APPENDIX C

Greenhouse Gas Emissions Inventory and Forecast

Greenhouse Gas Emissions Inventory and Forecast Technical Report

Draft



City of Huntington Beach

General Plan Update

May 23, 2014

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABBREVIATIONS

ABBREVIATION	DEFINITION
AB	Assembly Bill
ADC	alternative daily cover
APS	Alternative Planning Strategy
BAU	business as usual
CalRecycle	California Department of Resources Recycling and Recovery
CARB	California Air Resources Board
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH_4	methane
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
DOF	California Department of Finance
EIR	environmental impact report
EO	executive order
GHG	greenhouse gas
HFC	hydrofluorocarbon
ICLEI	Local Governments for Sustainability
IPCC	Intergovernmental Panel on Climate Change
kW	kilowatt
kWh	kilowatt-hour
LGOP	Local Government Operations Protocol
MG	million gallons
MPO	Metropolitan Planning Organization
$MTCO_2e$	metric tons of carbon dioxide equivalents
MWDOC	Municipal Water District of Orange County
N_2O	nitrous oxide
OCCOG	Orange County Council of Governments
OCSD	Orange County Sanitation District
RTP	Regional Transportation Plan
SAP	Sustainability Action Plan
SB	Senate Bill
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCE	Southern California Edison
SCG	Southern California Gas
SCS	Sustainable Communities Strategy

ABBREVIATION	DEFINITION
SF_6	sulfur hexafluoride
SONGS	San Onofre Nuclear Generating Station
US EPA	US Environmental Protection Agency
UWMP	Urban Water Management Plan
VMT	vehicle miles traveled

INTRODUCTION

This technical report summarizes the results of a greenhouse gas (GHG) emissions inventory and forecast for the City of Huntington Beach. It includes inventories of activities occurring within the community and the resulting GHG emissions for the years 2005 (the baseline) and 2012, and business-as-usual forecasts of future activities within the community and resulting GHG emissions for the years 2020 and 2035.

The inventory and forecast provide a starting point for the City to understand local GHG emissions. It will inform the creation of a Sustainability Action Plan (SAP), which will be a comprehensive plan to address sustainability in Huntington Beach and will function as the City's Qualified GHG Reduction Strategy pursuant to California Environmental Quality Act (CEQA) Guidelines Section 15183.5. The Sustainability Action Plan will contain strategies to reduce GHG emissions in the short term (through 2020), while also creating a long-term framework for the Huntington Beach General Plan, ensuring that sustainability principles are supported across all General Plan issues and policies.

ENVIRONMENTAL SETTING

The inventory and forecast cover activities occurring within the Huntington Beach city limits by both private and public sectors. In some instances, GHGs generated by these activities may be emitted within Huntington Beach, such as an individual driving a car within the city limits. In other cases, the emissions may occur elsewhere but are included because the activity responsible for generating the emissions is within Huntington Beach, such as a community member using electricity generated by a power plant in another part of the state.

Over the last several years, a number of local government agencies and organizations collaborated to develop a set of protocols to assist communities to conduct GHG inventories of emissions from community activities. The Governor's Office of Planning and Research recommends use of the 2012 *US Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions*, commonly referred to as the US Community Protocol. The protocol is not regulatory, but provides guidance on how to measure and report communitywide GHG emissions, including identification of relevant sources or activities, methods to estimate GHG emissions from each source, and consistency in the identification, assessment, and presentation of emissions results across multiple jurisdictions.

Consistent with the US Community Protocol, the Inventory and Forecast address activities and GHG emissions from seven types of activities, referred to throughout this report as sectors.

- **Residential energy:** electricity and natural gas used in residential settings
- **Nonresidential energy:** electricity and natural gas used in nonresidential settings
- **Transportation:** on-road vehicle trips that begin and/or end in Huntington Beach
- **Off-road equipment:** use of equipment and vehicles not on roads
- **Solid waste:** materials deposited in landfills

- **Water and wastewater:** energy used to treat and pump water used and wastewater created, along with emissions from the processing of wastewater

- **Oil drilling:** fuel used to extract oil in Huntington Beach and surrounding areas from on-shore wells, and emissions from intentional releases of vapors and unintentional leaks from pipes and machinery as part of the oil drilling process

The US Community Protocol also includes agricultural activities and the resulting emissions. This sector is not included in the Inventory and Forecast because agricultural activities do not occur within Huntington Beach to any substantive degree.

REGULATORY SETTING

STATE

Executive Order S-3-05

In 2005, then-Governor Arnold Schwarzenegger signed Executive Order (EO) S-3-05, declaring that California is vulnerable to the impacts of climate change through reductions in the Sierra Nevada snowpack (a major source of water for the state), reduced air quality, and rising sea levels. EO S-3-05 also sets the following GHG reduction goals for the state:

- Reduce emissions to 2000 levels by 2010

- Reduce emissions to 1990 levels by 2020

- Reduce emissions to 80% below 1990 levels by 2050

The California Global Warming Solutions Act of 2006 (AB 32)

The California Global Warming Solutions Act of 2006, also known as Assembly Bill (AB) 32, codifies the goals set in EO S-3-05 and sets a target for the state to reduce its total GHG emissions to 1990 levels by 2020 through a series of market-based and regulatory mechanisms. These mechanisms are discussed in the AB 32 Scoping Plan, developed by the California Air Resources Board (CARB) and released in 2008. Actions in the Scoping Plan include producing 33% of the state's electricity from renewable sources by 2020, implementing clean car standards, and developing a cap-and-trade program for major stationary sources of GHGs. The Scoping Plan also identifies local governments as strategic partners to achieve the statewide reduction goal and establishes a GHG emissions reduction of 15% below existing levels as being comparable to a return to 1990 levels. Agencies throughout California have generally interpreted "existing emissions levels" as emissions levels between 2005 and 2008.

AB 32 requires CARB to update the Scoping Plan at least once every five years. The first major update to the Scoping Plan was adopted by CARB on May 22, 2014. The updated Scoping Plan summarizes the most recent science related to climate change, including anticipated impacts to California and the levels of GHG reduction necessary to likely avoid risking irreparable damage. It identifies the actions California has already taken to reduce GHG emissions and focuses on areas where further reductions could be achieved to help meet the 2020 target established by AB 32. The Scoping Plan update also looks beyond 2020 toward the 2050 goal established in EO S-3-05, though not yet adopted as state law, and observes that "a mid-term statewide

emission limit will ensure that the State stays on course to meet our long-term goal." The Scoping Plan update does not establish or propose any specific post-2020 goals, but identifies such goals adopted by other governments or recommended by various scientific and policy organizations.

2007 Amendments to the State CEQA Guidelines (SB 97)

Senate Bill (SB) 97, which was signed in 2007 and went into effect in 2010, requires that projects estimate the GHG emissions associated with project-related vehicle traffic, energy use, water use, and construction activities as part of the environmental review process under CEQA. Projects located in jurisdictions with a Qualified GHG Reduction Strategy can streamline their GHG evaluation under CEQA by showing compliance with the strategy. A Qualified GHG Reduction Strategy, such as the SAP informed by this Inventory and Forecast, must satisfy the following six requirements identified in State CEQA Guidelines Section 15183.5(b):

a) Quantify GHG emissions, both existing and forecast over a set time period, from activities within a defined geographic area.

b) Establish a level below which GHG emissions from activities covered by the plan are not cumulatively considerable, based on substantive evidence.

c) Identify and analyze the GHG emissions as a result of specific actions or categories of actions anticipated within the defined geographic area.

d) Specific measures or a group of measures, including performance standards, which would collectively achieve the specified emissions level if implemented on a project-by-project basis, as demonstrated by substantive evidence.

e) Establish a mechanism to monitor the plan's progress toward achieving the level and to require revisions to the plan if it is not achieving the specified levels.

f) Be adopted in a public process following environmental review.

This technical report addresses the first two requirements. All six requirements will be addressed through development and adoption of the SAP.

Sustainable Communities and Climate Protection Act of 2008 (SB 375)

SB 375, signed in September of 2008, links regional transportation planning efforts, GHG reduction targets, and land use and housing allocations. It requires Metropolitan Planning Organizations (MPOs) to adopt a Sustainable Communities Strategy (SCS) or Alternative Planning Strategy (APS) as part of the land use and housing allocation in their Regional Transportation Plan (RTP). CARB will work with the MPOs to set reduction targets for passenger cars and light trucks in the area of the MPO's jurisdiction, to be updated every four to eight years.

The MPO for the area that includes Huntington Beach, the Southern California Association of Governments (SCAG), released its RTP/SCS in April 2012. The SCS is designed to reduce greenhouse gas emissions from passenger vehicles by 8% per capita by 2020, and by 13% per capita by 2035 compared to 2005, consistent with regional targets set by CARB. One aspect of SB 375 that is unique to the SCAG region is that subregions within SCAG have the option of

creating their own subregional Sustainable Communities Strategy. Of SCAG's 15 subregions, two accepted this option, including the Orange County Council of Governments (OCCOG), of which the City of Huntington Beach is a member agency. The underlying land use, socioeconomic, and transportation data provided in the OCCOG subregional SCS was incorporated into the regional SCS.

