which accounts for other GHGs such as N_2O, CH_4, and other high GWP gases.

Solid Waste

The solid waste sector includes emissions resulting from the collection, processing, and disposal of solid waste. Fugitive CH_4 emissions are released from solid waste facilities, namely landfills that accept organic waste. Solid waste disposal creates primarily CO_2 emissions, which occur under aerobic conditions, and CH_4 emissions, which occur under anaerobic conditions.

Community and government-generated solid waste data were provided by the City. City and community waste are contracted through Waste Management, which recycles, recovers, or disposes of the waste. The Frank R. Bowerman, Olinda Alpha, and Prima Deshecha Sanitary Landfills are the primary landfills for Mission Viejo.

GHG emissions resulting from solid waste collected within the community and from government services were estimated using EPA's Waste Reduction Model (WARM, 2009) and waste stream information provided by the City.

Water Consumption

The water sector includes emissions from energy associated with water treatment, distribution, and conveyance to the community.

In Mission Viejo, three water districts provide water service: Moulton Niguel, Santa Margarita, and El Toro. Because none of these water districts tracks water usage by jurisdiction, Mission Viejo's community water usage was estimated using the districts' 2010 Urban Water Management Plans and the percent of Mission Viejo's population compared to the water districts' overall service populations.

Many Southern California communities import water from remote locations via the Colorado River and State Water Project. Conveying and distributing imported water from these remote locations involves a considerable amount of electricity to run pumps and other facilities; the California Energy Commission (CEC) publishes water-energy-intensity studies that estimate the energy required to convey, treat, and distribute imported water to Southern California. Mission Viejo also uses recycled water by treating wastewater produced by the community. This represents a local source of water and uses less energy to supply and convey than imported water, but greater energy to treat and distribute (wastewater treatment plants are typically located at low elevations). Overall, recycled water is less energy-intensive. Imported and local water-related emissions were estimated using the appropriate emissions factors.

Wastewater

The wastewater sector includes emissions resulting from water treatment processes, including wastewater collection, septic systems management, primary and secondary treatment, solids handling, and effluent discharge. Wastewater treatment processes can encompass many different sources of GHG emissions. The primary GHG emissions from wastewater treatment facilities are the CH_4 and N_2O emissions created by septic systems and centralized wastewater treatment.

Community wastewater is treated at the 3A and J.B. Laethum treatment plants operated by the South Orange County Wastewater Authority (SOCWA). While SOCWA does not directly monitor wastewater generated in the community or by the City, it did provide an estimate of wastewater generated by the community. SOCWA was unable to estimate the amount of wastewater generated by local government operations, so this sector was excluded from the local government's inventory. This is typically a minor sector in municipal GHG emissions inventories.

Direct GHG emissions associated with wastewater treatment were calculated using the IPCC methodology for centralized, aerobic wastewater treatment plants (IPCC 2006). Indirect GHG emissions associated with energy embodied in treating wastewater were estimated using the CEC factors described in the Water sector. Water used in outdoor activities, such as landscape irrigation, is not collected by the water system and is, therefore, not subject to post-delivery wastewater treatment. Therefore, energy demand associated with post-delivery wastewater treatment is not included in outdoor water consumption estimates.

Other Sources

This sector groups emissions associated with construction, light commercial, industrial, lawn and gardening, and off-road vehicle activities and equipment.

Data for community activities were estimated using OFFROAD2007, which provides county-level emissions for off-road equipment. Because the City does not track municipal fuel use or hours of operation for small equipment, this sector was excluded from the municipal operations inventory.

ARB's OFFROAD2007 model was used to quantify GHG emissions associated with community sources. OFFROAD2007 is an off-road mobile source emissions model for California that provides emissions by county for equipment such as construction, light commercial, industrial, lawn and garden, and recreational vehicles. Applicable indicators specific to the City were used to allocate the total county-wide emissions. Indicators include statistics such as the U.S. Census Bureau and U.S. Department of Housing and Urban Development on households, retail jobs, and manufacturing jobs for construction, lawn and garden, light commercial, and industrial off-road equipment allocation.

Results

Reporting emissions by sector provides a useful way to understand the sources of a community's and a local government's emissions. By better understanding the relative scale of emissions from each of the sectors, the City can more effectively focus emissions reduction strategies to achieve the greatest reductions. Mission Viejo's 2008 communitywide GHG inventory indicates that transportation and electricity and gas consumption were the two largest emission sectors, accounting for approximately 55% and 38% of the total 725,833 metric tons of CO_2e per year (MT CO_2e/yr), respectively.

