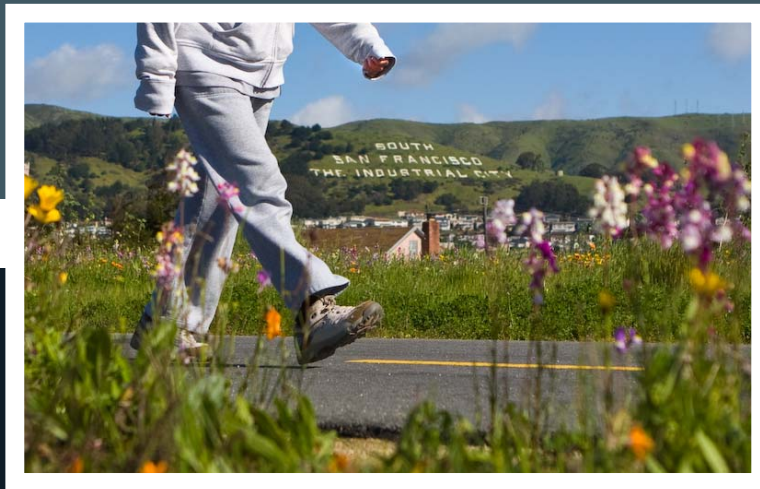


CITY OF
SOUTH SAN FRANCISCO

CLIMATE ACTION PLAN



CITY OF SOUTH SAN FRANCISCO

CLIMATE ACTION PLAN

Adopted February 13, 2014

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Disclaimer

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TABLE OF CONTENTS

TABLE OF CONTENTS

List of Abbreviations.....	v
Executive Summary	ES-1
Chapter 1 - Introduction	1
Purpose.....	1
Scope	1
Preparation of This Plan.....	2
Use of This Plan.....	2
Transportation and Land Use	4
City’s Sustainability Efforts.....	7
Public Participation and the Planning Process.....	9
Role of the Climate Action Plan	12
Chapter 2- Scientific and Regulatory Framework.....	15
Legislative Background and Regulatory Framework	18
Regional Partnerships.....	20
CEQA Guidance for CAPs.....	24
Chapter 3 - Greenhouse Gas Emissions Inventory.....	27
Inventory – Background and Approach.....	27
2005 Community-wide Baseline Inventory Results	28
GHG Emissions Forecast – 2020 and 2035	30
GHG Reduction Targets	32
Chapter 4 - GHG Reduction Strategy	35
GHG Reduction Summary	35
Municipal Achievements.....	40
Existing Activities	41
GHG Reduction Strategies	45
Chapter 5 - Adaptation and Resiliency	63
Introduction	63
Climate Change and Adaptation.....	63

TABLE OF CONTENTS

Chapter 6 - Implementation	69
Implementation Matrix	71
Glossary	77
References	87
Appendix - A: Scientific and Regulatory Background	93
Climate Change Overview	93
Legislative Background and Regulatory Framework	94
Appendix - B: GHG Inventory and Forecast Report	101
Appendix - C: BAAQMD Compliance	121
Appendix - D: GHG Methods and Assumptions	135
Appendix - E: Development Review Checklist	169

LIST OF TABLES

Table ES-1: 2005 Community-Wide Baseline Emissions by Sector	ES-4
Table ES-2: GHG Reduction Summary by Topic (MTCO ₂ e).....	ES-6
Table 1: Labor and Employment Efficiency in South San Francisco	5
Table 2: Land Uses, South San Francisco	6
Table 3: 2005 Community-Wide Baseline Emissions by Sector	29
Table 4: 2005 Community-Wide Baseline Emissions, Excluding Informational Items.....	29
Table 5: 2020 and 2035 BAU Emissions (MTCO ₂ e).....	31
Table 6: 2020 and 2035 ABAU Emissions (MTCO ₂ e).....	32
Table 7: Gap Between ABAU Emissions and AB 32 Goal, 2020	32
Table 8: GHG Reduction Summary by Topic (MTCO ₂ e)	35
Table 9: Municipal Energy Efficiency and GHG Reduction Projects	40
Table 10: Implementation Matrix	73
Table B-1: Community-Wide Emissions by Sector.....	106
Table B-2: 2005 Community-Wide Activity, Emissions, and Data Sources by Subsector	107
Table B-3: Demographic Projections for South San Francisco, 2005–2035	114
Table B-4: BAU Emissions by Sector, 2005–2035 (MTCO ₂ e)	115
Table B-5: GHG Impacts of State Reduction Efforts, 2020 and 2035 (MTCO ₂ e).....	117

TABLE OF CONTENTS

Table B-6: ABAU Emissions by Sector, 2005–2035 (MTCO ₂ e)	117
Table B-7: Comparison of BAU and ABAU Emission Scenarios, 2005–2035 (MTCO ₂ e).....	118
Table B-8: ABAU Emissions and AB 32 Goal, 2020	118
Table C-1: Community-Wide 2005 Emissions by Sector	123
Table C-2: 2005 Community-Wide Emissions by Sector, Excluding Informational Items	126
Table C-3: South San Francisco Community Growth Indicators	127
Table C-4: BAU GHG Emissions Comparison by Sector, 2005–2035	128
Table C-5: Summary of State Reductions, 2005–2035 (MTCO ₂ e)	129
Table C-6: GHG Reduction Summary by Topic	131

LIST OF FIGURES

Figure ES-1: Comparison of Emissions Scenarios and Reduction Targets, 2005–2020 (MTCO ₂ e).....	ES-5
Figure ES-2: Sample of CAP Co-Benefits	ES-7
Figure ES-3: 2020 GHG Emissions Targets and Reductions (MTCO ₂ e).....	ES-8
Figure ES-4: GHG Emissions per Service Population (MTCO ₂ e)	ES-9
Figure 1: Highlights of Key CAP Topics by Stakeholder	3
Figure 2: Racial and Ethnic Characteristics of South San Francisco, 2010	4
Figure 3: Inflow/Outflow of Commuters for Labor Market in South San Francisco, 2010	5
Figure 4: Timeline of South San Francisco Sustainability Efforts	8
Figure 5: Climate Change Impacts in California, 2070–2099.....	16
Figure 6: South San Francisco: Community-Based Transportation Plan Study Area	23
Figure 7: 2005 Community-Wide Baseline Emissions, Excluding Informational Items.....	30
Figure 8: Comparison of Emissions Scenarios and Reduction Targets, 2005–2020 (MTCO ₂ e).....	33
Figure 9: GHG Emission Targets and Reductions (MTCO ₂ e).....	36
Figure 10: Local Reductions by Topic (MTCO ₂ e), 2020	37
Figure 11: Local Reductions by Topic (MTCO ₂ e), 2035	37
Figure 12: Strategy Topic Areas	38
Figure 13: The Energy Loading Order	54
Figure 14: Cal-Adapt Sea Level Rise Map and Projections, South San Francisco	64
Figure 15: Complementary and Conflicting Adaptation and Reduction Actions.....	65

TABLE OF CONTENTS

Figure A-1: The Greenhouse Effect	94
Figure A-2: California Regulatory Framework.....	99
Figure B-1: 2005 Community-Wide Emissions by Sector	106
Figure B-2: 2005 Energy Emissions by Subsector	108
Figure B-3: 2005 Transportation Emissions by Subsector	110
Figure B-4: 2005 Solid Waste Emissions by Subsector	111
Figure B-5: 2005 Off-Road Emissions by Subsector	112
Figure B-6: 2005 Water and Wastewater Emissions by Subsector.....	113
Figure B-7: BAU GHG Emissions, 2005–2035 (MTCO ₂ e).....	115
Figure B-8: Comparison of Emission Scenarios and Reduction Targets, 2005–2020 (MTCO ₂ e).....	119
Figure C-1: Community-Wide 2005 Emissions by Sector.....	122
Figure C-2: Nonresidential 2005 Energy Emissions, Genentech Separate (MTCO ₂ e).....	125
Figure C-3: Community-Wide 2005 Emissions by Sector, Genentech Separate (MTCO ₂ e).....	125
Figure C-4: 2005 Community-Wide Emissions by Sector, Excluding Informational Items (MTCO ₂ e)	126
Figure C-5: BAU GHG Comparison, 2005–2035	128
Figure C-6: GHG Reduction Topics.....	130
Figure C-7: 2020 Local and State GHG Reductions (MTCO ₂ e)	131
Figure C-8: 2020 CAP GHG Reductions by Topic (MTCO ₂ e)	132
Figure C-9: GHG Emissions per Service Population, 2005–2035 (MTCO ₂ e)	133

ABBREVIATIONS

LIST OF ABBREVIATIONS

AB	Assembly Bill
ABAG	Association of Bay Area Governments
ABAU	adjusted business as usual
AB 32	Assembly Bill 32 (California Global Warming Solutions Act of 2006)
AB 811	Assembly Bill 811 (Property Assessed Clean Energy programs)
AB 1493	Assembly Bill 1493 (Clean Car Fuel Standard, also known as the Pavley bill)
ADC	alternative daily cover
ANIP	Aircraft Noise Insulation Program
ARRA	American Recovery and Reinvestment Act of 2009
ABAG	Association of Bay Area Governments
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
BAU	business as usual
BCDC	Bay Conservation and Development Commission
BPAC	Bicycle and Pedestrian Advisory Committee
C&D	construction and demolition
CalEPA	California Environmental Protection Agency
Cal Water	California Water Service Company
CAP	Climate Action Plan
CARB	California Air Resources Board
CBTP	Community-Based Transportation Plan
C/CAG	City/County Association of Governments of San Mateo County
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH ₄	methane

ABBREVIATIONS

CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
CPUC	California Public Utilities Commission
CSI	California Solar Initiative
EECBG	Energy Efficiency and Conservation Block Grant
EIR	environmental impact report
EO S-03-05	Executive Order S-03-05 (Greenhouse Gas Emissions Reduction Initiative)
EPA	Environmental Protection Agency
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
HVAC	heating, ventilation, and air conditioning
ICLEI	ICLEI – Local Governments for Sustainability
IPCC	Intergovernmental Panel on Climate Change
kW	kilowatt
kWh	kilowatt-hour
LCFS	Low Carbon Fuel Standard
LED	light-emitting diode
LEED	Leadership in Energy and Environmental Design
MG	million gallons
MT	metric tons
MTC	Metropolitan Transportation Commission
MTCO ₂ e	metric ton of carbon dioxide equivalent
N ₂ O	nitrous oxide
OPR	Governor’s Office of Planning and Research
PACE	Property Assessed Clean Energy
PFC	perfluorocarbon