South Coast Air Quality Management District

Huntington Beach lies within the jurisdiction of the South Coast Air Quality Management District (SCAQMD). Air districts have direct and indirect regulatory authority over sources of air pollution and GHGs within their territory, and can inform and guide how laws on air pollution and GHGs are applied. The districts play a critical role in providing support and guidance to jurisdictions, but they do not officially certify Qualified GHG Reduction Strategies. The SCAQMD has not yet officially adopted plan-level guidelines for GHG reduction, although the agency has proposed project-level thresholds, below which a project's GHG emissions would not be considered significant for CEQA purposes.

KEY TERMS

The following terms are used frequently throughout this report:

Baseline year: A year that sets a level against which future changes are measured. The baseline year for this Inventory, consistent with the AB 32 Scoping Plan and common practice throughout California, is 2005. In addition, this inventory and forecast includes emissions for 2012, the most recent year of data available at this time, to allow a comparison of recent emissions to 2005 levels.

Carbon dioxide equivalent (CO_2e): A unit of measurement commonly used for GHGs that accounts for the varying potency of different GHGs. For example, 1 metric ton (MT) of carbon dioxide (CO_2) is equal to 1 MT of CO_2e. Methane (CH_4) is about 21 times as potent as CO_2 in trapping heat, and so 1 MT of CH_4 is equal to 21 MTCO_2e.

Emission factor: A number that describes the amount of GHGs released per unit of a certain activity (e.g., GHGs per kilowatt-hour of electricity used). Emission factors are provided by utility companies, state agencies, and guidance documents.

Greenhouse gas (GHG): A gas that traps heat radiated out by the earth and reflects it back rather than allowing it to escape into space, similar to the glass walls and roof of a greenhouse. While some level of GHGs in the atmosphere is necessary to keep the planet at a comfortable temperature for life to exist, human activities since the Industrial Revolution have significantly increased the concentrations of these gases, causing more heat to be trapped and resulting in climate change. GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). GHGs are often measured in carbon dioxide equivalents (CO_2e).

Sector: A category of activities responsible for GHG emissions, such as transportation, solid waste, or residential energy. Sectors may comprise multiple subcategories, referred to as "subsectors."

STATE GHG INVENTORY AND FORECAST

CARB prepares an annual GHG inventory for all activities occurring within the state. The sectors in the statewide inventory and forecast are similar, although not identical, to the US Community Protocol sectors used in the Inventory and Forecast for Huntington Beach. CARB prepared a statewide inventory for 2005, as well as a recent inventory for 2012, which are identified in **Table 1**. The 2012 inventory of 459 million metric tons is approximately 2% higher than the 2011 inventory prepared by CARB due to increased natural gas electricity generation compensating for (1) the closure of the San Onofre Nuclear Generating Station (SONGS) and (2) a drop in hydropower resulting from a drier than average winter. The statewide inventory and forecast data are expressed as millions of metric tons of carbon dioxide equivalent ($MMTCO_2e$).

TABLE 1
CALIFORNIA STATEWIDE GHG EMISSIONS, 2005 AND 2012

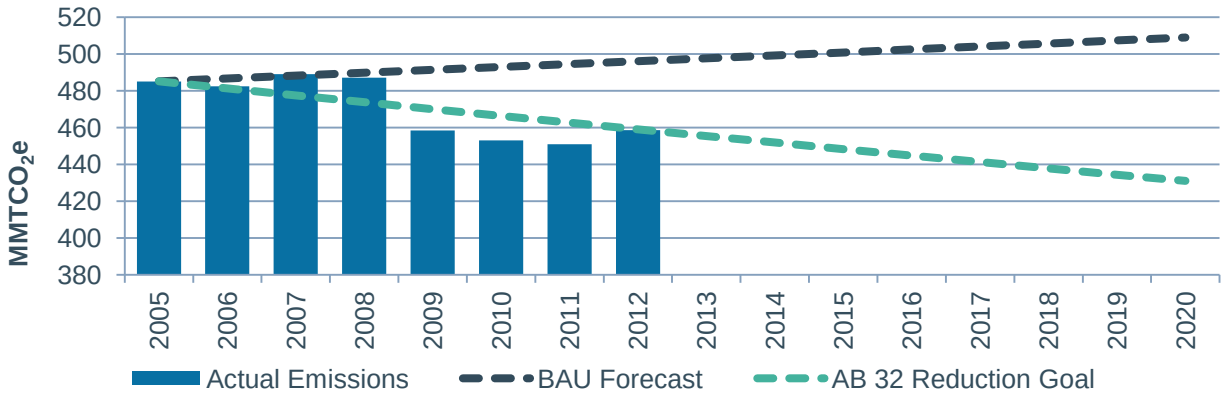
Sector	2005 $MMTCO_2e$	2012 $MMTCO_2e$
Transportation	189.08	167.38
Electric power	107.86	95.09
Commercial and residential	41.24	42.28
Industrial	92.29	89.16
Recycling and waste	7.75	8.49
High Global Warming Potential	10.36	18.41
Agriculture	36.54	37.86
Total	**485.13**	**458.68**

Source: CARB 2009, 2014a

Note: Due to rounding, totals may not equal the sum of the individual parts.

CARB also prepared a 2020 forecast showing projected emissions without the reduction strategies in the Scoping Plan, known as a business-as-usual (BAU) forecast. A comparison of statewide inventories to the 2020 BAU forecast (509 $MMTCO_2e$) and the AB 32 reduction target (431 $MMTCO_2e$) is shown in **Figure 1.**

FIGURE 1
CALIFORNIA STATEWIDE EMISSIONS, BAU FORECAST, AND REDUCTION GOAL, 2005–2020



Source: CARB 2009, 2014a, 2014b

HUNTINGTON BEACH GHG INVENTORY SUMMARY

In 2005, activities in Huntington Beach resulted in 1,452,070 $MTCO_2e$. On-road transportation was the largest sector and contributed 723,440 $MTCO_2e$, or 50% of the total. The residential built environment sector was the second-largest contributor of GHG emissions with 313,310 $MTCO_2e$ (22%), followed by the nonresidential built environment sector at 286,260 $MTCO_2e$ (20%). The solid waste sector was the fourth-largest emitter at 67,210 $MTCO_2e$ (5%), followed by the off-road equipment sector at 35,240 $MTCO_2e$ (2%) and the oil drilling sector at 16,610 $MTCO_2e$ (1%). The water and wastewater sector generated 10,000 $MTCO_2e$ (1%).

The same activities in Huntington Beach in 2012 resulted in the emission of 1,432,540 $MTCO_2e$. As in 2005, on-road transportation was the largest sector, contributing 726,190 $MTCO_2e$, or 51% of the total. Emissions from the residential built environment totaled 327,340 $MTCO_2e$ (23%), followed by emissions from the nonresidential built environment at 301,840 (21%). The solid waste sector contributed 38,620 $MTCO_2e$ (3%), with the oil drilling sector contributing 16,560 $MTCO_2e$ (1%) and the off-road equipment sector contributing 11,580 $MTCO_2e$ (1%). The water and wastewater sector had the smallest share of emissions (10,410 $MTCO_2e$, or 1%). GHG emissions estimates for 2005 and 2012 are summarized by sector in **Table 2** and **Figure 2**. Overall emissions declined by 1% from 2005 to 2012. Changes in emissions between 2005 and 2012 are attributed to the following factors:

- Substantially fewer houses were built in 2012 than in 2005, and the decline in construction activity caused a decrease in emissions from off-road equipment.
- Huntington Beach sent less waste to landfills in 2012 than in 2005, likely due to increased education about recycling and a decrease in construction activity, resulting in fewer GHG emissions in the solid waste sector.
- The closure of the SONGS facility (discussed in greater detail in the Electricity section) resulted in an increase in emissions from electricity use.
- An overall reduction in economic activity due to the recession may have modestly reduced energy, water, and fuel consumption in all sectors.