Discussion

As further detailed in Table B.1 and Figure B.1, the largest sources of GHG emissions in 2008 were the following, in descending order:

1. Transportation (55%)
2. Residential energy consumption (24%)
3. Non-residential energy consumption (14%)

The remaining sources, comprising approximately 7% of total 2008 GHG emissions, are also listed in descending order below:

1. Water demand (5%)
2. Generated solid waste (2%)
3. Wastewater treatment (<1%)
4. Non-road vehicles and portable equipment (<1%)

To provide more information about the largest emissions sector in the community inventory, Figure B.2 illustrates emissions in the transportation sector, broken down based on vehicle type. The City will likely be able to achieve the largest, most cost-effective emissions reductions from on-road mobile-source and energy conservation measures, which should be a strong focus in the SAP.

Figure B.1 – City of Mission Viejo 2008 Communitywide Greenhouse Gas Emissions Inventory

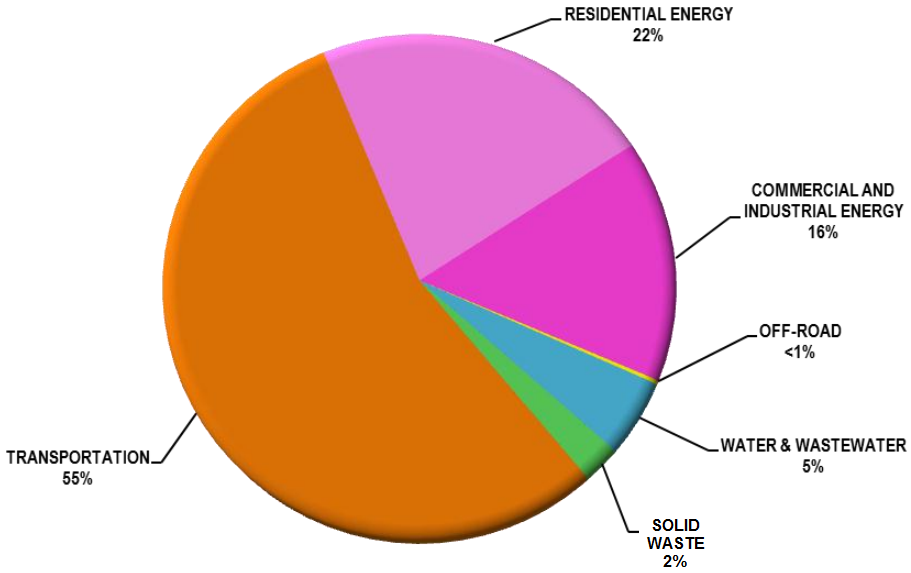
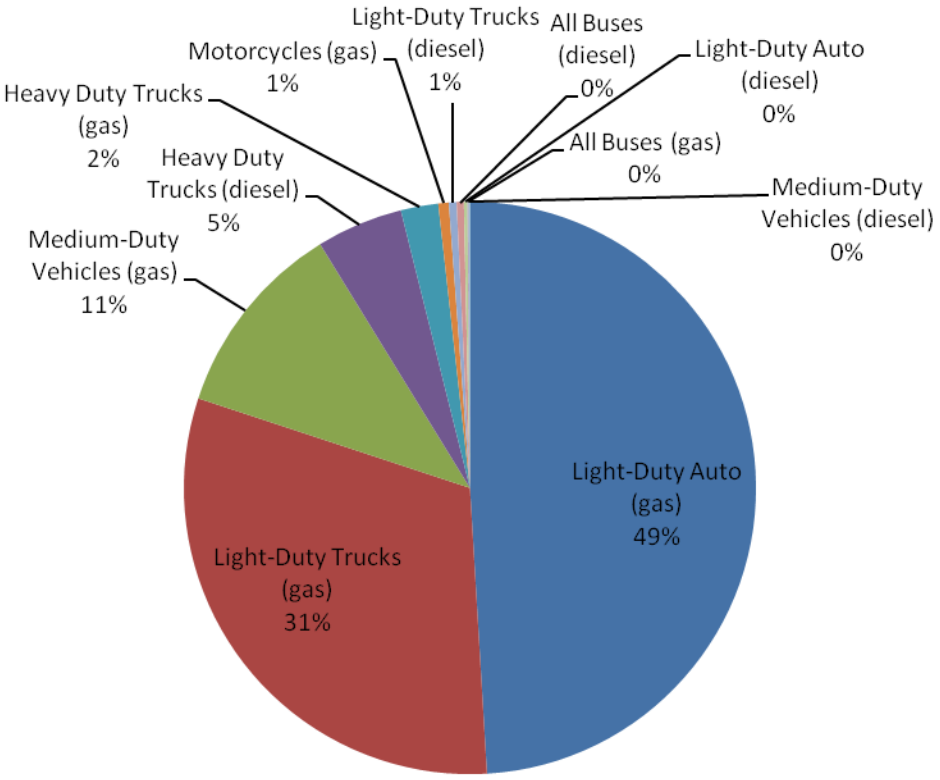