ABBREVIATIONS

PG&E	Pacific Gas and Electric
PMP	Pedestrian Master Plan
PV	photovoltaic
RICAPS	Regionally Integrated Climate Action Planning Suite
RPS	Renewables Portfolio Standard
SamTrans	San Mateo County Transit District
SB	Senate Bill
SCS	Sustainable Communities Strategy
SF ₆	sulfur hexafluoride
SGC	Strategic Growth Council
TAC	Technical Advisory Committee
TDM	Transportation Demand Management
VMT	vehicle miles traveled

ABBREVIATIONS

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The purpose of this Climate Action Plan (CAP) is to demonstrate the City of South San Francisco's continued commitment to reduce greenhouse gas (GHG) emissions while protecting the unique resources of the community. This Plan is intended to build upon existing environmental preservation, public health, and energy-saving efforts. The CAP will provide goals, policies, and programs to reduce GHG emissions, adapt to climate change, and support the goals of Assembly Bill (AB) 32 and Senate Bill (SB) 375. The City will also use this CAP to simplify the development review process. Measures and standards identified in this Plan allow the City to determine whether projects are eligible for streamlining incentives. By preparing this CAP consistent with the California Environmental Quality Act (CEQA) Guidelines and the Bay Area Air Quality Management District's (BAAQMD) expectations for a Qualified GHG Reduction Strategy, the City can provide streamlining incentives for project-level GHG emissions analysis.

The CAP includes the following chapters:

- Introduction (Chapter 1)
- Scientific and Regulatory Framework (Chapter 2)
- Greenhouse Gas Emissions Inventory (Chapter 3)
- GHG Reduction Strategy (Chapter 4)
- Adaptation and Resiliency (Chapter 5)
- Implementation (Chapter 6)
- Glossary and appendices provide additional details and information, which are referenced later in this Executive Summary

South San Francisco builds on a strong sustainability history.

Early efforts of the City and its partners are estimated to have reduced approximately 4,600 metric tons of carbon dioxide equivalent (MTCO₂e), and have contributed over 20% of the total local reductions identified in this Climate Action Plan.

INTRODUCTION: BUILDING ON SOUTH SAN FRANCISCO'S STRENGTHS

The City has prepared the CAP as a plan to address GHG emissions generated within the city limits of South San Francisco. The CAP meets the requirements of a Qualified GHG Reduction Strategy but also outlines a clear path for the City to successfully implement policies, programs, and activities that will achieve the City's GHG reduction target. Consistent with the Global Warming Solutions Act of 2006, this CAP presents a target reduction of 15% below baseline 2005 GHG emissions levels by 2020.

As described in **Chapter 1**, the CAP serves as the City's primary tool to integrate all City and community efforts to reduce GHG emissions. The CAP addresses existing environment, new development, and City government operations. Programs in the CAP are based on the City's leadership to date. Prior to undertaking this CAP, the City had already supported the community's overall reduction in the carbon footprint through policies, grants, and its own operational practices. Notable projects include creation of the Green X-Ray House, a demonstration project created in

EXECUTIVE SUMMARY

partnership with local green service and materials companies that displays low-impact renovations and energy- and water-efficient appliances to the public.

South San Francisco's distinctive land use patterns and community assets shape key opportunities that are targeted in this CAP, including the community's core industrial projects and transportation patterns. Several large advanced technology and life sciences companies are primary community employers. Three companies—Genentech, HCP Inc., and Biomed Realty—own nearly 175 acres of land for their campuses. Genentech, a biotechnology firm, is the community's largest employer with approximately 9,000 full-time employees working in South San Francisco. To support the transportation needs of these employees and residents, in 2001 the City adopted an aggressive Transportation Demand Management ordinance which requires that every large industrial and commercial business implement plans to reduce employee commute trips, with alternative mode shift requirements of 28–40%. Participation in commuter programs is supported by the City's transportation infrastructure. In 2012, a new ferry terminal opened at Oyster Point, expanding ferry routes and alternative commute options. The City also began planning for additional development around the Caltrain station in the downtown, helping to meet revitalization goals through an increased level of use and pedestrian access in the surrounding area. Building on these numerous efforts, the CAP strengthens the City's commitment to fostering alternative transportation that efficiently connects people to their destinations.

The community only achieves the goals of this Plan through partnership with the broader community. As a result, the CAP also serves as an educational document for the community. The South San Francisco business community and residents, as well as other stakeholders and members of the public, can use the Plan to identify programs and opportunities or learn about local conditions and priorities.

SCIENTIFIC AND REGULATORY CONTEXT

Chapter 2 describes the scientific and regulatory context guiding the preparation of this CAP. A brief overview of the science behind climate change is provided, including its potential implications, as well as relevant federal, state, regional, and local regulatory framework. This context helps to support South San Francisco's action to address climate change.

While the State of California has passed landmark legislation related to climate change, such as AB 32, SB 375, and SB 97, regulatory agencies are also implementing several other state laws related to climate change, land use and transportation, energy and renewable energy, water conservation, and waste and recycling at both the state and local levels. In addition to statewide efforts, the CAP also builds on local planning efforts that the City is actively supporting through the regional climate planning collaborative, the Regionally Integrated Climate Action Planning Suite effort. The City also continues to partner with the City/County Association of Governments of San Mateo County and other jurisdictions in San Mateo County to achieve its sustainability goals

EXECUTIVE SUMMARY

GREENHOUSE GAS EMISSIONS INVENTORY

In order to develop appropriate GHG emissions reduction strategies, the City must first understand existing and future GHG emissions. **Chapter 3** provides an inventory of community-wide emissions for baseline year 2005, projects emissions using assumptions about economic and demographic growth as well as state and federal policies, and compares the emissions forecast to the City's goals. This information is summarized in **Table ES-1** and **Figure ES-1**.

Table ES-1: 2005 Community-Wide Baseline Emissions by Sector

Sector	MTCO ₂ e	Percentage of Total
Energy	263,780	48%
Transportation	196,910	36%
Stationary Sources	35,580	6%
Off-Road	22,400	4%
Solid Waste	14,780	3%
Landfill	13,220	2%
Water and Wastewater	1,940	<1%
Total*	548,600	100%

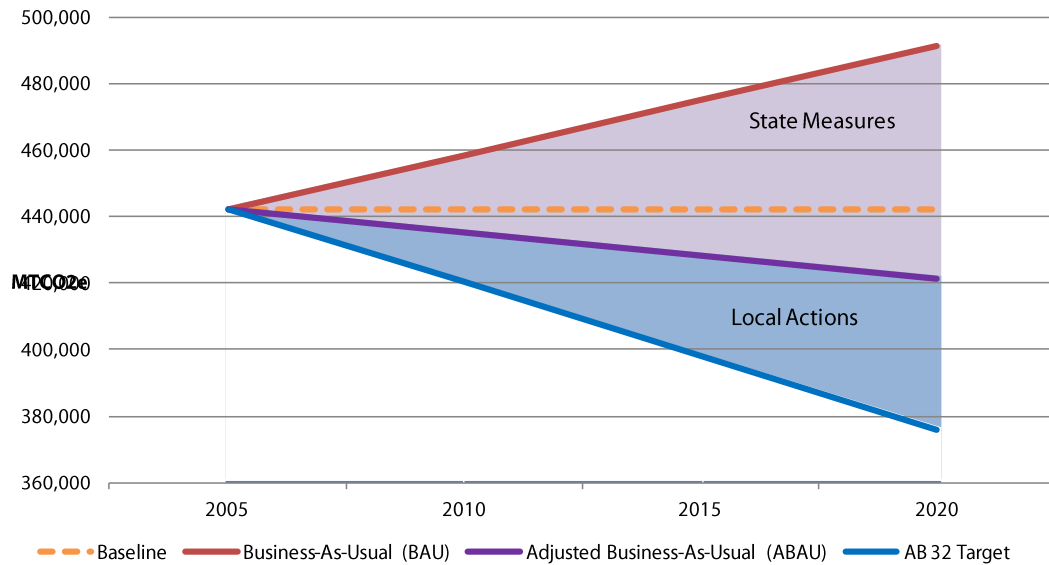
* Due to rounding, the total may not be the sum of component parts.

The community-wide inventory includes GHG emissions from activities such as electricity use, natural gas use, on-road transportation, solid waste disposal, direct landfill emissions, water and wastewater, off-road equipment, and stationary sources. The baseline inventory estimates that community-wide activities generated 548,600 metric tons of carbon dioxide equivalents (MTCO₂e) in 2005. For the purposes of this CAP, stationary sources, direct landfill emissions, and energy use at the Genentech campus are excluded from this inventory, resulting in a community-wide total of 442,400 MTCO₂e. Stationary sources and direct landfill emissions are excluded from the CAP because the stationary sources are regulated by the BAAQMD and CARB. The Genentech facility is also a stationary emitter that CARB will regulate through California's cap-and-trade program.

Community-wide GHG emissions were forecast for 2020 and 2035 using 2005 energy consumption rates, demographic and economic projections from the Association of Bay Area Governments, and estimated growth in off-road equipment and vehicle miles travelled. This forecast was adjusted to include GHG reductions that will occur as a result of state and federal policy. The difference between these forecasts and the City's reduction target is the GHG emissions reduction needed to achieve that target. **Figure ES-1** illustrates the GHG emissions forecast, the adjusted forecast, and the reductions required to achieve the City's target, a 15% reduction below baseline 2005 GHG emissions.

EXECUTIVE SUMMARY

Figure ES-1: Comparison of Emissions Scenarios and Reduction Targets, 2005–2020 (MTCO₂e)



GHG REDUCTION STRATEGY

In order to achieve the State-recommended AB 32 reduction target of 15% below 2005 emissions levels by 2020, the City will need to continue implementation of existing programs and implement the recommended goals, policies, and actions set forth in this document. **Chapter 4** presents the City's reduction strategy to achieve the AB 32 target. The reduction measures included in this Plan build upon existing efforts and provide a diverse mix of regulatory and incentive-based programs for both new and existing development. The reduction measures also aim to reduce GHG emissions from each source to avoid reliance on any one strategy or sector to achieve the target.