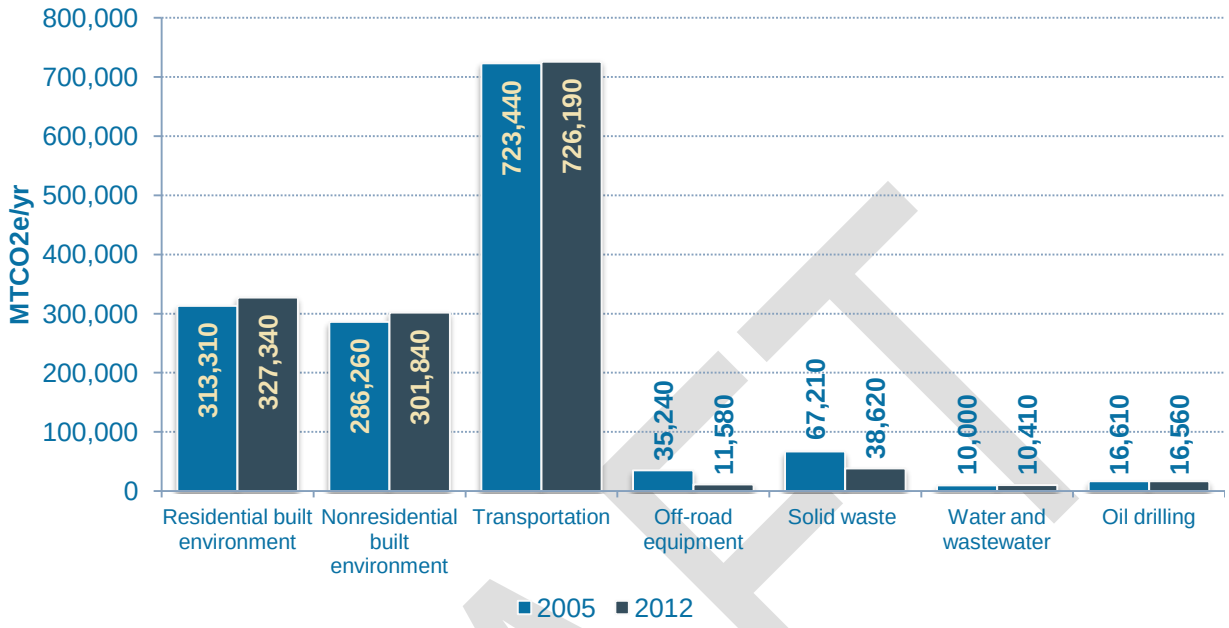
TABLE 2
HUNTINGTON BEACH GHG EMISSIONS BY SECTOR, 2005 AND 2012

Sector	2005 $MTCO_2e$	2005 Percentage	2012 $MTCO_2e$	2012 Percentage	Percentage Change, 2005–2012
Residential built environment	313,310	22%	327,340	23%	4%
Nonresidential built environment	286,260	20%	301,840	21%	5%
Transportation	723,440	50%	726,190	51%	<1%
Off-road equipment	35,240	2%	11,580	1%	-67%
Solid waste	67,210	5%	38,620	3%	-43%
Water and wastewater	10,000	1%	10,410	1%	4%
Oil drilling	16,610	1%	16,560	1%	<-1%
Total	**1,452,070**	**100%**	**1,432,540**	**100%**	**-1%**

Source: Data compiled by PMC (2014)

Note: Due to rounding, totals may not equal the sum of the individual parts.

FIGURE 2
HUNTINGTON BEACH GHG EMISSIONS BY SECTOR, 2005 AND 2012



Source: Data compiled by PMC (2014)

INVENTORY METHODS

Calculations and Emission Factors

For each sector, the Inventory relies on activity data provided by service providers (e.g., Southern California Edison (SCE), the City of Huntington Beach, Southern California Gas Company, Rainbow Environmental Services) or obtained through analysis tools provided by state agencies such as CARB or the California Department of Resources Recycling and Recovery (CalRecycle). To determine GHG emissions for each sector, activity data are multiplied by an emission factor (a number that describes how many GHGs are released per unit of activity). Emission factor values used in the Inventory are shown in **Table 3** for 2005 and 2012 (note that subsectors without emission factors are not included). For the off-road equipment and solid waste sectors, activity data were used to calculate GHG emissions using publicly available analysis tools.

TABLE 3
GHG EMISSION FACTORS, 2005 AND 2012

Sector	Subsector	2005 Inventory Emission Factor	2012 Inventory Emission Factor	Emission Factor Source
Residential built environment	Electricity	0.000304 $MTCO_2e$/kWh	0.000340 $MTCO_2e$/kWh	SCE, US EPA, CARB
	Natural gas	0.005320 $MTCO_2e$/therm	0.00532 $MTCO_2e$/therm	US Community Protocol
Nonresidential built environment	Electricity (SCE)	0.000304 $MTCO_2e$/kWh	0.000340 $MTCO_2e$/kWh	SCE, US EPA, CARB
	Electricity (direct access)	0.000432 $MTCO_2e$/kWh	0.000419 $MTCO_2e$/kWh	US Community Protocol
	Natural gas	0.005320 $MTCO_2e$/therm	0.005320 $MTCO_2e$/therm	US Community Protocol
Transportation	n/a	0.000488 $MTCO_2e$/VMT	0.000407 $MTCO_2e$/VMT	CARB
Off-road equipment	n/a	Emission factors not provided for this sector		
Solid waste	n/a	0.178144 $MTCO_2e$/ton	0.177821 $MTCO_2e$/ton	CalRecycle
Water and wastewater	Energy use	0.000304 $MTCO_2e$/kWh	0.000340 $MTCO_2e$/kWh	SCE, US EPA, CARB
Oil drilling	Fuel use	0.044035 $MTCO_2e$/barrel	0.0344035 $MTCO_2e$/barrel	CARB
	Fugitive emissions	0.004336 $MTCO_2e$/barrel	0.004336 $MTCO_2e$/barrel	CARB
	Vented emissions	0.000724 $MTCO_2e$/barrel	0.000724 $MTCO_2e$/barrel	CARB

Source: Data compiled by PMC (2014)

A detailed description of the methods used to calculate GHG emissions from each sector is described in the following sections.

RESIDENTIAL AND NONRESIDENTIAL BUILT ENVIRONMENT (ENERGY AND BUILDINGS)

Electricity

Huntington Beach's electricity provider, Southern California Edison (SCE), reported that the community used a total of 1,211,966,610 kilowatt-hours (kWh) of electricity in 2005. Residential buildings used 485,753,410 kWh (40%), while nonresidential buildings (including offices, stores and restaurants, and industry) used 726,213,200 kWh (60%). Of the nonresidential electricity, 601,304,530 kWh (83% of nonresidential electricity, or 50% of total electricity) was supplied by SCE. The remaining 124,908,670 kWh (17% of nonresidential electricity, 10% of the total) was "direct access" electricity purchased from a source other than the normal electricity provider. SCE does not indicate which customers or which types of activities are purchasing direct access electricity, although direct access customers are often large industrial users. It is likely that major industrial operations are purchasing direct access electricity, but this cannot be confirmed.

In 2012, Huntington Beach used 1,190,357,920 kWh of electricity, with 487,243,550 kWh (41%) used by residential customers and 703,114,370 kWh (59%) used for nonresidential purposes. Of the nonresidential electricity, 598,350,330 kWh (85% of nonresidential electricity, or 50% of total electricity) was supplied by SCE-purchased energy and 104,764,040 kWh (15% of nonresidential electricity, 9% of the total) was direct access electricity. **Table 4** and **Table 5** show activity data and GHG emissions for 2005 and 2012, respectively. **Table 6** shows changes in activity data and GHG emissions from 2005 to 2012.

Emission factors for electricity change annually depending on the sources of electricity. The composition of SCE's energy portfolio changed considerably in 2012 compared to previous years with the temporary closure (and eventual decommissioning) of the SONGS facility.[1] Prior to 2012, the SONGS facility, a GHG-free power source, accounted for approximately 19%–24% of the utility's energy portfolio, depending on the year (CEC 2011, 2012a). In 2012, nuclear energy use made up 7% of the SCE portfolio, while unspecified sources made up 41% (CEC 2013), likely due to short-term energy purchases made by SCE to meet customer demand while the SONGS facility was temporarily closed.

The 2005 verified emission factor was provided by SCE. Since SCE has not publicly released a verified emission factor for 2012, PMC estimated SCE's 2012 emission factor based on the utility's reported Power Content Label for the year and the emission factors for individual power generation sources in the SCE service area provided by the California Energy Commission (CEC) and the US Environmental Protection Agency (US EPA).

Direct access emission factors were provided by the US Community Protocol and represent an average of emission factors for all electricity generated in California. Because a 2012 emission factor for direct access energy was unavailable, the most recent available factor (2007) was used. The SONGS facility did not supply electricity to direct access customers; thus, the direct access emission factor is not affected by the closure.

TABLE 4
ELECTRICITY ACTIVITY DATA AND GHG EMISSIONS, 2005

Subsector	2005 kWh	2005 $MTCO_2e$	Percentage of kWh	Percentage of $MTCO_2e$
Residential electricity	485,753,410	147,570	40%	38%
Nonresidential electricity (SCE)	601,304,530	182,680	50%	48%
Direct access electricity	124,908,670	53,960	10%	14%
Total	**1,211,966,610**	**384,210**	**100%**	**100%**

Source: Activity data from SCE (2014)

Note: Due to rounding, totals may not equal the sum of the individual parts.

[1] SCE closed the SONGS facility permanently in 2013, although it had not been operational since early 2012. SCE has identified and entered into long-term energy contracts to fill the void created by closing the SONGS facility, primarily using natural gas power generating facilities (Davis and Hausman 2014).