Table B.1 – 2008 Mission Viejo Communitywide Greenhouse Gas Emissions

Emissions Sector	Subsector	Emissions (MT CO_2e/year)	Percent of Total
Transportation			
	Subtotal	**397,797**	**55%**
Energy – Residential	Electricity	83,982	12%
	Natural Gas	76,745	11%
Energy – Nonresidential	Electricity	87,628	12%
	Natural Gas	25,227	3%
	Subtotal	**273,582**	**38%**
Water	Water Demand	27,329	4%
	Wastewater Treatment	8,095	1%
	Subtotal	**35,424**	**5%**
Solid Waste			
	Subtotal	**17,296**	**2%**
Off-Road Mobile	Off-Road Equipment	1,407	0.2%
	Recreation	329	0.05%
	Subtotal	**1,737**	**0.25%**
Total		**725,833**	**100%**

Figure B.2 – Community Transportation Emissions by Vehicle Type



Notes: MT CO_2e = metric tons of carbon dioxide equivalent
Sectors showing 0% represent <1% of total emissions.

Municipal operations within the City during 2008 contributed 2.4% of total communitywide GHG emissions. The primary source of these emissions was energy consumption (Table B.2). Unlike the community inventory, the largest source of emissions for the municipal inventory was the energy sector, which accounted for 77% of all emissions. The City will likely be able to achieve the largest, most cost-effective municipal emissions reductions from energy conservation measures.

Table B.2 – 2008 Mission Viejo Municipal Greenhouse Gas Emissions

Sector	MT CO_2e	%
Transportation:		
Vehicle Fleet	159	1%
Employee Commute	719	4%
Energy:		
Electricity	2,921	17%
Natural Gas	10,595	60%
Solid Waste:		
Generated Solid Waste	99	1%
Water	3,022	17%
Total	**17,514**	**100%**

Notes: MT CO2e = metric tons of carbon dioxide equivalent
Sectors may not add to the totals due to rounding

BUSINESS-AS-USUAL EMISSIONS FORECASTS

Overview

Communitywide and municipal operations GHG emissions were projected for 2020 and 2035 under a business-as-usual (BAU) scenario. The communitywide BAU scenario estimates future trends in energy, solid waste, wastewater, water, and other sectors based on the Southern California Association of Governments' forecasts of population, housing, and employment for the City, and assuming that historic trends in energy consumption and waste generation continue. The community transportation forecasts were created by Iteris based on preliminary Orange County Projections 2010 provided by the Orange County Transportation Authority. This dataset and General Plan land uses were used to update the Mission Viejo Traffic Analysis Model, which provides VMT estimates. Using the 2008 and 2035 VMT data, Iteris interpolated a 2020 scenario.

Recognizing that economies of scale exist in providing municipal services (i.e., that municipal services and resultant emissions would not grow directly proportional to population growth), it was assumed that municipal operations would grow at 65% of the residential growth of the community under the BAU scenario. These BAU scenarios describe what would likely occur with implementation of the General Plan, but without implementation of a SAP or other GHG-reducing measures, such as the Low Carbon Fuel Standard; Pavley legislation, which covers passenger auto and light truck fuel efficiency; and the Renewable Portfolio Standard. These statewide emissions reduction measures were excluded because they would likely be accounted for in the SAP.