In total, state actions and GHG reduction measures in the CAP will reduce GHG emissions in the community of South San Francisco by 116,040 MTCO₂e by 2020, a 15% reduction below baseline 2005 emissions (see **Table ES-2**). Local actions will contribute approximately 40% of 2020 reductions, while state actions will contribute approximately 60% of 2020 reductions. The City has already made significant progress towards the 2020 reduction target. Existing programs initiated after 2005 will contribute approximately 22% of total local reductions necessary to achieve the AB 32 reduction target. These existing programs include public-private partnerships, municipal retrofits, and other quasi-public projects the City has supported. In addition to achieving GHG reductions, both existing actions and measures create numerous co-benefits for the community, including reduced household costs, improved public health, and reduced fuel use. Co-benefits and participation metrics are presented for all measures identified in **Chapter 4**. Icons are used to generally represent co-benefits. **Figure ES-2** presents a sample of co-benefit icons contained in this CAP.

EXECUTIVE SUMMARY

Table ES-2: GHG Reduction Summary by Topic (MTCO₂e)

Topic	2020	2035
State Reduction Efforts	-69,770	-104,590
Existing Local Programs	-10,090	-13,020
Alternative Transportation	-4,470	-4,380
Land Use and Parking	-2,660	-2,600
Alternative Fuel Vehicles	-2,770	-6,530
Off-Road Vehicles and Equipment	-2,670	-5,880
Energy Efficiency and Conservation	-11,810	-30,100
Renewable Energy	-5,100	-11,760
Waste Minimization	-6,720	-10,950
Water and Wastewater	-250	-530
Municipal Operations ¹	-	-
Total GHG Reductions²	-116,310	-190,340

1. Note that existing municipal activities are quantified under existing local programs, municipal reduction measures are considered supportive, and GHG reductions are not quantified.

2. Due to rounding, totals may not equal the sum of the component parts.

EXECUTIVE SUMMARY

Figure ES-2: Sample of CAP Co-Benefits

CAP measures do more than reduce GHG emissions.

They make sense for the community.

Extra “co-benefits” of the measures identified in this CAP include:



Revitalizes Urban
and Community
Centers



Saves Money



Reduces
Automobile
Use and Fuel
Consumption



Reduces Water
Use

EXECUTIVE SUMMARY

Figure ES-3: 2020 GHG Emissions Targets and Reductions (MTCO₂e)

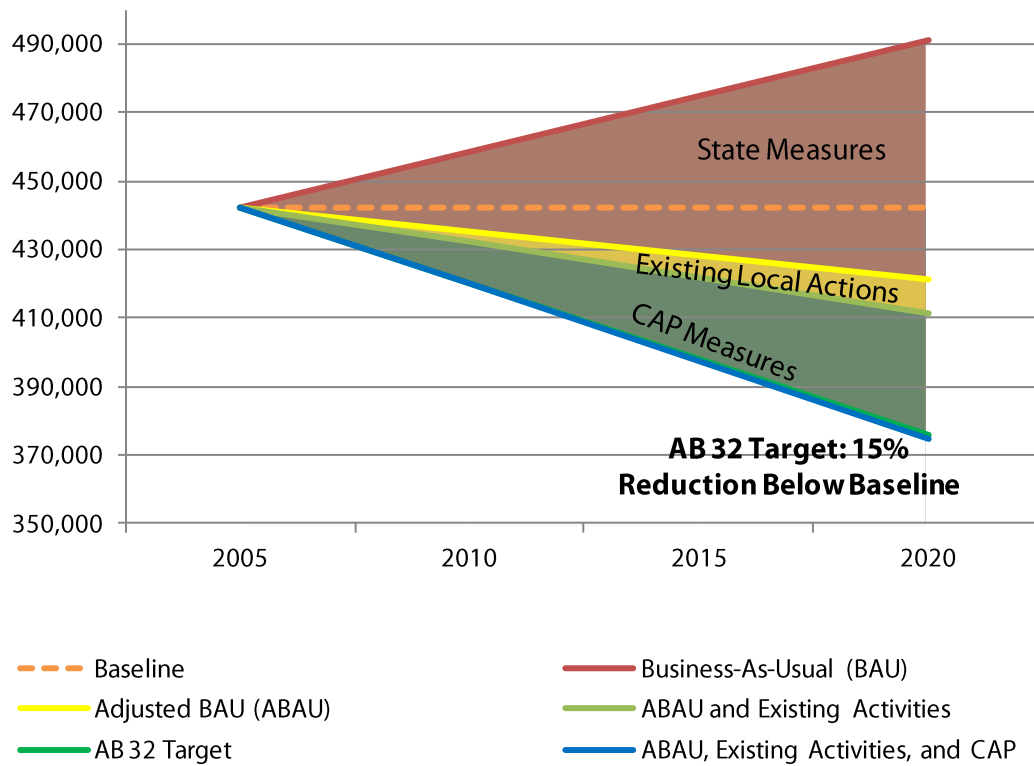
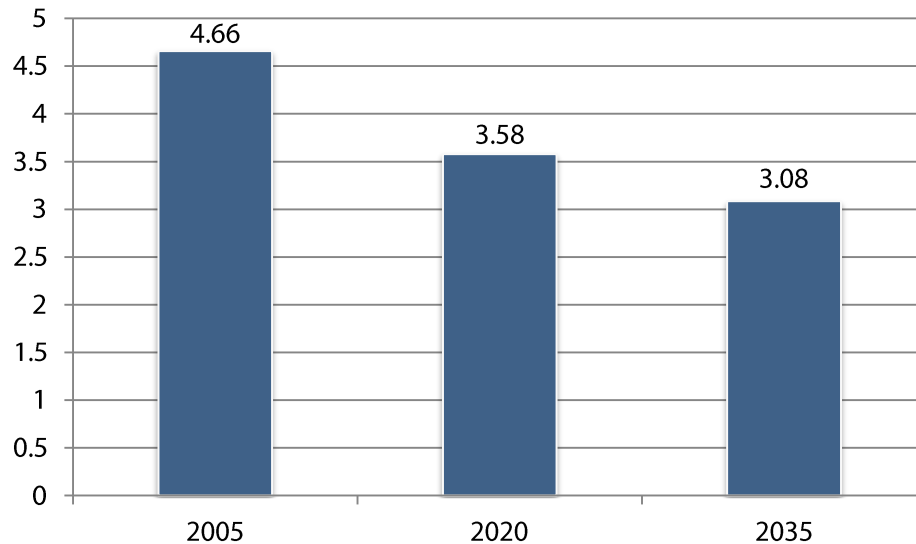


Figure ES-3 shows the contribution of state activities, existing programs, and CAP measures to the 2020 reduction target. Achievement of a 15% reduction in GHG emissions by 2020 will achieve state recommendations and BAAQMD threshold requirements for developing a Qualified GHG Reduction Strategy. As shown in **Figure ES-4**, through the implementation of this Plan, South San Francisco’s per capita GHG emissions will decrease from 4.66 MTCO₂e annually in 2005 to 3.49 MTCO₂e annually in 2020 and 3.07 MTCO₂e annually in 2035.

EXECUTIVE SUMMARY

Figure ES-4: GHG Emissions per Service Population (MTCO₂e)



ADAPTATION AND RESILIENCY

Even if global GHG emissions ceased immediately, the already elevated levels of carbon dioxide and other GHGs in the atmosphere are expected to have significant impacts on the earth's climate. Specifically, South San Francisco is expected to experience the following impacts from climate change:

- Greater frequency of extreme heat events
- Decline in air quality
- Greater frequency and severity of storms
- Increase in sea level
- Decrease in water and electricity supply
- Ecosystem damage

Chapter 5 presents adaptation policies to equip the city as it prepares for and adapts to the impact of climate change. Ongoing coordination with regional partners and assessment of local vulnerabilities are identified as critical strategies for success.

EXECUTIVE SUMMARY

IMPLEMENTATION

To ensure successful achievement of the City's reduction target, **Chapter 6** of the CAP identifies implementation strategies, implementation partners, and supporting actions. This chapter also includes an implementation matrix with details specific to each measure, including the responsible department and implementation time frame. The implementation matrix will be a critical tool to monitor the City's progress toward implementing the CAP.

GLOSSARY, APPENDICES, AND SUPPLEMENTAL MATERIALS

To streamline the main document, several technical appendices provide additional detail and information regarding GHG reductions, plan development, and sources. This CAP includes the following appendices:

- Glossary of key terms used throughout the document (**Glossary**)
- List of references for the CAP and GHG inventory (**References**)
- Additional information on the scientific and regulatory context, expanding on the information presented in **Chapter 2 (Appendix A: Scientific and Regulatory Background)**
- Technical GHG emissions inventory results and methods (**Appendix B: GHG Inventory and Forecast Report**)
- Detailed discussion of how the CAP addresses BAAQMD requirements for a Qualified GHG Reduction Strategy (**Appendix C: BAAQMD Appendix**)
- Summary of sources and assumptions used to estimate GHG reductions for each reduction measure (**Appendix D: GHG Methods and Assumptions**)
- A checklist to be completed by project development applicants to demonstrate compliance with the CAP (**Appendix E: Development Review Checklist**)

EXECUTIVE SUMMARY

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CHAPTER 1

INTRODUCTION

CHAPTER 1

Chapter 1 provides a brief overview of the purpose and scope of this Climate Action Plan (CAP or Plan) and describes how it will build off of the City's existing efforts toward environmental stewardship and leadership. The City has prepared the CAP to not only meet the requirements of a Qualified Greenhouse Gas Reduction Strategy but to also outline a clear path to successfully implementing policies, programs, and activities that will achieve the South San Francisco's greenhouse gas (GHG) reduction targets.

PURPOSE

The purpose of this Climate Action Plan is to demonstrate the City of South San Francisco's continued commitment to reduce GHG emissions while protecting the unique resources of the community. This Plan is intended to build upon existing environmental preservation, public health, and energy-saving efforts. The Climate Action Plan will provide goals, policies, and programs to reduce greenhouse gas emissions, adapt to climate change, and support the goals of Assembly Bill (AB) 32 and Senate Bill (SB) 375.