TABLE 5
ELECTRICITY ACTIVITY DATA AND GHG EMISSIONS, 2012

Subsector	2012 kWh	2012 $MTCO_2e$	Percentage of kWh	Percentage of $MTCO_2e$
Residential electricity	487,243,550	165,820	41%	40%
Nonresidential electricity (SCE)	598,350,330	203,640	50%	49%
Direct access electricity	104,764,040	43,880	9%	11%
Total	**1,190,357,920**	**413,340**	**100%**	**100%**

Source: Activity data from SCE (2014)

Note: Due to rounding, totals may not equal the sum of the individual parts.

TABLE 6
PERCENTAGE CHANGE, ELECTRICITY ACTIVITY DATA AND GHG EMISSIONS, 2005–2012

Subsector	kWh Percentage Change	$MTCO_2e$ Percentage Change
Residential electricity	<1%	12%
Nonresidential electricity (SCE)	<-1%	11%
Direct access electricity	-16%	-19%
Total	**-2%**	**8%**

Source: Data compiled by PMC (2014)

Emissions from electricity supplied by SCE increased from 2005 to 2012 despite small declines in overall electricity use. As a result of the closure of the SONGS facility, SCE replaced the electricity from the nuclear power plant (which produced no GHG emissions) with electricity largely from natural gas-fired power plants (which do emit GHG emissions) (Davis and Hausman 2014). This increase in the carbon intensity of SCE's electricity resulted in an increase of emissions from 2005 to 2012.

The kWh and GHG emissions for direct access electricity declined significantly from 2005 to 2012. This decrease may be the result of some direct access customers closing down during this period, coinciding with the economic downturn. Alternatively, some direct access customers may have ended their direct access contracts and begun obtaining electricity from SCE. If this occurred in conjunction with substantial energy efficiency measures, there would be little net difference in the total amount of nonresidential electricity supplied by SCE.

Natural Gas

In 2005, Huntington Beach's natural gas provider, Southern California Gas Company (SCG), supplied 40,484,550 therms of natural gas to the community. Residential customers used 31,156,530 therms (77%), while nonresidential customers used 9,328,020 therms (23%). In 2012, SCG customers in Huntington Beach used 40,574,040 therms of natural gas. Residential uses accounted for 30,363,590 therms (75%) and nonresidential uses comprised the remaining 10,210,450 therms (25%). **Table 7** shows 2005 activity data and GHG emissions, **Table 8** describes 2012 activity data and GHG emissions, and **Table 9** shows the change in activity data and GHG emissions from 2005 to 2012.

Huntington Beach is home to a natural gas power plant (AES Huntington Beach), which is among the largest power plants in California as measured by output. AES Huntington Beach does not purchase natural gas through retail services, and thus is not included in the activity data provided above.[2] GHG emissions from AES Huntington Beach are indirectly accounted for in the SCE emission factor used to calculate emissions from electricity use. Emissions from AES Huntington Beach are addressed by the statewide Cap and Trade program administered by CARB, which requires covered entities to reduce emissions by approximately 2%–3% annually.

The US Community Protocol provided GHG emission factors for natural gas. Natural gas emission factors generally do not change over time, so the same factor was used for both years.

TABLE 7
NATURAL GAS ACTIVITY DATA AND GHG EMISSIONS, 2005

Subsector	2005 Therms	2005 $MTCO_2e$	Percentage of Therms	Percentage of $MTCO_2e$
Residential natural gas	31,156,530	165,740	77%	77%
Nonresidential natural gas	9,328,020	49,620	23%	23%
Total	**40,484,550**	**215,360**	**100%**	**100%**

Source: Activity data from SCG (2014)

Note: Due to rounding, totals may not equal the sum of the individual parts.

TABLE 8
NATURAL GAS ACTIVITY DATA AND GHG EMISSIONS, 2012

Subsector	2012 Therms	2012 $MTCO_2e$	Percentage of Therms	Percentage of $MTCO_2e$
Residential natural gas	30,363,590	161,520	75%	75%
Nonresidential natural gas	10,210,450	54,320	25%	25%
Total	**40,574,040**	**215,840**	**100%**	**100%**

Source: Activity data from SCG (2014)

Note: Due to rounding, totals may not equal the sum of the individual parts.

[2] The amount of natural gas used by AES Huntington Beach is unknown. However, in 2012, CARB reported that emissions from the facility totaled 572,170 $MTCO_2e$, over 10 times the emissions from all community-wide nonresidential natural gas use.

TABLE 9
PERCENTAGE CHANGE, NATURAL GAS ACTIVITY DATA AND GHG EMISSIONS, 2005–2012

Subsector	Therm Percentage Change	$MTCO_2e$ Percentage Change
Residential natural gas	-3%	-3%
Nonresidential natural gas	9%	9%
Total	**<1%**	**<1%**

Source: Data compiled by PMC (2014)

TRANSPORTATION

On-road transportation activity was measured in vehicle miles traveled (VMT). The VMT includes the full distance of trips that begin and end within the city limits of Huntington Beach (internal-internal) and half the distance of trips between Huntington Beach and another location (internal-external). Trips that pass through Huntington Beach, but do not begin or end (external-external) within the city, are not included.

In 2005, the total trip distance for Huntington Beach was 1,481,723,500 VMT. Of this, internal-internal trips accounted for 256,199,950 VMT (17%) and internal-external trips contributed 1,225,523,550 VMT (83%). VMT for 2012 was interpolated using the average VMT growth rate from 2005 to 2020. Through this interpolation, Huntington Beach generated 1,566,979,720 VMT, with internal-internal trips generating 268,811,640 VMT (17%) and internal-external trips generating 1,298,168,080 VMT (83%). Changes in VMT will be verified based on ongoing traffic counts. **Table 10** and **Table 11** provide 2005 and 2012 activity data and GHG emissions, respectively. **Table 12** presents a comparison of activity data and GHG emissions between 2005 and 2012.

The 2005 Huntington Beach Traffic Model provided VMT figures for the analysis. Figures for 2012 were interpolated based on 2005 and 2035 traffic model data. CARB supplied the GHG emission factor, based on the average distribution of vehicle types in Orange County, using the publicly available EMFAC modeling software.

TABLE 10
TRANSPORTATION ACTIVITY DATA AND GHG EMISSIONS, 2005

Subsector	2005 VMT	2005 $MTCO_2e$	Percentage of VMT	Percentage of $MTCO_2e$
Internal-internal	256,199,950	125,090	17%	17%
Internal-external	1,225,523,550	598,350	83%	83%
Total	**1,481,723,500**	**723,440**	**100%**	**100%**

Source: Activity data from Austin-Foust Associates, Inc. (2004), compiled by Stantec (2014)

Note: Due to rounding, totals may not equal the sum of the individual parts.

TABLE 11
TRANSPORTATION ACTIVITY DATA AND GHG EMISSIONS, 2012

Subsector	2012 VMT	2012 $MTCO_2e$	Percentage of VMT	Percentage of $MTCO_2e$
Internal-internal	268,811,640	124,580	17%	17%
Internal-external	1,298,168,080	601,610	83%	83%
Total	**1,566,979,720**	**726,190**	**100%**	**100%**

Source: Activity data from Austin-Foust Associates, Inc. (2004), compiled by Stantec (2014)
Note: Due to rounding, totals may not equal the sum of the individual parts.

TABLE 12
PERCENTAGE CHANGE, TRANSPORTATION ACTIVITY DATA AND GHG EMISSIONS, 2005–2012

Subsector	VMT Percentage Change	$MTCO_2e$ Percentage Change
Internal-internal	5%	<-1%
Internal-external	6%	1%
Total	**6%**	**<1%**

Source: Data compiled by PMC (2014)

GHG emissions from transportation increased by slightly less than 1% from 2005 to 2012, even though total VMT is interpolated to have increased approximately 6%. This is primarily due to an increase in vehicle fuel efficiency during this period. There was also a small shift in the vehicle type distribution in Orange County between 2005 and 2012. In 2012, a greater share of VMT came from passenger cars and small trucks/SUVs, compared to less fuel-efficient heavy vehicles, than in 2005, based on countywide data from the EMFAC modeling software. While these data show a shift toward more fuel-efficient vehicles, including hybrids, plug-in hybrids (PHEVs), and electric vehicles (EVs), they do not describe how many vehicles are hybrids, PHEVs, or EVs compared to fuel-efficient conventional vehicles.

OFF-ROAD EQUIPMENT

The off-road equipment sector consists of equipment and vehicles that consume gasoline or diesel fuel but are not intended for on-road transportation. The activities included in this sector range from the use of small landscaping equipment (e.g., leaf blowers) to large construction and industrial equipment. In Huntington Beach, this sector includes two subsectors:

- **Construction:** equipment and vehicles used for construction, such as tractors, cranes, and excavators
- **Lawn and garden:** equipment used for landscaping purposes, including lawnmowers, chainsaws, and tillers

GHG emissions are calculated using CARB's publicly available OFFROAD modeling software rather than activity data. OFFROAD provides emissions estimates for different equipment types at the countywide level based on equipment and vehicle registration numbers. Emissions for construction equipment were allocated based on the percentage of new houses in Orange

County constructed in Huntington Beach during each inventory year, using California Department of Finance (DOF) estimates. Lawn and garden emissions were calculated using the percentage of Orange County households located in Huntington Beach, also using DOF estimates. Off-road emissions for 2005 and 2012, along with the corresponding change in emissions from 2005 to 2012 by subsector, are shown in **Table 13**.