Results

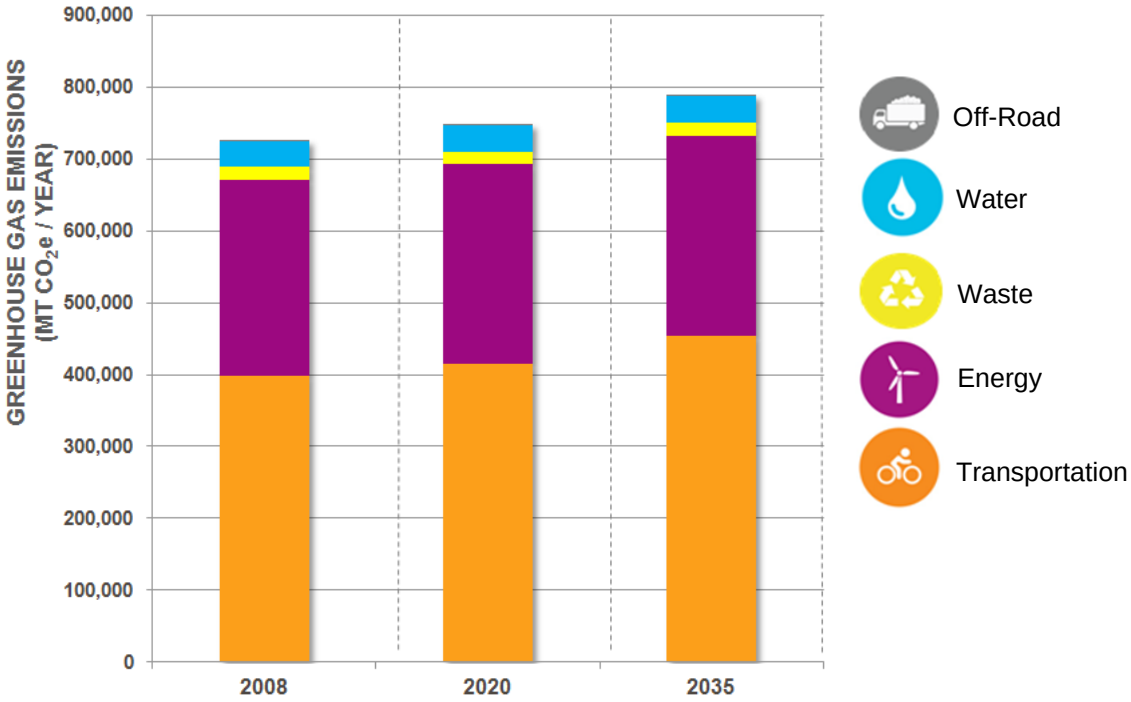
Similar to the baseline GHG inventory, the BAU emissions forecast is separated into sectors. This allows the City to evaluate emissions changes by sector, which may be useful for the SAP. Overall communitywide emissions are estimated to increase by 3%, or by 17,919 MT CO_2e/yr, by 2020, and 8%, or 54,660 MT CO_2e/yr, by 2035, from the 2008 base year. These increases would bring total communitywide emissions for the community to 749,321 MT CO_2e/yr in 2020 and 787,303 MT CO_2e/yr in 2035 (Table B.3 and Figure B.3). The largest emissions increases would occur within the transportation sector, which would increase by 5% by 2020 and 14% by 2035 from the 2008 base year.

Table B.3 – Mission Viejo Communitywide Business-as-Usual Emissions Forecasts (2020 and 2035)

Emissions Sector	2008 Emissions (MT CO_2e/yr)	2020 Emissions (MT CO_2e/yr)	2020 % Increase from Base Year	2035 Emissions (MT CO_2e/yr)	2035 % Increase from Base Year
Transportation	397,797	415,716	5%	452,457	14%
Energy	273,582	277,927	2%	278,848	2%
Solid Waste	17,296	17,899	4%	18,097	5%
Water	35,424	36,008	2%	36,123	2%
Off-Road Mobile	1,737	1,771	2%	1,778	3%
Total	**725,833**	**749,321**	**3%**	**787,703**	**8%**

Notes: MT CO_2e = metric tons of carbon dioxide equivalent
Sectors may not add to the totals due to rounding

Figure B.3 – Mission Viejo Communitywide Business-as-Usual Emissions Forecasts (2020 and 2035)



Notes: MT CO_2e = metric tons of carbon dioxide equivalent. Off-Road Mobile Emissions account for <1% of emissions and may be difficult to discern in this figure.

All sectors for the municipal 2020 and 2035 forecasts were estimated assuming that the City's municipal operations, and resultant emissions, would increase at 65% of the rate of residential population growth. Therefore, all municipal sectors are forecasted to increase by 2.25% by 2020 and 3% by 2035 (Table B.4).

Table B.4 – Mission Viejo Municipal Operations Business-as-Usual Emissions Forecasts (2020 and 2035)

Emissions Sector	2008 Emissions (MT CO_2e/yr)	2020 Emissions (MT CO_2e/yr)	2035 Emissions (MT CO_2e/yr)
Transportation			
Vehicle Fleet	159	164	166
Employee Commute	719	743	750
Energy			
Electricity	2,921	2,987	3,008
Natural Gas	10,595	10,833	10,911
Solid Waste			
Generated Solid Waste	99	101	102
Water	3,022	3,090	3,112
Total	**17,514**	**17,918**	**18,050**

Notes: MT CO_2e/yr = metric tons of carbon dioxide equivalent per year
Sectors may not add to the totals due to rounding

Discussion

Emissions reduction goals are set for a year in the future, typically 2020, 2035, and occasionally 2050. Because of this, it is important to account for predictable changes in community and municipal operations that will affect the GHG emissions of various sectors. Understanding the BAU forecasts, the City can elect to create a package of emissions reduction measures that will enable it to reduce communitywide GHG emissions, subject to the availability of funding and resources. BAU forecasts that align with any emissions reduction goals are also used as a baseline for quantifying GHG reduction measures.