Strategies in this Plan build on the City of South San Francisco's innovative work to reduce air pollution, decrease waste, provide a range of commute and circulation options, improve the energy efficiency of buildings, and develop access to reliable, clean, and affordable energy. The Plan also outlines the City's strategy to adapt to a changing climate by protecting the built environment, public health, and natural resources from the vulnerabilities caused by changing climate conditions.

SCOPE

Local governments play a primary role in reducing greenhouse gas emissions and mitigating the potential impacts of climate change. South San Francisco has a demonstrated commitment to implementing sustainability programs and proactively working to reduce GHG emissions. This Plan recognizes the importance of City leadership and indicates how the City will reduce GHG emissions through strategies that are tailored to the community's living and working characteristics. The CAP builds upon the City's completed Government Operations Emissions Inventory, a community-wide Greenhouse Gas Emissions Inventory, the Bicycle Master Plan, the Community-Based Transportation Plan, and the El Camino Real Master Plan.

In addition to reducing GHG emissions, the strategies in this Plan will provide additional benefits to the community such as lower energy bills, greater transportation options, improved air quality, expanded economic growth, protection of bay-front resources, and enhanced quality of life.

INTRODUCTION

PREPARATION OF THIS PLAN

The California Strategic Growth Council (SGC) awarded South San Francisco a Planning Grant providing the bulk of the funding for the preparation of this Plan. The grant also funded the creation of a Pedestrian Master Plan conducted in concert with the development of the CAP. The purpose of the SGC Grant Program is to help local jurisdictions in planning sustainable communities to meet AB 32 goals and generally help to:

- Improve air and water quality
- Protect natural resources and agriculture lands
- Increase the availability of affordable housing
- Promote public health
- Improve transportation
- Encourage greater infill and compact development
- Revitalize community and urban centers

This Plan achieves the intent of the SGC program by creating a strategy to reduce community-wide energy use, to reduce fuel combustion through more efficient transportation and land use patterns, and to spur growth in local energy efficiency industries.

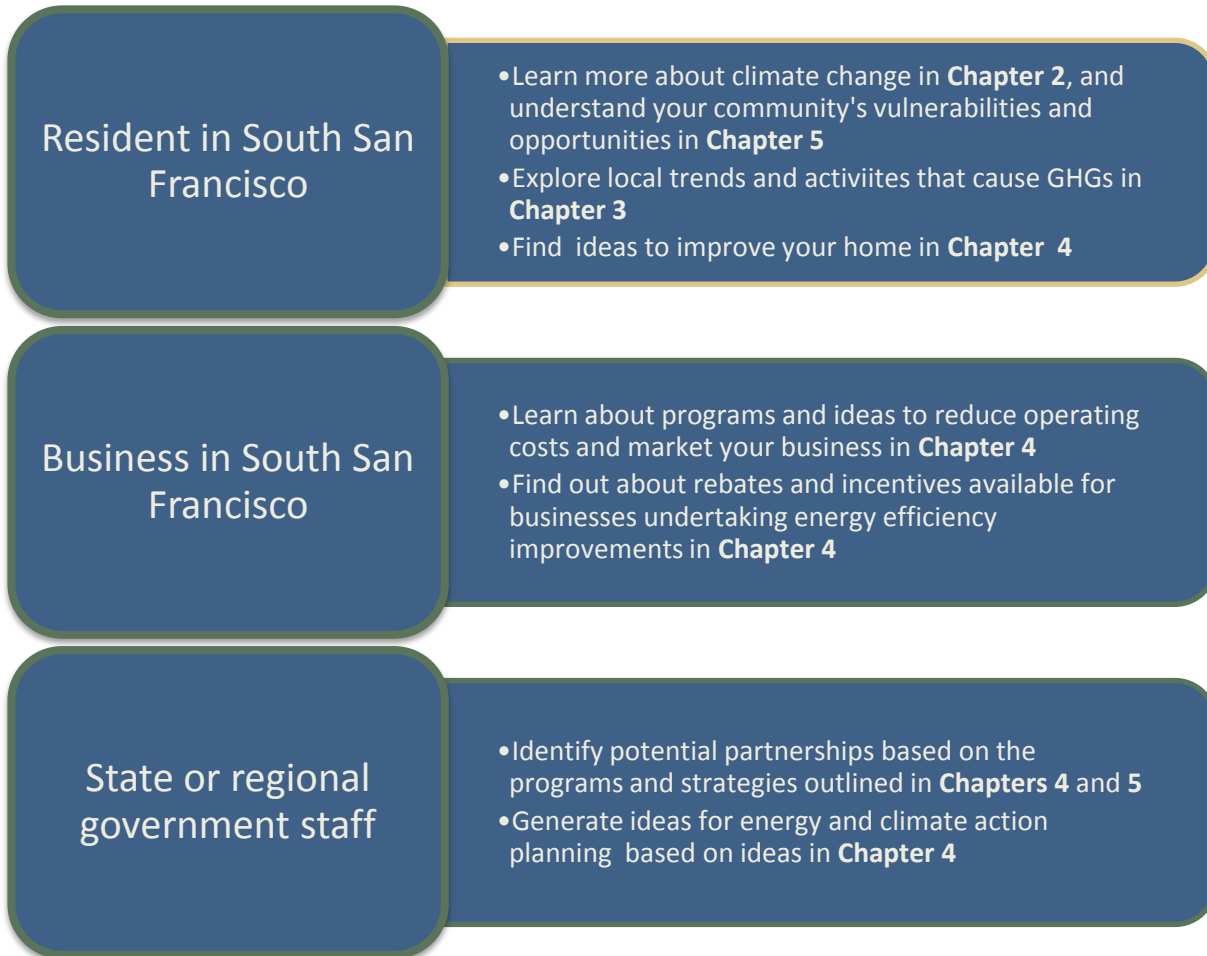
USE OF THIS PLAN

The CAP serves as South San Francisco's greenhouse gas reduction strategy. The Plan is primarily a tool to identify the City's plan to reduce GHG emissions. But the City will only achieve the goals of this Plan through partnership with the broader community. As a result, the CAP also serves as an educational document for the community. The South San Francisco business community and residents, as well as other stakeholders and members of the public, can use the Plan to identify programs and opportunities or learn about local conditions and priorities.

Figure 1 highlights the key considerations for a variety of stakeholders.

CHAPTER 1

Figure 1: Highlights of Key CAP Topics by Stakeholder



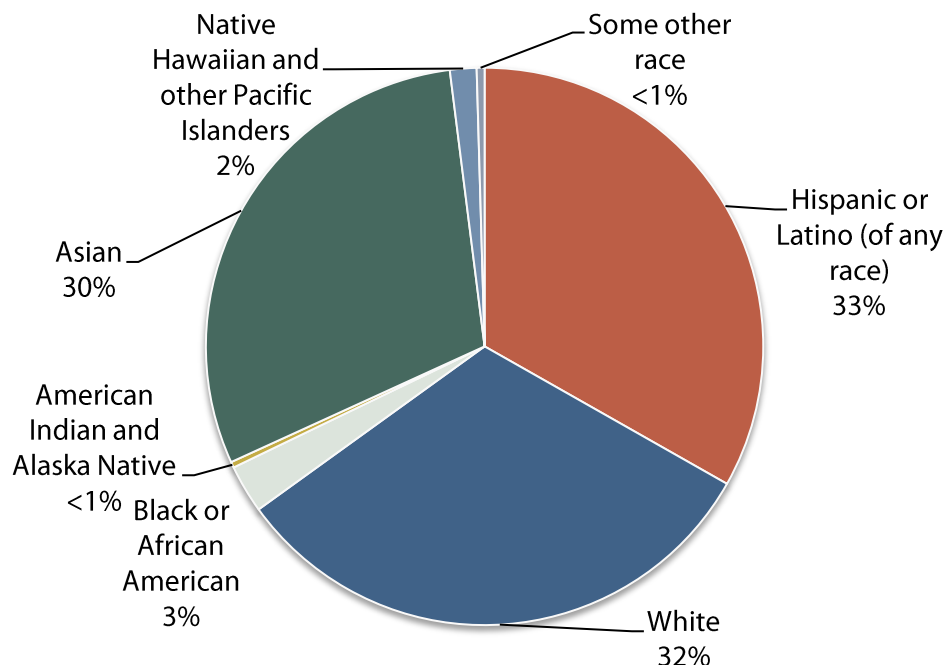
LOCAL SETTING

South San Francisco, California is located on the San Francisco Peninsula and occupies 9.63 square miles of land touching the San Francisco Bay. As of 2010, the city has a population of 63,632.

Situated about 10 miles south of the City of San Francisco, South San Francisco is located immediately north of the San Francisco International Airport. The community is connected to much of the Bay Area through roads and alternative transit networks, as discussed below. Incorporated in 1908, the city has developed both its industrial and residential sectors, and has a high degree of cultural, social, and economic diversity. The ethnic diversity of South San Francisco is shown in **Figure 2**, with Hispanic, White, and Asian peoples comprising about one-third each of the city's residents.