TABLE 13
OFF-ROAD GHG EMISSIONS, 2005 AND 2012

Subsector	2005 $MTCO_2e$	Percentage of 2005 $MTCO_2e$	2012 $MTCO_2e$	Percentage of 2012 $MTCO_2e$	$MTCO_2e$ Percentage Change, 2005–2012
Construction	28,330	80%	4,590	40%	-84%
Lawn and garden	6,910	20%	6,990	60%	1%
Total	**35,240**	**100%**	**11,580**	**100%**	**-67%**

Source: GHG emissions from CARB (2007)

Note: Due to rounding, totals may not equal the sum of the individual parts.

The largest change in off-road emissions occurred in the construction equipment subsector. Significantly fewer houses were constructed in both Huntington Beach and Orange County in 2012 than in 2005, resulting in an 84% decline in construction-related GHG emissions.

SOLID WASTE DISPOSAL

Huntington Beach residents, businesses, and visitors disposed of 377,260 tons of solid waste in landfills in 2005, according to data maintained by CalRecycle. This amount does not include materials that were recycled, composted, or recovered in other ways, Of the total solid waste disposed, 302,650 tons (80%) was municipal solid waste (materials thrown away directly in a landfill). The remaining 74,610 tons (20%) of solid waste disposal was considered alternative daily cover (ADC), material that is used to help reduce odor, control litter, and protect public health in compliance with state and federal standards. Additionally, a small amount of solid waste (approximately 2 tons) was sent to a facility to be burned for energy.

In 2012, the total solid waste disposed by Huntington Beach residents, businesses, and visitors was 217,170 tons, representing a 42% reduction in waste disposal from 2005. This total includes 161,510 tons (74%) of municipal solid waste, combined with 55,660 tons (26%) of ADC. A small amount (approximately 5 tons) was burned for energy. 2005 activity data and GHG emissions are shown in **Table 14**, 2012 activity data and GHG emissions are identified in **Table 15**, and **Table 16** presents the change in activity data and GHG emissions from 2005 to 2012.

Emissions from solid waste were calculated using the publicly available CARB landfill emissions tool Version 1.3. The tool takes into account the composition of the waste using statewide waste characterization estimates and the climate where the landfill is located (which affects decomposition rates) and calculates the total GHG emissions produced by decomposition of the material. Most large landfills have systems to capture a portion of the methane gas generated by material decomposition and convert the captured gas into electricity. The analysis assumes that 75% of the methane gas was successfully captured, such that only 25% of the GHGs generated by the decomposition of solid waste is included in the community inventory.

There are multiple closed landfills in Huntington Beach, which have been capped, and are now the site of various community and private facilities, including Edison Community Park and the Sports Complex. Although these landfills are no longer operational, they continue to emit methane as the materials deposited in them decompose.

While methane control and monitoring systems are in place at several sites throughout Huntington Beach, the amount of methane collected or vented at each site is not required to be reported, and therefore emissions from these methane collection systems cannot be calculated or estimated with a high degree of accuracy.

TABLE 14
SOLID WASTE ACTIVITY DATA AND GHG EMISSIONS, 2005

Subsector	2005 Tons	2005 $MTCO_2e$	Percentage of Tons	Percentage of $MTCO_2e$
Municipal solid waste	302,650	55,700	80%	83%
Alternative daily cover	74,610	11,510	20%	17%
Waste to energy	2	2	<1%	<1%
Total	**377,260**	**67,210**	**100%**	**100%**

Source: Activity data from CalRecycle (2014)

Note: Due to rounding, totals may not equal the sum of the individual parts.

TABLE 15
SOLID WASTE ACTIVITY DATA AND GHG EMISSIONS, 2012

Subsector	2012 Tons	2012 $MTCO_2e$	Percentage of Tons	Percentage of $MTCO_2e$
Municipal solid waste	161,510	30,030	74%	78%
Alternative daily cover	55,660	8,580	26%	22%
Waste to energy	5	4	<1%	<1%
Total	**217,170**	**38,620**	**100%**	**100%**

Source: Activity data from CalRecycle (2014)

Note: Due to rounding, totals may not equal the sum of the individual parts.

TABLE 16
PERCENTAGE CHANGE, SOLID WASTE ACTIVITY DATA AND GHG EMISSIONS, 2005–2012

Subsector	Tons Percentage Change	$MTCO_2e$ Percentage Change
Municipal solid waste	-47%	-46%
Alternative daily cover	-25%	-25%
Waste to energy	122%	122%
Total	**-42%**	**-43%**

Source: Data compiled by PMC (2014)

Total tons of solid waste disposed in landfills annually declined by approximately 42% from 2005 to 2012, resulting in a decrease in annual GHG emissions from solid waste disposal of approximately 43%. This decrease has been observed by most jurisdictions in California, due to an increase in recycling and waste reduction strategies to keep waste out of landfills.

WATER AND WASTEWATER

Water

The City of Huntington Beach provides water service to residents and businesses in the planning area. A majority of the City's water (roughly two-thirds) comes from local groundwater, while the remaining portion is imported from the Municipal Water District of Orange County (MWDOC). Water from the MWDOC comes from regional groundwater and surface water supplies, recycled water, and water obtained from the State Water Project and the Colorado River.

GHG emissions from water result from the electricity needed to extract, convey, treat, and distribute the supplies. The amount of electricity needed to extract, transport, and distribute the water varies depending on the source. **Table 17** shows the amount of energy (in kilowatt-hours (kWh) per million gallons (MG)) needed to extract, convey, and treat imported water based on values published by the CEC. The kWh per MG values listed in **Table 17** are unique to Huntington Beach and are reported as the electricity use of the City's water infrastructure.

TABLE 17
STATE AVERAGES OF EMBEDDED ENERGY IN WATER, BY ACTIVITY AND SOURCE

Activity	kWh per MG
Extraction	
Surface water	0
Groundwater	4[1]
Conveyance	
State Water Project	8,235[2]
Colorado River	6,140
Local sources	120
Treatment	
All sources	100

Source: CEC 2006

Notes:

1. *kWh per MG per foot of well depth.*
2. *kWh per MG for the State Water Project varies by location. The figure given here is for the Los Angeles region.*

In 2005, the City supplied 10,630 million gallons of water to customers (excluding customers in Sunset Beach, which has received water from the City since the 1960s), resulting in total electricity use of 23,253,970 kWh.[3] Of this total, 5,356,940 kWh (23%) was used to distribute water to customers through the City's water infrastructure, while the other 17,897,030 kWh (77%) was used to process and deliver imported water to the city. The City supplied 9,710 MG of water to customers in 2012, requiring 21,830,830 kWh. Of this total, 4,894,040 kWh (22%) was used to distribute water to customers and 16,936,800 kWh (78%) was used process and deliver imported water. **Table 18** and **Table 19** show activity data and GHG emissions for water use for 2005 (not including Sunset Beach) and 2012, respectively. **Table 20** shows the change in water use activity data and GHG emissions from 2005 to 2012.

The City supplied data on water use and the amount of electricity used by its water infrastructure. Information on imported water sources was obtained from the current Urban Water Management Plan for Huntington Beach and suppliers of imported water. Data describing the energy needed to supply imported water were provided by the CEC. The 2005 verified emission factor for this electricity was supplied by SCE. As noted in the Electricity section of this report, SCE has not provided a verified emission factor for 2012; therefore, an estimated emission factor was calculated using data from the US EPA and the CEC.

TABLE 18
WATER ACTIVITY DATA AND GHG EMISSIONS, 2005

Subsector	2005 MG	2005 kWh	2005 $MTCO_2e$	Percentage of MG	Percentage of kWh	Percentage of $MTCO_2e$
Local water infrastructure	6,950	5,356,940	1,630	65%	23%	23%
Imported water	3,690	17,897,030	5,440	35%	77%	77%
Total	**10,630**	**23,253,970**	**7,070**	**100%**	**100%**	**100%**

Source: Activity data from the City of Huntington Beach (Villasenor 2014b) and CEC (2006)
Note: Due to rounding, totals may not equal the sum of the individual parts.

TABLE 19
WATER ACTIVITY DATA AND GHG EMISSIONS, 2012

Subsector	2012 MG	2012 kWh	2012 $MTCO_2e$	Percentage of MG	Percentage of kWh	Percentage of $MTCO_2e$
Local water infrastructure	6,020	4,894,040	1,670	62%	22%	22%
Imported water	3,690	16,936,800	5,760	38%	78%	78%
Total	**9,710**	**21,830,840**	**7,430**	**100%**	**100%**	**100%**

Source: Activity data from the City of Huntington Beach (Villasenor 2014c) and CEC (2006)
Note: Due to rounding, totals may not equal the sum of the individual parts.