REFERENCES

California Air Resources Board (ARB)
2010 *Local Government Operations Protocol for the Quantification and Reporting of Greenhouse Gas Emissions Inventories*. Version 1.1. May.

Intergovernmental Panel on Climate Change (IPCC)
2006 *IPCC Guidelines for National Greenhouse Gas Inventories*. Chapter 6 – Wastewater Treatment and Discharge.

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APPENDIX C

GREENHOUSE GAS REDUCTION MEASURES AND QUANTIFICATION

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C

This appendix summarizes the assumptions and parameters used to calculate greenhouse gas (GHG) emission reduction performance of recommended Sustainability Action Plan (SAP) measures for which a quantified reduction is provided. A summary of the reductions estimated for the years 2020 and 2035 are shown in Table C.1.

Table C.1. Summary of Reduction Measures and Performance by 2020 and 2035

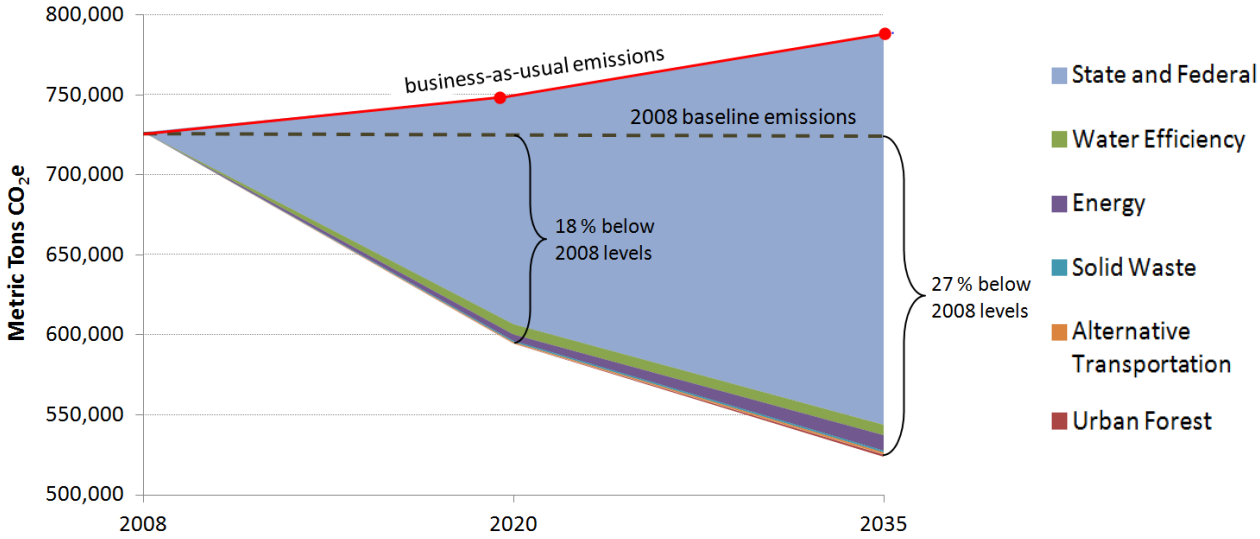
Measure		2020 GHG Reductions (MT CO_2e/yr)	2035 GHG Reductions (MT CO_2e/yr)
Measure 1 – Urban Forestry			
Action 1A	Increase Urban Forest	130	1,430
Subtotal		**130**	**1,430**
Measure 2 – Water Efficiency			
Action 2A	Urban Water Management Plan Conservation Strategies (SB 7x7)	2,405	2,476
Subtotal		**2,405**	**2,476**
Measure 3 – Clean and Efficient Energy			
Action 3A	Energy Efficiency & Renewable Energy	4,025	9,743
Subtotal		**4,025**	**9,743**
Measure 4 – Solid Waste Reduction			
Action 4A	Enhanced Construction Diversion	869	1,043
Action 4B	Enhanced Food Waste Diversion	58	130
Action 4C	On-Site Residential Composting	7	20
Subtotal		**934**	**1,193**
Measure 5 – Alternative Transportation			
Action 5A	Commute Trip Reduction	643	1,122
Action 5B	Safe Routes to Schools	NA	NA
Subtotal		**643**	**1,122**
Measure 6 – Traffic Management			
Action 6A	Traffic Signal Synchronization	NA	NA
Subtotal		NA	NA
SUBTOTAL SAP MEASURES		**8,136**	**15,963**
State and Federal Measures			
AB 1493	Passenger vehicle and light-duty truck fuel efficiency standards (Pavley I & II)	71,904	184,078
LCFS	Low Carbon Fuel Standard	29,796	20,260
RPS	Renewable Portfolio Standard (33% by 2020)	40,859	39,376
SUBTOTAL STATE AND FEDERAL MEASURES		**142,559**	**243,714**
TOTAL REDUCTIONS		**150,695**	**259,678**
BUSINESS AS USUAL (BAU) EMISSIONS		**749,321**	**787,303**
NET EMISSIONS (BAU—Reductions)		**598,626**	**527,625**
PERCENT REDUCTION BELOW 2008 EMISSIONS (725,833 MT CO_2e)		**18%**	**27%**