INTRODUCTION

Figure 2: Racial and Ethnic Characteristics of South San Francisco, 2010



Source: US Census Bureau 2010

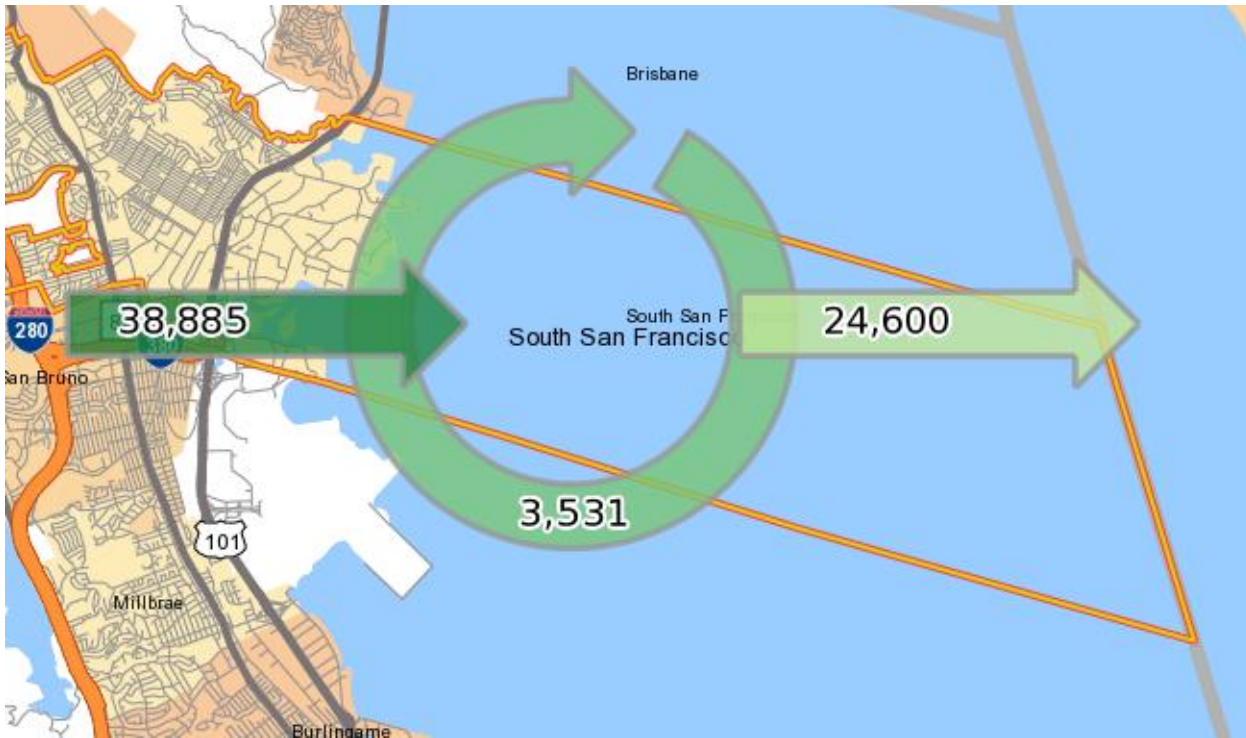
With its prime location on the Bay, by the beginning the twentieth century, South San Francisco was a thriving stockyard and marketplace. The 1950s brought modern industrial parks to the city's port-side area, and freight forwarding, light industries, and other airport-related businesses thrived. In 1976, the biotechnology firm Genentech was founded in the city, pioneering research on DNA technologies and earning the city the moniker "the Birthplace of Biotechnology." South San Francisco remains a strong market industrial center, with major biotech and pharmaceutical businesses at the heart of the city's economy.

TRANSPORTATION AND LAND USE

South San Francisco is located adjacent to the San Francisco International Airport and is served by US Route 101 and Interstate 280. The city is also a stopping point on major transit lines, including the Bay Area Rapid Transit (BART) network, Caltrain commuter rail, San Mateo County's SamTrans passenger bus service, and a ferry providing service to the cities of Alameda and Oakland. As shown in **Figure 3** and **Table 1**, commuting is a major component of transportation (and by extension, greenhouse gas emissions) in South San Francisco. Each day, about 24,600 employees commute to jobs located outside of the city.

CHAPTER 1

Figure 3: Inflow/Outflow of Commuters for Labor Market in South San Francisco, 2010



Source: US Census Bureau 2012

Table 1: Labor and Employment Efficiency in South San Francisco

Group	Number	Percentage
Labor Force Efficiency		
Living in South San Francisco	28,131	100%
Living and working in South San Francisco	3,531	12.6%
Living in South San Francisco and working elsewhere	24,600	87.4%
Employment Efficiency		
Working in South San Francisco	42,416	100%
Working and living in South San Francisco	3,531	8.3%
Working in South San Francisco and living elsewhere	38,885	91.7%
Net Job Inflow	14,285	-

Source: US Census Bureau 2012

INTRODUCTION

South San Francisco has made a number of investments to improve and expand the transportation infrastructure, including an expansion and overpass for Oyster Point Boulevard completed in 2004, the planned modernization of the Caltrain station, and improvements to 22 major intersections.

South San Francisco has a distinctive and diverse land use pattern, reflecting the decision to initially locate industrial areas east of US Route 101 in order to take advantage of topography and winds on Point San Bruno. Consequently, land uses in South San Francisco tend to be clearly divided and single-use, with industry in the eastern and southeastern portions of the city, single-family homes to the north and west, commercial uses along a few transportation corridors, and multi-family housing clustered in those same corridors and on hillsides. Single-family residences occupy approximately a third of city land. Industrial uses—warehouses, manufacturing areas, and business parks—comprised nearly a quarter of the land (see **Table 2**).

Table 2: Land Uses, South San Francisco

Type	Percentage
Single-Family Residential	33%
Multi-Family Residential	15%
Industrial	26%
Commercial	8%
Parks and Open Space	10%
Vacant	4%
Other	5%
Total	100%

Source: City of South San Francisco 2011

Several large advanced technology and life sciences companies maintain campuses in the areas of the city designated for industrial and commercial land uses. Three companies—Genentech, HCP Inc., and Biomed Realty—own nearly 175 acres of land for their campuses.

With approximately 9,000 full-time employees working in South San Francisco, Genentech is the largest employer in the community. As of 2012, Genentech operates 2.8 million square feet of manufacturing, office, and laboratory space, and generates an estimated 60 million vehicle miles traveled each year. The company's Ten Year Facilities Master Plan will more than double the campus's operating square footage. Due to the size and type of operations, the Genentech campus has been listed by the California Air Resources Board (CARB) as an entity covered by California's cap-and-trade program (see **Chapter 2** for details).

CHAPTER 1

SOUTH SAN FRANCISCO GROWTH EXPECTATIONS

The City's current General Plan includes goals and implementation policies to guide planning for residential and job growth through its horizon year of 2020. As of 2011, development approved or under review included 1,745 housing units and 3.4 million square feet of nonresidential space. The largest growth project in the works is the 6 million square feet of office and R&D space approved for Genentech as part of the company's Master Plan buildout. According to the General Plan, in 2020, South San Francisco is expected to have a residential population of approximately 69,800, an increase of 15% over the 2000 population of 59,200.

CITY'S SUSTAINABILITY EFFORTS

South San Francisco is focused on sustainability. The City has created a Sustainability Division that aids staff in pursuing grants, conducts outreach to the community regarding sustainable practices, and provides resources for green building practices. Prior to undertaking this Climate Action Plan and the new Pedestrian Master Plan, the City had already aided in the reduction of the community's overall carbon footprint through policies, grants, and its own operational practices. The City has completed a range of notable projects to help reach its goal.

The City has made aggressive efforts to reduce transportation emissions. A Transportation Demand Management ordinance passed in 2001 requires that every large industrial and commercial business implement plans to reduce employee commute trips, with alternative mode shift requirements of 28–40%. In 2012, the City began planning for additional development around the Caltrain station in the downtown, helping to meet revitalization goals through an increased level of use and pedestrian access in the surrounding area.

As a means to combat traffic congestion and improve air quality, South San Francisco has also passed an ordinance banning drive-through facilities. This prohibition also encourages a more pedestrian-friendly environment and helps to promote healthier lifestyles. The City adopted the prohibition in 2011 to preclude additional drive-through facilities as part of the comprehensive update to the City Zoning Ordinance.

A recently completed public parking garage, the Miller Avenue Parking Structure, provides the first electric vehicle charging stations in the area and has other environmentally responsible features including bicycle parking, sustainable building materials, geothermal wells for heating and cooling, energy-efficient lighting, and water-efficient landscaping.

Buildings in South San Francisco are becoming more environmentally responsible as well. The City operates the Green X-Ray House, which in partnership with local green service and materials companies offers a demonstration of low-impact renovations and energy- and water-efficient appliances. The City recently welcomed its first Gold-rated building under the Leadership in Energy and Environmental Design (LEED) New Construction green building rating system, the Oyster Point Marina Plaza, a two-building, five-story office complex situated on the San Francisco Bay. The City is also coordinating with the San Francisco International Airport on the Aircraft Noise Insulation Program (ANIP), a program to insulate homes near the airport against noise, which is expected to have the side

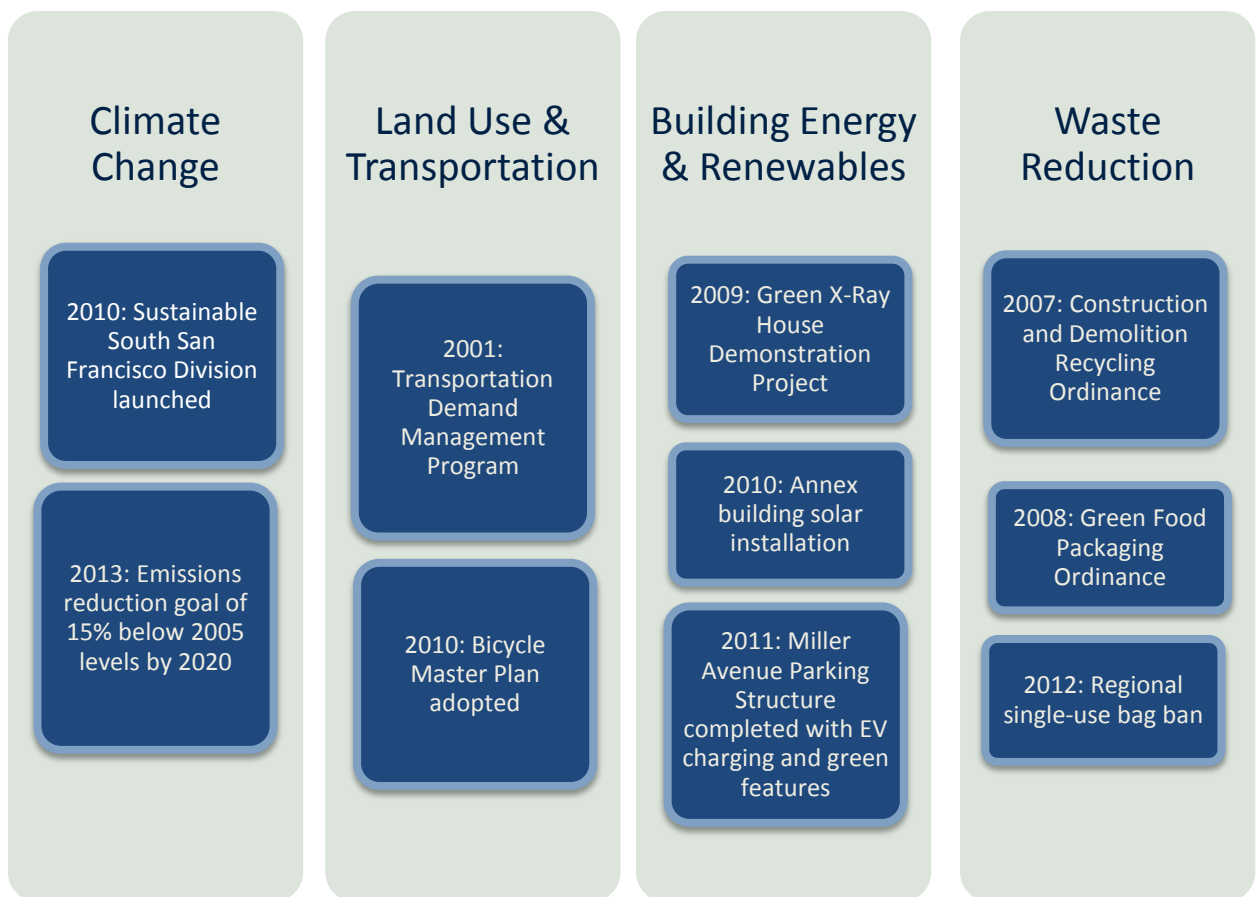
INTRODUCTION

benefit of increasing the energy efficiency of the retrofitted homes by up to 30%. Approximately 250 homes have been retrofitted since 2005, with another 500 set to receive retrofits in the future.