[3] Although Sunset Beach has received water from Huntington Beach since the 1960s, it was not incorporated into the city until 2011 (Miller 2011). Consistent with the guidance of the US Community Protocol, water use in Sunset Beach is not part of the community total in 2005 but is included in 2012. In 2005, water use in Sunset Beach totaled approximately 65 MG, using 144,690 kWh and resulting in approximately 40 $MTCO_2e$.

TABLE 20
PERCENTAGE CHANGE, WATER ACTIVITY DATA AND GHG EMISSIONS, 2005–2012

Subsector	MG Percentage Change	kWh Percentage Change	$MTCO_2e$ Percentage Change
Local water infrastructure	-13%	-9%	2%
Imported water	0%	-5%	6%
Total	**-9%**	**-6%**	**5%**

Source: Data compiled by PMC (2014)

Emissions increased from 2005 to 2012 while total water use and associated electricity use declined. This is due to the increase in carbon intensity of SCE's electricity as a result of the closure of SONGS, as described in greater detail in the Electricity section of this report.

Wastewater

Wastewater treatment service in Huntington Beach is provided by the Orange County Sanitation District (OCSD). The City of Huntington Beach operates infrastructure within the city limits to convey wastewater from properties to OCSD treatment plants. Wastewater activity includes the electricity needed to convey, treat, and discharge wastewater. This emissions category also includes "process" emissions, which result from the decomposition of material that is removed as part of the wastewater treatment process. No activity data are available for process emissions.

In 2005, uses within Huntington Beach (not including Sunset Beach) generated 5,800 MG of wastewater, requiring 8,719,060 kWh of electricity for conveyance and treatment. Of this total, 998,120 kWh (11%) was used by the City's wastewater delivery infrastructure and 7,720,940 kWh (89%) was used by the OCSD to treat and discharge wastewater. In 2012, uses within Huntington Beach generated 5,310 MG of wastewater, requiring 18,064,780 kWh of electricity for conveyance and treatment. Of this total, 906,990 kWh (5%) was used by the City's wastewater delivery infrastructure and 17,157,800 kWh (95%) was used by the OCSD to treat and discharge the wastewater. **Table 21** and **Table 22** show wastewater-related activity data and GHG emissions for 2005 and 2012, respectively. **Table 23** shows the change in activity data and GHG emissions from 2005 to 2012.

The City provided data on wastewater delivery and associated electricity use. Data describing the average electricity use for wastewater treatment and discharge processes are based on energy intensity estimates provided by the CEC. Annual GHG emissions estimates reported to CARB by the OCSD were used to determine the Huntington Beach community's share of total OCSD process emissions, considering the population of the community as a percentage of the total population served by the OCSD. The 2005 verified emission factor for this electricity was supplied by SCE. As noted in the Electricity section of this report, SCE has not provided a verified emission factor for 2012; therefore, an estimated emission factor was calculated using data from the US EPA and the CEC.

TABLE 21
WASTEWATER ACTIVITY DATA AND GHG EMISSIONS, 2005

Subsector	2005 kWh	2005 $MTCO_2e$	Percentage of kWh	Percentage of $MTCO_2e$
City delivery infrastructure	998,120	300	12%	10%
OCSD treatment and discharge	7,673,190	2,330	88%	80%
Process emissions	—	300	—	10%
Total	**8,671,310**	**2,930**	**100%**	**100%**

Source: Activity data from the City of Huntington Beach (Villasenor 2014c), CEC (2006), CARB (2013b), OCSD (2005)
Note: Due to rounding, totals may not equal the sum of the individual parts.

TABLE 22
WASTEWATER ACTIVITY DATA AND GHG EMISSIONS, 2012

Subsector	2012 kWh	2012 $MTCO_2e$	Percentage of kWh	Percentage of $MTCO_2e$
City delivery infrastructure	906,990	310	11%	10%
OCSD treatment and discharge	7,015,960	2,390	89%	80%
Process emissions	—	280	—	9%
Total	**7,922,950**	**2,980**	**100%**	**100%**

Source: Activity data from the City of Huntington Beach (Villasenor 2014b), CEC (2006), CARB (2013b), OCSD (2010)
Note: Due to rounding, totals may not equal the sum of the individual parts.

TABLE 23
PERCENTAGE CHANGE, WASTEWATER ACTIVITY DATA AND GHG EMISSIONS, 2005–2012

Subsector	kWh Percentage Change	$MTCO_2e$ Percentage Change
City delivery infrastructure	-9%	3%
OCSD treatment and discharge	-9%	3%
Process emissions	—	-7%
Total	**-9%**	**2%**

Source: Data compiled by PMC (2014)

GHG emissions from electricity use associated with wastewater increased, while the amount of electricity used to treat wastewater declined. This is a result of the increase in carbon intensity of SCE's electricity, due to the closure of the SONGS facility in early 2012, as described in greater detail in the Electricity section of this report.

OIL DRILLING

Oil was first discovered in Huntington Beach in 1920, and while local drilling reached a peak in the 1960s, oil extraction continues to occur in the community. GHG emissions from oil drilling primarily result from the fuel used to power the drilling equipment. Lower levels of GHGs also result from fugitive emissions (unintentional leaks in pipes and equipment) and vented emissions (intentional releases as part of regular operations and maintenance).

Oil drilling activity is measured in barrels of oil extracted. Each barrel of oil generates emissions from fuel use, fugitive leaks, and venting. Oil extraction data for the City of Huntington Beach and surrounding areas are provided in **Table 24**.[4]

TABLE 24
OIL EXTRACTION, CITY OF HUNTINGTON BEACH AND SURROUNDING AREAS, 2005 AND 2012

Area	2005 Barrels	2012 Barrels
City limits	338,260	337,390
Surrounding areas	184,510	184,030
City limits and surrounding areas	**522,770**	**521,430**

Source: Data from City of Huntington Beach (Villasenor 2014d), California Department of Conservation (2006, 2013), CARB (2011c)

Activity data were provided by the City of Huntington Beach and the California Department of Conservation. Emission factors for fuel use, fugitive leaks, and venting per barrel of oil were supplied by CARB. A 2012 emission factor was not available at the time this inventory was prepared; therefore, a 2011 emission factor was used. **Tables 25**, **26**, and **27** identify 2005 and 2012 GHG emissions for oil drilling occurring within the city limits, surrounding areas, and the city limits and surrounding areas together, respectively. For the purposes of this inventory, only emissions from oil drilling in the city limits are included in the community total; emissions from oil drilling in the surrounding areas are presented as information items.

TABLE 25
OIL DRILLING GHG EMISSIONS, 2005 AND 2012, CITY LIMITS

Subsector	2005 $MTCO_2e$	Percentage of 2005 $MTCO_2e$	2012 $MTCO_2e$	Percentage of 2012 $MTCO_2e$	$MTCO_2e$ Percentage Change, 2005–2012
Fuel use	14,900	91%	14,860	90%	<-1%
Fugitive emissions	1,470	9%	1,460	9%	-1%
Vented emissions	240	1%	240	1%	0%
Total	**16,610**	**100%**	**16,560**	**100%**	**<-1%**

Source: Data from City of Huntington Beach (Villasenor 2014d), California Department of Conservation (2006, 2013), CARB (2011c)
Note: Due to rounding, totals may not equal the sum of the individual parts.

[4] This figure includes oil produced in the Bolsa Chica wetlands and areas adjacent to the city, including the Seal Beach Naval Base. It does not include any off-shore production.

TABLE 26
OIL DRILLING GHG EMISSIONS, 2005 AND 2012, SURROUNDING AREAS

Subsector	2005 $MTCO_2e$	Percentage of 2005 $MTCO_2e$	2012 $MTCO_2e$	Percentage of 2012 $MTCO_2e$	$MTCO_2e$ Percentage Change, 2005–2012
Fuel use	8,120	91%	8,100	90%	<-1%
Fugitive emissions	800	9%	800	9%	0%
Vented emissions	130	1%	130	1%	0%
Total	**9,050**	**100%**	**9,030**	**100%**	**<-1%**

Source: Data from City of Huntington Beach (Villasenor 2014d), California Department of Conservation (2006, 2013), CARB (2011c)
Note: Due to rounding, totals may not equal the sum of the individual parts.

TABLE 27
OIL DRILLING GHG EMISSIONS, 2005 AND 2012, CITY LIMITS AND SURROUNDING AREAS

Subsector	2005 $MTCO_2e$	Percentage of 2005 $MTCO_2e$	2012 $MTCO_2e$	Percentage of 2012 $MTCO_2e$	$MTCO_2e$ Percentage Change, 2005–2012
Fuel use	23,020	90%	22,960	90%	<-1%
Fugitive emissions	2,270	9%	2,260	9%	<-1%
Vented emissions	380	1%	380	1%	0%
Total	**25,670**	**100%**	**25,600**	**100%**	**<-1%**

Source: Data from City of Huntington Beach (Villasenor 2014d), California Department of Conservation (2006, 2013), CARB (2011c)
Note: Due to rounding, totals may not equal the sum of the individual parts.