Notes: Subtotals and totals may not appear to add correctly due to rounding. Reductions estimates are based on business-as-usual projected emission scenarios for 2020 and 2035. MT CO_2e = Metric tons of carbon dioxide equivalent.
NA = accurate reduction estimates are not available for this measure.

INTRODUCTION

As illustrated in Figure C.1, federal, state, and local GHG reduction strategies have the potential to reduce GHG emissions in Mission Viejo by approximately 150,695 MT CO_2e in 2020, which is approximately 18% below 2008 emission levels, and by 259,678 MT CO_2e in 2035, which is about 27% below 2008 emission levels.

Figure C.1. 2020 and 2035 Greenhouse Gas Reduction Potential



LOCAL MEASURES AND REDUCTION ESTIMATES

URBAN FORESTRY

1A Increase Urban Forest

The GHG reduction potential of Measure 1A. is based on the building energy reduction and CO_2 sequestration capacity of an additional 4,600 trees to be planted in the City by 2035, with an interim target of 1,600 trees by 2020.

2020

Performance Measure	Trees Planted	Efficiency – Amount of Carbon (MT CO_2e/year) Sequestered Annually	Scaled Measure Performance (Reduction in GHG Emissions)
Enhanced Urban Forest	1,600	130	0.1%

2035

Performance Measure	Trees Planted	Efficiency – Amount of Carbon (MT CO_2e/year) Sequestered Annually	Scaled Measure Performance (Reduction in GHG Emissions)
Enhanced Urban Forest	4,600	1,430	0.5%

WATER

This measure's water efficiency actions would reduce per capita water consumption 20% by 2035 and 2020 compared to a baseline average. Since some efficiencies have occurred prior to the baseline emissions inventory, only those efficiencies expected after 2008 can be counted as reductions. Among the City's water suppliers, an average of 12% efficiency compared to baseline levels has been achieved. Per capita water consumption assumes water consumption from all water usage sources.

In order to estimate the GHG reductions associated with implementation of these water conservation measures, 2008 urban water consumption and population values were used to calculate baseline per capita water consumption. Water consumption in 2035 and 2020, under a business-as-usual scenario, was estimated using 2035 and 2020 population growth estimates consistent with the General Plan.

2A Urban Water Management Plan Conservation Strategies

2020

Performance Measure	Community Water Savings (Million Gallons/Year)	GHG Reductions (MT CO_2e/Year)	Scaled Measure Performance (Reduction in GHG Emissions)
SB-7x Indoor Water Reductions	255	1,392	1%
SB-7x Outdoor Water Reductions	218	1,012	1%
Total	473	2,405	2%

2035

Performance Measure	Community Water Savings (Million Gallons/ Year)	GHG Reductions (MT CO_2e/Year)	Scaled Measure Performance (Reduction in GHG Emissions)
SB-7x Indoor Water Reductions	263	1,434	<1%
SB-7x Outdoor Water Reductions	224	1,042	<1%
Total	487	2,476	1%

2035

Performance Measure	Community Water Savings (Million Gallons/ Year)	GHG Reductions (MT CO_2e/Year)	Scaled Measure Performance (Reduction in GHG Emissions)
SB-7x Indoor Water Reductions	263	1,434	<1%
SB-7x Outdoor Water Reductions	224	1,042	<1%
Total	487	2,476	1%

CLEAN AND EFFICIENT ENERGY

3A Energy Efficiency & Renewable Energy

The GHG reduction potential of Measure 3A is based on retrofits of existing residential units with low and high efficiency, the installation of solar water heaters in single- and multi-family residential units and commercial buildings, and the installation of solar photovoltaic (PV) systems to existing residential homes.