Sixty solar photovoltaic (PV) installations have been permitted in the city, including on a number of municipal buildings. The solar panels on the City Hall Annex alone are helping the City save \$12,000 in annual energy costs. Changes to light fixtures and a variety of other cost-saving measures resulted in an \$80,000 rebate from Pacific Gas and Electric (PG&E). Since 1992, the City has operated a 400 kW cogeneration engine system at the South San Francisco/San Bruno Water Quality Control Plant, a City-owned and operated plant that serves the communities of South San Francisco, San Bruno, and Colma. The cogeneration system produces approximately a third of the electrical demand of the plant. In addition, the South San Francisco Unified School District has the largest K–12 school solar and energy efficiency program in San Mateo County.

Other sustainable projects carried out by the City include revitalizing downtown and reducing waste through a construction and demolition recycling ordinance, a green food packaging ordinance which includes a ban on Styrofoam, and an ordinance banning single-use plastic bags, as shown in **Figure 4**.

Figure 4: Timeline of South San Francisco Sustainability Efforts



CHAPTER 1

PUBLIC PARTICIPATION AND THE PLANNING PROCESS

The City of South San Francisco engaged community members in CAP development through an ongoing public outreach campaign. Community feedback helped to provide community education and identify community priorities and interests. While the public outreach process does not necessarily provide input representative of the entire community of South San Francisco, outreach events nonetheless provided key opportunities to engage the community in CAP development. Outreach efforts included four community workshops, convening of a Technical Advisory Committee, input from the Bicycle and Pedestrian Advisory Committee (BPAC) and Planning Commission, development of a project website, interagency coordination, and conversations with local and regional partners.

The ongoing outreach provided direction for the CAP and helped to confirm community perceptions and interests. Using this input, City staff and the consultant team were able to prepare a document that reflects the diverse characteristics of residents, local businesses, employees, City staff, and key stakeholders. One theme identified through the outreach process includes the community's expectations of City staff leadership in ongoing education and outreach to achieve climate action objectives.

CAP ADVISORY GROUPS

Two advisory committees participated in the development of the CAP and Pedestrian Master Plan: the Bicycle and Pedestrian Advisory Committee and the Technical Advisory Committee. These groups provided initial guidance, confirmed recommendations, and reviewed draft documents. Each committee provided a unique perspective for the CAP.

- The Bicycle and Pedestrian Advisory Committee (BPAC) is an existing City committee, consisting of seven members appointed by the City Council. The BPAC works with City staff to provide guidance on bicycle and pedestrian improvements, identify capital improvement projects, receive input, promote educational awareness, and review and recommend grant applications. BPAC members provided input on the CAP at committee hearings on April 4, 2012, and October 4, 2012.
- The Technical Advisory Committee (TAC) is an ad hoc group of City staff members that supported the development of the CAP. The TAC played a key role in recommending, reviewing, and refining reduction strategies for the Climate Action Plan.

INTRODUCTION

PUBLIC WORKSHOPS

Workshop 1: March 10, 2012, Community Open House, Municipal Services Building, South San Francisco

The first of three community workshops was held Saturday, March 10, 2012, from 10:00 a.m. to 2:00 p.m. for the public to learn more about and provide input on the City of South San Francisco's CAP and Pedestrian Master Plan. This first workshop took place at the meeting room in the Municipal Services Building located at 33 Arroyo Drive in South San Francisco. Approximately 20 people participated in the open house.

The community members and interested stakeholders were given an opportunity to provide input on how to improve pedestrian access and safety and ways to conserve energy resources. As an open house event, participants could drop in throughout the day. Posters and displays allowed participants to take part in big-picture visioning activities and policy ideas. Large-scale aerial maps allowed people to creatively identify pedestrian issues, opportunities, and constraints at specific locations throughout the community. Participants also provided input through a 35-question multiple-choice survey.

Workshop 2: May 6, 2012, Streets Alive! Parks Alive! at Orange Memorial Park

The second workshop was held Saturday, May 6, 2012, from 10:00 a.m. to 1:00 p.m. for the public to learn more about and provide input on the City's CAP and Pedestrian Master Plan (PMP). This second workshop took place during the Streets Alive! Parks Alive! event at Orange Memorial Park located at the southwest corner of Orange Avenue and Tennis Drive. Streets Alive! Parks Alive! is an initiative hosted by cities in San Mateo County, which began in 2010 to emphasize the importance of parks and open spaces in fostering healthy activities and improving the overall quality of life. Many cities have opened streets and highlighted public places such as parks, plazas, and trails as a way to promote fitness and mobility. The City held the May 6 event to coincide with World Health Day.

The CAP/PMP outreach team engaged 115 individuals who completed surveys and provided feedback on the proposed greenhouse gas (GHG) reduction measures. Many survey respondents have already completed energy efficiency improvements at their homes or businesses and showed interest in additional energy-conserving behaviors.

Input from participants at Workshop 1 indicates that residents may be willing to implement additional energy efficiency retrofits, building on basic activities and improvements that have already been undertaken

**Based on 18 completed surveys*



Community members provide visioning direction for the City's CAP at the March 10 workshop.

CHAPTER 1

Workshop 3: May 2, 2013, Planning Commission and Open House

The third workshop was an open house event held in conjunction with a Planning Commission meeting on Thursday, May 2, 2013, at 6:30 p.m. This event focused on the proposed reduction measures, presenting examples of key items along with their anticipated GHG reductions, levels of participation, and co-benefits to the community. Participants were invited to give feedback on these measures, including the appropriate balance between encouraged and required actions. This event also included an update on the progress of the CAP and the strategy for implementing it.

Workshop 4: July 17, 2013, Business Community Workshop

The fourth outreach event was a stakeholder event for South San Francisco's business community on July 17, 2013, with representatives from some of South San Francisco's largest employers attending. This event focused on the CAP's applicability to businesses, including its impact on future commercial and industrial development. Business representatives were invited to give feedback on several proposed reduction measures, helping to identify ways the City could achieve its GHG reduction goals and assist businesses to become more environmentally responsible while simultaneously helping to promote economic growth in South San Francisco.



A family completes a CAP survey at the May 6, 2013, Streets Alive! Parks Alive! event.

At the City's Streets Alive! Parks Alive! event on May 6, 2012, 115 respondents gave input on the CAP.

A majority of respondents surveyed had already:

- Sealed air and duct leaks (53%)
- Upgraded to more highly insulating heat-reflective windows (42%)
- Installed motion-sensor lighting to light areas only when in use (41%)

Respondents were willing to try the following measures in their home or office:

- Generate or capture energy at home for electricity, water heating, etc. (43%)
- Use cool roofs or heat-reflective paints to reduce building heat (42%)

INTRODUCTION

ROLE OF THE CLIMATE ACTION PLAN

The CAP is meant to be used in coordination with, and be incorporated into, other planning efforts for the City. GHG benefits will be realized from updates to the General Plan, Specific Plans, and the Zoning Code, as well as from the new Pedestrian and Bicycle master plans. The CAP will build upon and incorporate these related City efforts. It will provide the framework connecting the range of planning efforts already under way in South San Francisco and translate them into numeric estimates of overall GHG reduction potential across different emissions sectors.

RELATIONSHIP TO THE GENERAL PLAN AND ZONING CODE

Numerous policies already in the updated South San Francisco General Plan will help reduce greenhouse gas emissions. The General Plan identifies vehicle trip and emissions reductions, energy efficiency, waste reductions, and compact commercial and residential growth as priorities for the city. The City recently amended multiple sections of the General Plan throughout 2010 and 2011, including the Land Use, Transportation, Housing, and Parks elements, as well as various Sub-Area Plans. The General Plan attempts to balance regional growth objectives with conservation of residential and industrial neighborhoods. Development is targeted in centers and corridors to fulfill the City's objectives of enhancing quality of life and economic vitality, to ensure that established areas are not unduly impacted, and to support the regional investments in transit represented by the extension of BART to the city.

Several General Plan policies are designed to encourage development that reduces vehicle miles traveled, through shorter trips, and walkable and bikeable amenities. They include:

- **Neighborhood-Oriented Development** – Land uses are designated to ensure balanced neighborhood development with a mix of uses and provision of parks, stores, and offices in neighborhoods that presently lack them. The General Plan also includes detailed policies for each of the city's neighborhoods. Neighborhood-oriented developments can help reduce vehicle trips by allowing residents to meet all their basic needs through short walking or biking trips nearby.
- **Economic Development and Diversification** – Articulates the City's leadership role. The General Plan also designates a new live/work district adjacent to downtown. Live/work developments encourage less use of single-occupant vehicles and can result in lower vehicle miles traveled within the city.
- **Land Use/Transportation Correlation and Promotion of Transit** – Land uses, mixes, and development intensities in the General Plan have been designed to capitalize on major regional transit improvements under way and to promote alternative forms of transit. High-intensity, mixed-use districts are proposed near BART stations, and incentives are offered for specific transit-oriented amenities.
- **Performance-Based Standards for Services to Ensure Sustainability** – The General Plan includes standards for capital facilities and public services, such as streets.