BUSINESS-AS-USUAL FORECAST

A business-as-usual (BAU) forecast identifies how the community's emissions may change in the future if no action is taken at the federal, state, or local level to reduce emissions, yet the community continues to grow. A BAU forecast assumes per-person activity data will remain constant with growth. The following section describes a BAU forecast prepared for the years 2020 and 2035. Emissions are forecast to 2020 for consistency with AB 32, while a 2035 forecast is included because this is estimated to be the buildout year of the existing 1996 Huntington Beach General Plan.

The BAU forecast is a preliminary step intended to show GHG emissions if no actions to reduce emissions were in place. In actuality, reductions have already occurred as a result of state and local actions, and are anticipated to continue to occur to 2020 and beyond. Projections will be adjusted to account for existing and anticipated state and local actions in the Sustainability Action Plan and General Plan. Additional forecasts of future GHG emissions will also be based on future growth scenarios, and ultimately the updated General Plan.

The BAU forecast projections use per-person activity data and emission factors (where available) from 2012 to reflect more current conditions in the community. Under this BAU scenario, 2020 GHG emissions for the Huntington Beach community are estimated to increase by 3% above 2012 levels to 1,482,450 $MTCO_2e$. GHG emissions in 2035 are projected to reach 1,576,790 $MTCO_2e$, representing a 10% increase above 2012 levels. 2012 emissions were 1% below 2005 levels. Forecast emissions for each sector in each year are provided in **Table 28.**

TABLE 28
INVENTORY AND FORECAST EMISSIONS BY SECTOR, 2005–2035

Sector	2005 $MTCO_2e$	2012 $MTCO_2e$	2020 $MTCO_2e$	2035 $MTCO_2e$	Percentage Change, 2012–2035
Residential built environment	313,310	327,340	331,520	346,390	6%
Nonresidential built environment	286,260	301,840	312,360	314,320	4%
Transportation	723,440	726,190	750,740	814,800	12%
Off-road equipment	35,240	11,580	20,450	32,780	183%
Solid waste	67,210	38,620	40,030	40,910	6%
Water and wastewater	10,000	10,410	10,790	11,030	6%
Oil drilling	16,610	16,560	16,560	16,560	0%
Total	**1,452,070**	**1,432,540**	**1,482,450**	**1,576,790**	**10%**
Percentage change from 2012	**—**	**—**	**3%**	**10%**	**—**

Source: Data compiled by PMC (2014)

Note: Due to rounding, totals may not equal the sum of the individual parts.

A substantial increase in emissions is forecasted in the off-road equipment sector due to the construction subsector. A fairly small number of houses were built in 2012, but the annual rate of housing construction is expected to rise by 2020 and to increase again by 2035, resulting in the large observed increase in emissions from off-road equipment.

Different indicators are used to prepare forecasts for each sector. With the exception of off-road emissions, all subsectors within a sector use the same indicator. Data used to complete the forecasts include DOF local demographic estimates, SCAG local profiles and growth forecasts, and the Huntington Beach Transportation Model. This reflects the best available information at the time the forecast was prepared. Future forecasts by the DOF, SCAG, or the City may provide different growth indicators. Indicators and sources are shown in **Table 29**.

TABLE 29
FORECAST INDICATORS

Sector	Indicator	2005 Value	2012 Value	2020 Value	2035 Value	Percentage Change, 2012–2035	Source
Residential built environment	Households	74,740	74,850	75,800	79,200	6%	DOF and SCAG
Nonresidential built environment	Jobs	81,600	77,400	80,100	80,600	4%	SCAG
Transportation	Annual VMT (1,000s)	1,481,723.5	1,542,040.1	1,614,007.5	1,758,190.5	14%	HB Traffic Model
Off-road - Construction	New households	250	40	120	230	475%	DOF and SCAG
Off-road– Lawn and garden	Households	74,740	74,850	75,800	79,200	6%	DOF
Oil drilling	No indicator – assumed constant from 2012 levels						
Solid waste	Service population[1]	274,180	270,050	279,900	286,100	6%	DOF and SCAG
Water and wastewater	Service population[1]	274,180	270,050	279,900	286,100	6%	DOF and SCAG

Source: Data compiled by PMC (2014)

Note: Service population represents the combined number of residents and jobs in the community.

REDUCTION TARGET

An emissions reduction target represents the amount of GHG emissions the community plans to reduce by the forecast year. Reduction targets are often expressed as a percentage of emissions reduced relative to a baseline year (e.g., 15% below baseline levels by 2020). The State CEQA Guidelines outlining a Qualified GHG Reduction Strategy do not set a specific goal for GHG reduction; instead, communities are called upon to "establish a level, based on substantial evidence, below which the contribution to greenhouse gas emissions from activities covered by the plan would not be cumulatively considerable." AB 32 sets this level as equal to 1990 levels for the state, and the AB 32 Scoping Plan suggests that 15% below baseline levels by 2020 is a comparable level for local jurisdictions. Individual air districts can recommend a level for communities within their jurisdiction, but to date, the SCAQMD has not officially done so. A sample of reduction targets adopted or under consideration by other communities in Orange County is shown in **Table 30.**

TABLE 30
EXAMPLE 2020 GHG REDUCTION TARGETS, ORANGE COUNTY COMMUNITIES

Community	2020 Reduction Target
Fullerton	15% below baseline
Mission Viejo	18% below baseline
San Clemente	15% below BAU

Source: Data compiled by PMC (2014)

A reduction target of 15% below baseline levels is the commonly accepted target, but jurisdictions may adopt other targets, as demonstrated in the table above. A 15% reduction target also demonstrates a clear connection with the AB 32 Scoping Plan and helps ensure consistency with the Scoping Plan and State CEQA Guidelines Section 15183.5(b). However, as neither the State CEQA Guidelines nor the SCAQMD recommend a specific target, the City may use another target in the SAP as long as it sets a level below which emissions would not be cumulatively considerable.

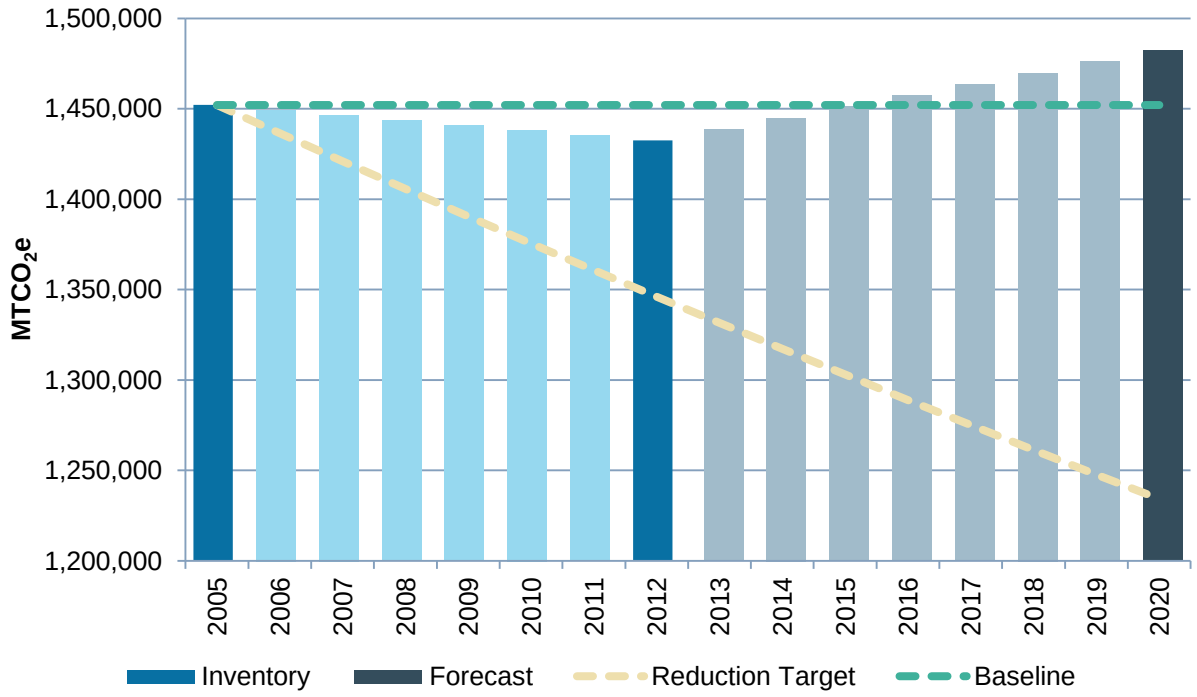
A reduction of 15% below baseline 2005 levels would equate to a target emissions level of 1,234,260 $MTCO_2e$ by 2020, as illustrated in **Table 31** and **Figure 3**.