Retrofits in Existing Buildings: Residential & Commercial

2020

Performance Measure	Participation Rate	Electricity Reduced (kWh/Year)	Natural Gas Reduced (kBTU/Year)	GHG Reductions (MT CO_2e/Year	Scaled Measure Performance (Reduction in GHG Emissions)
Energy Efficiency Retrofits in Existing Buildings: Residential	10%	1,422	4,501,210	239	0.2%
Energy Efficiency Retrofits in Existing Buildings: Commercial		1,098,049	0	338	0.2%
Total		1,099,471	4,501,210	578	2%

kWh/Year = kilowatt hours per year

kBTU/Year =kilo British Thermal Units per year

2035

Performance Measure	Participation Rate	Electricity Reduced (kWh/Year)	Natural Gas Reduced (kBTU/Year)	GHG Reductions (MT CO_2e/Year	Scaled Measure Performance (Reduction in GHG Emissions)
Energy Efficiency Retrofits in Existing Buildings: Residential	25%	3,556	11,253,028	598	0.2%
Energy Efficiency Retrofits in Existing Buildings: Commercial	30%	2,745,122	0	846	0.3%
Total		2,748,678	11,253,028	1,444	0.5%

Renewable Energy

2020

	Participation Rate	Electricity Generated (kWh/Year)	Natural Gas Reduced (kBTU/Year)	GHG Reductions (MT CO_2e/Year)	Scaled Measure Performance (Reduction in GHG Emissions)
Photovoltaics: Single-Family Residential	3%	6,110,223	0	1,882	
Photovoltaics: Commercial and Multi-Family Residential	2 MW	3,628,328	0	1,118	
Subtotal		9,738,551	0	3,000	1%
Solar Water Heaters: Single-Family Residential	2%	0	83,152	441	
Solar Water Heaters: Commercial	3%	0	90,292	6	
Subtotal		0	83,152	447	1%
Total		9,738,551	83,152	3,447	

2035

	Participation Rate	Electricity Generated (kWh/Year)	Natural Gas Reduced (kBTU/Year)	GHG Reductions (MT CO_2e/Year	Scaled Measure Performance (Reduction in GHG Emissions)
Photovoltaics: Single-Family Residential	7%	14,257,211	0	4,392	
Photovoltaics: Commercial and Multi-Family Residential	5 MW	9,070,821	0	2,795	
Subtotal		23,328,031	0	7,187	3%
Solar Water Heater: Single-Family Residential	5%		207,881	1,103	
Solar Water Heaters: Commercial	3%		1,580	8	
Subtotal		0	209,462	1,112	0.4%
Total		23,076,709		9,743	

SOLID WASTE REDUCTION

4A Enhanced Construction Diversion

The GHG emissions reduction potential of Measure 4A is based on the diversion of lumber from construction waste.

2020

Performance Measure	Participation Rate	Diversion Rate	Waste Reduction (Tons/Year)	Methane Reduction	GHG Reductions (MT CO_2e/Year	Scaled Measure Performance (Reduction in GHG Emissions)
Enhanced Lumber Waste Diversion	90%	75%	3,008	37.8	569	0.6%

2035

Performance Measure	Participation Rate	Diversion Rate	Waste Reduction (Tons/Year)	Methane Reduction	GHG Reductions (MT CO_2e/Year	Scaled Measure Performance (Reduction in GHG Emissions)
Enhanced Lumber Diversion	90%	90%	3,609	45.4	1,043	0.4%

4B Enhanced Food Waste Diversion

The GHG reduction potential of Measure 4B is based on increase in the food scrap diversion rate for commercial businesses.

2020

Performance Measure	Participation Rate	Diversion Rate	Waste Reduction (Tons/Year)	Methane Reduction	GHG Reductions (MT CO_2e/Year	Scaled Measure Performance (Reduction in GHG Emissions)
Food Scrap and Compostable Paper Diversion	5%	80%	156	2.5	58	0.04%
Total	5%	80%	156	2.5	58	0.04%

2035

Performance Measure	Participation Rate	Diversion Rate	Waste Reduction (Tons/ Year)	Methane Reduction	GHG Reductions (MT CO_2e/Year	Scaled Measure Performance (Reduction in GHG Emissions)
Food Scrap and Compostable Paper Diversion	10%	90%	350	5.7	130	0.05%
Total	10%	90%	350	5.7	130	0.05%

4C Residential On-Site Composting

The GHG reduction potential for Measure 4C is based on the increase of on-site composting of yard waste.