CHAPTER 1

Based on these General Plan updates, the City amended the Zoning Code in 2011, including key amendments for the El Camino Real corridor. The El Camino Real corridor also includes land zoned for mixed-use high intensity and high density, where most of South San Francisco’s future development is expected to occur. Together, the Zoning Code revisions and General Plan updates represent important efforts the City has taken to reduce GHG emissions since the baseline year of 2005. These efforts are further credited toward the City’s reduction target **in Chapter 4**.

RELATIONSHIP TO TRANSPORTATION PLANNING EFFORTS

In addition to General Plan and Zoning Code updates, the City of San Francisco is working to improve walkability and bikeability, through the development of a Traffic Calming Plan, Bicycle Master Plan, and Pedestrian Master Plan.

Completed in 2011, the South San Francisco Bicycle Master Plan sets forth a comprehensive and integrated system of bikeways intended to provide safer, more direct bicycle routes through residential neighborhoods, to employment and shopping areas, and to transit stops. The Pedestrian Master Plan (PMP) is a similar community-wide plan for providing a network of sidewalks and paths to facilitate increased walking to local destinations. The plan includes an inventory and assessment of current pedestrian facilities and a gap analysis, identifies and prioritizes needed improvements, and provides goals moving forward. While the primary purpose of the PMP is to improve the safety and comfort of pedestrians in South San Francisco, it does serve to support GHG reduction efforts. A number of potential strategies in the PMP, including improving walkability in new developments and promoting “complete streets,” would help to reduce GHG emissions. The PMP identifies the specific programs and other actions to implement the policies put forward in the General Plan and in this CAP. These planning actions are separate from the Climate Action Plan but contain related components of the City’s sustainability strategy, especially in relation to programmatic actions to address transportation emissions. All such actions are addressed and, to the extent possible, quantified in the CAP. Refer to **Chapter 4** for further discussion of these efforts.

INTRODUCTION

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CHAPTER 2
SCIENTIFIC AND REGULATORY
FRAMEWORK

CHAPTER 2

In order to make informed, meaningful, and effective decisions about greenhouse gas (GHG) reductions, it is important to understand the scientific background and regulatory framework supporting this Climate Action Plan (CAP or Plan). This chapter provides a brief summary of climate change and its implications, as well as an overview of the federal, state, regional, and local regulations that guided and informed the development of this CAP.

CLIMATE CHANGE OVERVIEW

When sunlight strikes the earth, a portion of the energy is absorbed and reflected back as heat. A layer of GHGs in the atmosphere, including carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O), reflect this heat back toward the earth, preventing the heat from escaping into space and helping to maintain the planet's temperature. This process, known as the greenhouse effect, occurs naturally and is necessary for life on earth. However, scientific consensus states that human activities are rapidly increasing the concentrations of GHGs in the atmosphere, resulting in a warming of the planet and altering the earth's climate systems.

CLIMATE CHANGE IMPACTS

Global Impacts

The Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC), released in 2007, is the largest summary of the science of climate change and its impacts. If trends remain unchanged, the AR4 projects that the warming of the earth and the resulting changes to the planet's climate will accelerate, with significant consequences for the world's population and ecosystems (IPCC 2007). For a more detailed explanation of the global impacts of climate change, see **Appendix A**.

California Impacts

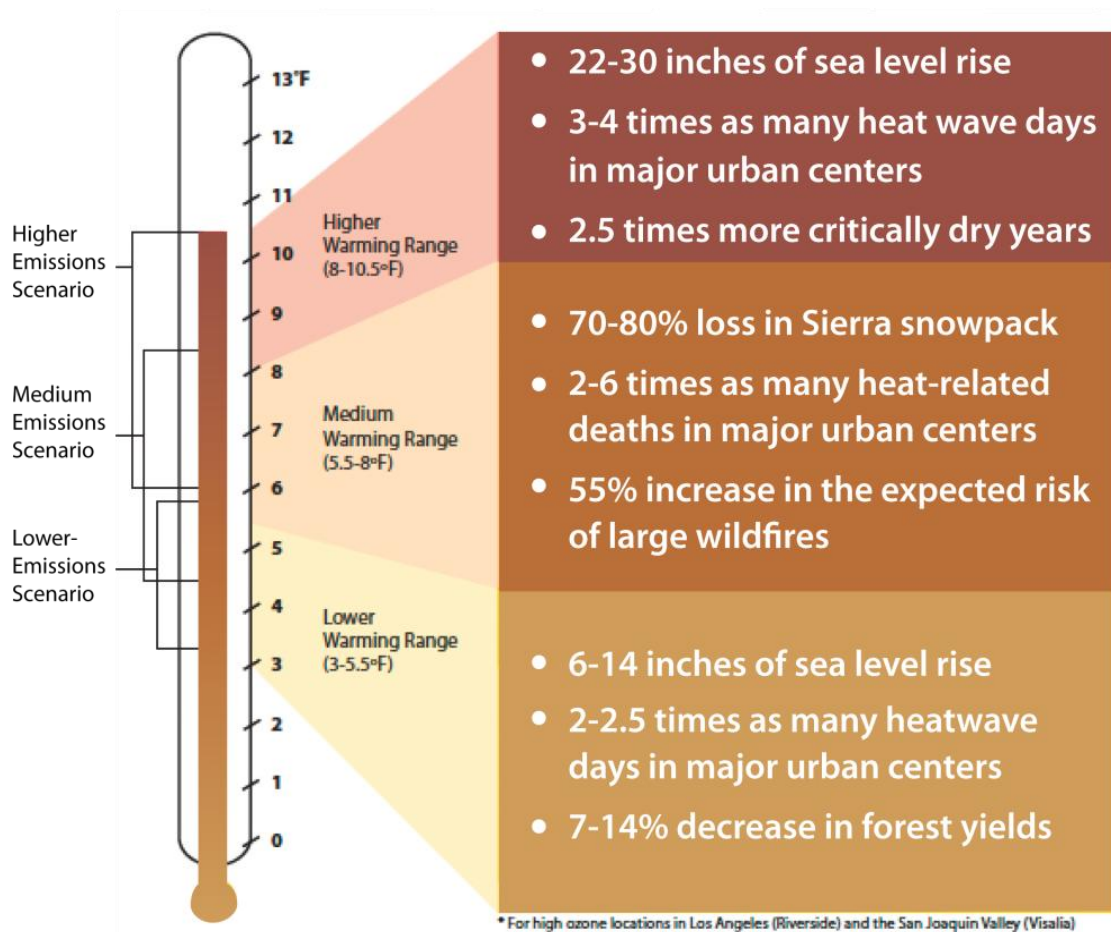
Climate change is projected to cause generally hotter and drier conditions in California, resulting in more extreme heat events, an increased risk of drought, more intense weather events, flooding of low-level coastal areas as a result of sea level rise, and less available water due to a decrease in snowfall. The combined impacts of these risks pose a significant threat to the economic and natural systems of the state. It is estimated that not taking substantial action to address climate change will cause direct economic losses of tens of billions of dollars annually and put trillions of dollars of assets at risk (California Natural Resources Agency 2009).

SCIENTIFIC AND REGULATORY FRAMEWORK

SOUTH SAN FRANCISCO IMPACTS

Because of the diversity of California's natural and built environments, the specific impacts of climate change will vary from place to place. This section discusses the most relevant impacts to South San Francisco, including extreme heat, sea level rise, and reduced water supply. Several key climate change impacts are presented below in **Figure 5**.

Figure 5: Climate Change Impacts in California, 2070–2099



Source: California Energy Commission 2006

More Extreme Heat

Climate change is expected to increase the frequency of extreme heat events, including in South San Francisco. Heat waves can have significant direct impacts to human health; a 2006 event in California killed 140 people and may have been indirectly responsible for over 600 additional deaths afterward.

CHAPTER 2

Although heat events usually occur in warmer, inland parts of California, coastal areas are expected to see a greater increase in the number of heat waves because the temperature threshold for such events is lower. Because many in the coastal areas of the San Francisco Bay Area have only limited experience with extreme heat, the potential risk is greater, particularly among already vulnerable populations such as infants and the elderly.

In addition to the direct consequences, extreme heat also contributes to deteriorating air quality. Rising temperatures increase the concentration of ground-level ozone, along with a number of other harmful airborne particles. Other effects of climate change, such as increased electricity demand and a decrease in water availability, are exacerbated by extreme heat events.

Greater Storm Frequency and Severity

While precipitation levels are expected to change the most in Southern California, South San Francisco and other communities around the San Francisco Bay will likely be affected as well. The greatest change is to “atmospheric river” storms: a successive series of large weather events that are associated with flooding and California’s most intense precipitation. Atmospheric river storms are expected to occur more frequently as a result of climate change; additionally, the individual storms are projected to be up to 11% more intense. Precipitation levels in the spring are expected to decrease.

Sea Level Rise

The sea level in the San Francisco Bay Area is expected to rise 11 to 19 inches compared to 2000 levels by 2050, and 30 to 55 inches by 2100. While much of California’s coastal areas are at risk of sea level rise, South San Francisco and other communities around the San Francisco Bay are particularly at risk. Currently in San Mateo County, an estimated \$16 billion of property on the Bay is currently at risk of a 100-year flood. A 55-inch rise in sea levels would put an additional \$7 billion of property at risk; even a 20-inch increase would threaten another \$2 billion in property.

Flooding

The increase in storm intensity, combined with rising sea levels, is expected to increase the risk of flooding in South San Francisco and around the San Francisco Bay. Currently in South San Francisco, the 100-year flood zone (the area where there is a 1% chance of a flood level being exceeded in any given year) is confined mostly to the area around Colma Creek. It is projected that by 2100, 100-year floods in the San Francisco Bay Area will be occurring annually. In addition to the human health risk and damage to private property, flooding may also disrupt important infrastructure in South San Francisco, including railways, road networks, and water and sewage infrastructure such as the South San Francisco/San Bruno Water Quality Control Plant.