TABLE 31
2020 REDUCTION GOAL SCENARIO
(15% BELOW BASELINE)

	$MTCO_2e$
2005 baseline	1,452,090
2020 BAU forecast	1,482,450
2020 reduction goal	1,234,260
Reduction from baseline	-217,830
Reduction from BAU forecast	-248,190

Source: Data compiled by PMC (2014)

FIGURE 3
2020 REDUCTION GOAL SCENARIO



Note: Lighter-colored bars are interpolations. Emissions were calculated for 2005, 2012, and 2020.

NEXT STEPS

As a next step, the City will determine 2020 and post-2020 reduction targets that are locally appropriate and will allow the SAP to function as a Qualified GHG Reduction Strategy.

REFERENCES

Austin-Foust Associates, Inc. 2004. City of Huntington Beach Traffic Model Description.

Boswell, M. R., A. I. Greve, and T. L. Seale. 2012. *Local Climate Action Planning*. Island Press.

California Department of Conservation. 2006. 2005 Annual Report of the State Oil and Gas Supervisor. ftp://ftp.consrv.ca.gov/pub/oil/annual_reports/2005/PR06_Annual_2005.pdf.

———. 2013. 2012 Preliminary Report of California Oil and Gas Production Statistics. ftp://ftp.consrv.ca.gov/pub/oil/annual_reports/2012/PR03_PreAnnual_2012.pdf.

CalRecycle (California Department of Resources Recycling and Recovery). 2014. CalRecycle Disposal Reporting System. http://www.calrecycle.ca.gov/LGCentral/Reports/DRS/Default.aspx.

CARB (California Air Resources Board). 2007. OFFROAD 2007. http://www.arb.ca.gov/msei/categories.htm.

———. 2009. California's 1990–2004 Greenhouse Gas Emissions Inventory and 1990 Emissions Level Technical Support Document. http://www.arb.ca.gov/cc/inventory/doc/methods_v1/ghg_inventory_technical_support_document.pdf.

———. 2011a. ARB Landfill Emissions Tool. http://www.arb.ca.gov/cc/protocols/localgov/localgov.htm.

———. 2011b. EMFAC Emission Rates Database. http://www.arb.ca.gov/jpub/webapp/EMFAC2011WebApp/rateSelectionPage_1.jsp.

———. 2011c. Oil and Natural Gas Industry Survey Results, Draft Report. http://www.arb.ca.gov/cc/oil-gas/draftreport.pdf.

———. 2011d. Overview of ARB Emissions Trading Program. http://www.arb.ca.gov/newsrel/2011/cap_trade_overview.pdf.

———. 2013a. 2008–2012 GHG Emissions Summary Data. http://www.arb.ca.gov/cc/reporting/ghg-rep/reported-data/ghg-reports.htm.

———. 2013b. List of Covered Entities [data set]. http://www.arb.ca.gov/cc/capandtrade/covered_entities_110413.xlsx.

———. 2014a. California Greenhouse Gas Inventory for 2000–2012. http://www.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_00-12_2014-03-24.pdf.

———. 2014b. First Update to the Climate Change Scoping Plan. http://www.arb.ca.gov/cc/scopingplan/2013_update/first_update_climate_change_scoping_plan.pdf.

CEC (California Energy Commission). 2006. Refining Estimates of Water-Related Energy Use in California (CEC-500-2006-118). http://www.energy.ca.gov/2006publications/CEC-500-2006-118/CEC-500-2006-118.PDF.

———. 2011. Utility Annual Power Content Labels for 2010 – Investor Owned Utilities (IOUs). http://www.energy.ca.gov/sb1305/labels/2010_index.html.

———. 2012a. Utility Annual Power Content Labels for 2011 – Investor Owned Utilities (IOUs). http://www.energy.ca.gov/sb1305/labels/2011_index.html.

———. 2012b. Annual Report for Calendar Year 2011, Gas Distribution System, Southern California Gas. http://www.cpuc.ca.gov/NR/rdonlyres/5D2F4701-8573-4760-AC51-968AADA16C02/0/GD2011SouthernCaliforniaGasCo.pdf.

———. 2013. Utility Annual Power Content Labels for 2012 – Investor Owned Utilities (IOUs). http://www.energy.ca.gov/sb1305/labels/2012_labels/IOUs/.

City of Huntington Beach. 2005. City of Huntington Beach 2005 Urban Water Management Plan. http://www.ci.huntington-beach.ca.us/files/users/public_works/urban_water_plan_2005.pdf.

———. 2011. City of Huntington Beach 2010 Urban Water Management Plan. http://www.huntingtonbeachca.gov/files/users/public_works/urban-water-plan.pdf.

Davis, L., and C. Hausman. 2014. The Value of Transmission in Electricity Markets: Evidence from a Nuclear Power Plant Closure. http://ei.haas.berkeley.edu/pdf/working_papers/WP248.pdf.

DOF (California Department of Finance). 2012. E-8 Historical Population and Housing Estimates for Cities, Counties, and the State, 2000–2010. http://www.dof.ca.gov/research/demographic/reports/estimates/e-8/2000-10/.

———. 2013. E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011–2013 with 2010 Census Benchmark. http://www.dof.ca.gov/research/demographic/reports/estimates/e-5/2011-20/view.php.

ICLEI Local Governments for Sustainability USA. 2012. US Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions. http://www.icleiusa.org/tools/ghg-protocol/community-protocol.

Miller, M. 2011. “Sunset annexed, group plans appeal.” Huntington Beach Independent. http://www.hbindependent.com/news/tn-hbi-0825-sunset-20110819,0,7971130.story.

MWD (Metropolitan Water District). 2007. Metropolitan Water District 2006/2007 Annual Report. http://www.mwdh2o.com/mwdh2o/pages/about/AR/AR07.html.

———. 2012. Metropolitan Water District 2011/2012 Annual Report. http://www.mwdh2o.com/mwdh2o/pages/about/AR/AR12.html.

MWDOC (Municipal Water District of Orange County). 2006. Municipal Water District of Orange County 2005 Urban Water Management Plan – Section 2. http://www.mwdoc.com/documents/2005UWMPFinal-Section2.pdf.

———. 2011. Municipal Water District of Orange County 2010 Urban Water Management Plan. http://www.mwdoc.com/Uploads/MWDOC_2010_RUWMP_final_draft_Submitted_04_28_11.pdf.

OCSD (Orange County Sanitation District). 2005. Orange County Sanitation District 2004/2005 Annual Report, Operations and Maintenance – Chapter 2. http://www.ocsd.com/Home/ShowDocument?id=10333.

———. 2010. Orange County Sanitation District 2009/2010 Annual Report, Operations and Maintenance. http://www.ocsd.com/Home/ShowDocument?id=10348.

———. 2013. Orange County Sanitation District 2012/2013 Comprehensive Annual Financial Report. www.dacbond.com/GetContent?id=0900bbc78011de7b.

SCAG (Southern California Association of Governments). 2007. Adopted 2008 RTP Growth Forecast, by City. http://gisdata.scag.ca.gov/Pages/SocioEconomicLibrary.aspx?keyword=Forecasting.

———. 2012. Adopted 2012 RTP Growth Forecast. http://gisdata.scag.ca.gov/Lists/Socio%20Economic%20Library/Attachments/43/2012AdoptedGrowthForecast.xls

———. 2013. Profile of City of Huntington Beach. http://www.scag.ca.gov/Documents/HuntingtonBeach.pdf

SCE (Southern California Edison). 2014. Activity reports for 2005 and 2012, Huntington Beach.

SCG (Southern California Gas Company). 2014. Activity reports for 2005 and 2012, Huntington Beach.

Stantec. 2014. Huntington Beach Vehicle Miles Traveled Summary Memo.

US EPA (US Environmental Protection Agency). 2014. eGRID Ninth Edition. http://www.epa.gov/cleanenergy/energy-resources/egrid/index.html.

Villasenor, Jennifer. 2014a. Senior Planner, City of Huntington Beach. Personal correspondence to Jeff Henderson, PMC project manager, and Aaron Pfannenstiel, PMC senior planner. January 23.

———. 2014b. Senior Planner, City of Huntington Beach. Personal correspondence to Jeff Henderson, PMC project manager, and Aaron Pfannenstiel, PMC senior planner. January 29.

———. 2014c. Senior Planner, City of Huntington Beach. Personal correspondence to Jeff Henderson, PMC project manager, and Aaron Pfannenstiel, PMC senior planner. February 4.

———. 2014d. Senior Planner, City of Huntington Beach. Personal correspondence to Mary Beth Broeren, City of Huntington Beach planning manager, and Tammy Seale, PMC project director. March 31.

LIST OF PREPARERS

Jeff Henderson, PMC
Eli Krispi, PMC
Xico Manarolla, PMC
Tammy Seale, PMC
Leeanne Singleton, PMC