2020

Performance Measure	Participation Rate	Diversion Rate	Waste Reduction (Tons/Year)	Methane Reduction	GHG Reductions (MT CO_2e/Year	Scaled Measure Performance (Reduction in GHG Emissions)
Enhanced Landscape Waste Diversion	5%	25%		0.3	7	0.004%

2035

Performance Measure	Participation Rate	Diversion Rate	Waste Reduction (Tons/Year)	Methane Reduction	GHG Reductions (MT CO_2e/Year	Scaled Measure Performance (Reduction in GHG Emissions)
Enhanced Landscape Diversion	15%	25%	NA	0.8%	28	0.007%

ALTERNATIVE TRANSPORTATION

5A Commute Trip Reduction

The GHG reduction potential of Measure 5A is based on employed residents using commute modes other than driving alone.

2020

Performance Measure	Participation Rate	Vehicle Miles Traveled Reduction (Miles/Year)	Fuel Savings (Gallons/Year)	GHG Reductions (MT CO_2e/Year	Scaled Measure Performance (Reduction in GHG Emissions)
Transportation Demand Management	155	1,325,779	68,901	643	0.4%

2035

Performance Measure	Participation Rate	Vehicle Miles Traveled Reduction (Miles/Year)	Fuel Savings (Gallons/Year)	GHG Reductions (MT CO_2e/Year	Scaled Measure Performance (Reduction in GHG Emissions)
Transportation Demand Management	25%	2,209,632	119,659	1,122	0.4%

5B Safe Routes to School Program

The Safe-Route-to-School Program is a supporting measure based on grant funding that the City of Mission Viejo received to increase biking and walking as transportation modes for students.

ALTERNATIVE TRANSPORTATION

6A Traffic Management

Traffic signal synchronization is taking placed funded by Assembly Bill (AB) 2766 and the Orange County Transportation Authority. GHG reductions are realized through lower fuel use. Emissions reductions have not yet been completed for this measure, but may be evaluated by comparing pre- and post-implementation average speeds in the affected segments.

STATE AND FEDERAL MEASURES AND REDUCTION ESTIMATES

AB 1493

AB 1493, California's mobile-source GHG emissions regulations for passenger vehicles, was signed into law in 2002. The level of GHG emissions reductions associated with AB 1493 was estimated using the ARB's Pavley + Low Carbon Fuel Standard Postprocessor software (Version 1.0) and modified to include new emissions standards for 2016-2025. It is expected that implementation of Pavley would reduce on-road mobile-source GHG emissions by approximately 41% by 2035 and 17% by 2020.

Low Carbon Fuel Standard

Executive Order S-01-07 reduces the carbon intensity of California's transportation fuels by at least 10% by 2020. The Low Carbon Fuel Standard (LCFS) is a performance standard with flexible compliance mechanisms that incentivizes the development of a diverse set of clean, low-carbon transportation fuel options to reduce GHG emissions.

The level of GHG emissions reductions associated with the LCFS were estimated using the ARB's Pavley + Low Carbon Fuel Standard Postprocessor software (Version 1.0) using Mission Viejo-specific traffic data. It is expected that implementation of the standard would reduce on-road mobile-source GHG emissions by approximately 10% by 2020 and 2035. The LCFS standard reduction was applied to total transportation emissions minus the reductions already achieved by Pavley, so as to avoid double counting of reduction potential.

Regulated Performance Improvement		Transportation Sector Emissions (with reductions from Measure 5A applied)		GHG Emissions Reductions (MT CO_2e/year)	
2020	**2035**	**2020**	**2035**	**2020**	**2035**
17%	41%	415,073	451,335	101,700	204,338

Renewable Portfolio Standard

The renewable portfolio standard (RPS) requires utilities to establish renewable energy portfolios of 33% by 2020, which would result in a reduction of GHG emission factors associated with electricity generation and consumption. For Mission Viejo, it was assumed that GHG emissions associated with electricity consumption would be reduced by 33% between the base year (2008) and 2035 and 2020 associated with the implementation of the RPS.

Subsector	BAU Emissions 2008 Base Year (MT CO_2e/year)	BAU Building Energy Emissions (electricity) (with reductions from local SAP measures applied) (MT CO_2e/year)		Building Energy Emissions (electricity) (33% Renewable) (MT CO_2e/year)		GHG Emissions Reductions (MT CO_2e/year)	
	2008	2020	2035	2020	2035	2020	2035
Residential	83,982	81,700	74,316	63,005	57,138	18,696	17,178
Commercial	87,628	89,771	89,912	67,607	67,714	22,163	22,198
Total	**171,609**	**171,471**	**164,228**	**130,612**	**124,851**	**40,859**	**39,376**