Water Supply

Most of South San Francisco’s water is purchased from the San Francisco Public Utilities Commission, which gets its water largely from reservoirs in the Sierra Nevada. Warmer temperatures are expected to result in less snow in the Sierra Nevada, and snow that does fall will likely melt faster, decreasing the amount of available water during the dry season. By 2050, it is estimated that the Sierra snowpack will

SCIENTIFIC AND REGULATORY FRAMEWORK

be 25% to 40% smaller than the current average. Lower water levels may also decrease the power output of hydroelectric power plants.

Natural Resources

Changing temperatures are expected to cause a shift in the ecosystems in and around South San Francisco, as members of a species move to new areas to stay within their preferred climate zone. Species unable to move fast enough or adapt to a changed climate are likely to see their numbers decline. As a result, areas that are currently protected for conservation purposes may no longer be sufficient; it is estimated that by 2100, as little as 8% of the San Francisco Bay Area's existing conservation areas will still span the same climate range. Warmer temperatures may also increase the spread of invasive species and are partially linked to the decline of oak trees due to Sudden Oak Death.

LEGISLATIVE BACKGROUND AND REGULATORY FRAMEWORK

In 2006, California established itself as a national leader on climate change with the adoption of the California Global Warming Solutions Act, also known as Assembly Bill 32 (AB 32), which sets statewide targets for GHG emissions reductions. AB 32 is the key piece of legislation supporting this CAP, although there are a number of federal, state, and local influences. This section discusses the existing legislative framework guiding the development and implementation of the Climate Action Plan. See **Appendix A** for additional information on this topic.

FEDERAL FRAMEWORK

At the moment, there is no comprehensive GHG reduction program at the federal level. However, various federal agencies have been using existing regulations and programs to support state and local governments, residents, and businesses in reducing their GHG emissions and plan for climate change. The federal government also supplies a number of educational resources and analytical tools to support GHG analysis and climate action planning.

American Reinvestment and Recovery Act – Energy Efficiency and Conservation Block Grants

The American Reinvestment and Recovery Act (ARRA) supports GHG reduction activities as part of the Energy Efficiency and Conservation Block Grant (EECBG) funding. This program, managed by the US Department of Energy, has provided about \$3.2 billion to cities and counties across the country for energy efficiency and fossil fuel use reductions in buildings and vehicles, reducing GHG emissions in the process.

Clean Air Act

In 2011, the Environmental Protection Agency (EPA) proposed a set of regulations to reduce GHG emissions from stationary sources under the New Source Performance Standards of the Clean Air Act,

CHAPTER 2

which are expected to be finalized in 2013. Stationary sources are fixed-site sources of pollution, such as power plants, manufacturing facilities, and other industrial sites.

CALIFORNIA FRAMEWORK

There have been a number of California laws and other actions to address GHG emissions at the state and local levels. This section discusses three of the primary actions: Executive Order S-3-05, AB 32, and Senate Bill (SB) 375.

Executive Order S-3-05

Signed in 2005, Executive Order S-3-05 established a series of GHG emissions reduction targets for California. It calls for a reduction of emissions to year 2000 levels by 2010, a reduction to 1990 levels by 2020, and a reduction of 80% below 1990 levels by 2050.

California Global Warming Solutions Act (AB 32)

AB 32, officially known as the California Global Warming Solutions Act of 2006, requires the California Air Resources Board (CARB) to develop the regulatory and market-based mechanisms that will reduce statewide GHG emissions to 1990 levels by 2020. AB 32 contains a number of specific requirements, including:

- Establishing a scoping plan that establishes the most technically feasible and cost-effective ways to reduce GHG emissions. The plan covers a variety of activity areas, including transportation, buildings and energy use, waste, and water use. The scoping plan identifies local governments as strategic partners to achieve the state goal, translating the reduction goal to 15% below baseline emissions by 2020. Additionally, the scoping plan calls for the creation of a cap-and-trade program for California's largest emitters, enforceable beginning in 2013.
- Requiring the largest industrial sources of emissions in California to report and verify their GHG emissions annually.
- Requiring CARB to identify and adopt early actions that could begin to reduce GHG emissions by 2010. These actions cover subjects such as refrigerants in cars, landfills, and increased use of electric equipment at shipping ports.

Sustainable Communities and Climate Protection Act (SB 375)

SB 375 establishes a nexus between transportation funding and land use planning to reduce GHG emissions. It requires the metropolitan planning organizations such as the Association of Bay Area Governments (ABAG) to create Sustainable Communities Strategies (SCS) in their regional transportation plans. Each SCS is required to show how the region will meet CARB's greenhouse gas reduction targets through land use, transportation, and housing planning.

In addition to these three efforts, California has passed further legislation to address climate change through a number of other issues, including water, solid waste, and energy use. A summary of the State's recent efforts by topic is shown in **Appendix A**.

SCIENTIFIC AND REGULATORY FRAMEWORK

Cap and Trade

Cap and trade is a market-based approach to reduce GHG emissions, identified by the AB 32 scoping plan as a way to achieve California's desired reductions, which enables industrial emitters to reduce overall emissions and invest in cleaner fuels and energy efficiency. Under a cap-and-trade program, a regulatory agency sets an enforceable limit on the amount of emissions that can be produced by large industrial emitters, known as a "cap," which will be gradually reduced over time. Each emitter will receive permits for the amount of emissions allowable under their cap. Emitters that do not use all their permits can auction them off to other emitters, who can use the additional permits to exceed their cap.

California's cap-and-trade program has been designed by CARB in conjunction with stakeholders over several years. Beginning in 2013, CARB will set a cap on large industrial emitters of 2% below their 2012 GHG emissions levels. CARB will also collect revenue from the permit auctions, estimated to generate about \$1 billion for the state in the 2012–2013 auction, and possibly up to \$10 billion annually by 2020. One emitter in South San Francisco, the Genentech campus, will be participating in the cap-and-trade program.

Several pieces of legislation seek to guide revenue from the cap-and-trade program toward programs to reduce pollution in disproportionately impacted communities. One such example is the California Global Solutions Act of 2006 Greenhouse Gas Reduction Fund (AB 1532), which requires administering agencies to allocate funds from the cap-and-trade program to measures that meet specific criteria and are to be implemented in specific areas, including:

- Areas in close proximity to sources that produce toxic levels of air pollution, and other hazards that can lead to negative public health effects.
- Areas that contain or produce materials posing a significant hazard to human health and safety.
- Areas with an elevated concentration of people who experience low income, high unemployment, low levels of homeownership, high costs of rent, and other socioeconomic challenges.

AB 1532 also requires that the California Environmental Protection Agency (CalEPA) develop a method for identifying priority communities for cap-and-trade revenue investment opportunities based on a variety of factors, including geographic, environmental, and socioeconomic conditions. An additional measure, SB 535, builds off of AB 1532 by requiring 10% of revenue from the cap-and-trade program to be allocated for projects located within disadvantaged communities, and 25% for projects that benefit disadvantaged communities, to reduce pollution levels and develop clean energy.

REGIONAL PARTNERSHIPS

The City of South San Francisco is actively involved in regional energy and sustainability planning. This commitment to regional partnerships helps maximize the efforts of municipal, county, regional, nonprofit, and public utility entities. The following efforts provided a foundation for the development of the Climate Action Plan and offer opportunities for future dialogue.

CHAPTER 2

SAN MATEO COUNTY ENERGY STRATEGY 2012

Created by the County of San Mateo Utilities and Sustainability Task Force, with support from the County of San Mateo, the City/County Association of Governments of San Mateo County (C/CAG), and the Bay Area Air Quality Management District (BAAQMD), the San Mateo County Energy Strategy 2012 is a guidance document that identifies general energy reduction strategies appropriate for San Mateo County, regional organizations, and municipalities. While most goals, strategies, and actions focus on reducing municipal energy use, several actions aim to reduce community energy use, including:

- Reduce or eliminate permitting fees for the investment of clean energy systems
- Adopt green building standards and ordinances
- Provide financial incentives and rebates for water-conserving products
- Update general plans and municipal codes to include water conservation policies
- Consider incentives for businesses to achieve Green Business Certification

After releasing the document, C/CAG provided additional educational materials to cities and the County and provided incentives to promote the completion of government operation inventories for cities in the county.

SAN MATEO COUNTY ENERGY WATCH

San Mateo County Energy Watch is a partnership between C/CAG and Pacific Gas and Electric (PG&E). The program's goal is to reduce energy usage through energy efficiency in San Mateo County cities and unincorporated areas. San Mateo County Energy Watch provides energy efficiency services to public agencies, nonprofits, small businesses, and residential customers. These program elements include:

- A direct-install program for lighting and refrigeration measures for public agencies, nonprofits, and small businesses
- Comprehensive audits for public agencies and nonprofits
- Technical assistance for more complex energy efficiency projects for public agencies and nonprofits through PG&E's Customized Retrofit Incentives program
- A direct-install program for lighting and weatherization measures for moderately low-income residents
- Climate action program assistance for cities and the County
- Energy efficiency training and education workshops and classes

As part of the Energy Watch program, PG&E and the BAAQMD have provided support to C/CAG to develop the Regionally Integrated Climate Action Planning Suite (RICAPS). The County provides standardized tool kits for cities and towns in San Mateo County to create climate action plans. Tool kits

SCIENTIFIC AND REGULATORY FRAMEWORK

include inventory tools, suggestions for quantified reduction measures, and climate action plan language. C/CAG and the County have been actively engaged in the development of these tools.

REGIONALLY INTEGRATED CLIMATE ACTION PLANNING SUITE (RICAPS)

South San Francisco has participated in the development of the Regionally Integrated Climate Action Planning Suite project, the RICAPS. C/CAG has led this project to provide a climate action planning template for local governments in San Mateo County. Funded by grants from the BAAQMD and PG&E, RICAPS tools will help participating jurisdictions to assess GHGs and meet the BAAQMD's California Environmental Quality Act (CEQA) Guidelines for a Qualified Greenhouse Gas Reduction Strategy. RICAPS provides standardized tool kits for creation of local, streamlined climate action plans. The City has actively participated in the development of these tools.

Tools developed through the RICAPS effort include a template of proposed GHG reduction measures with calculations, a forecast and reduction target workbook, and an online calculation tool to track progress over time, the Hara ESS Tool. These tools were developed with the input of participating local governments.

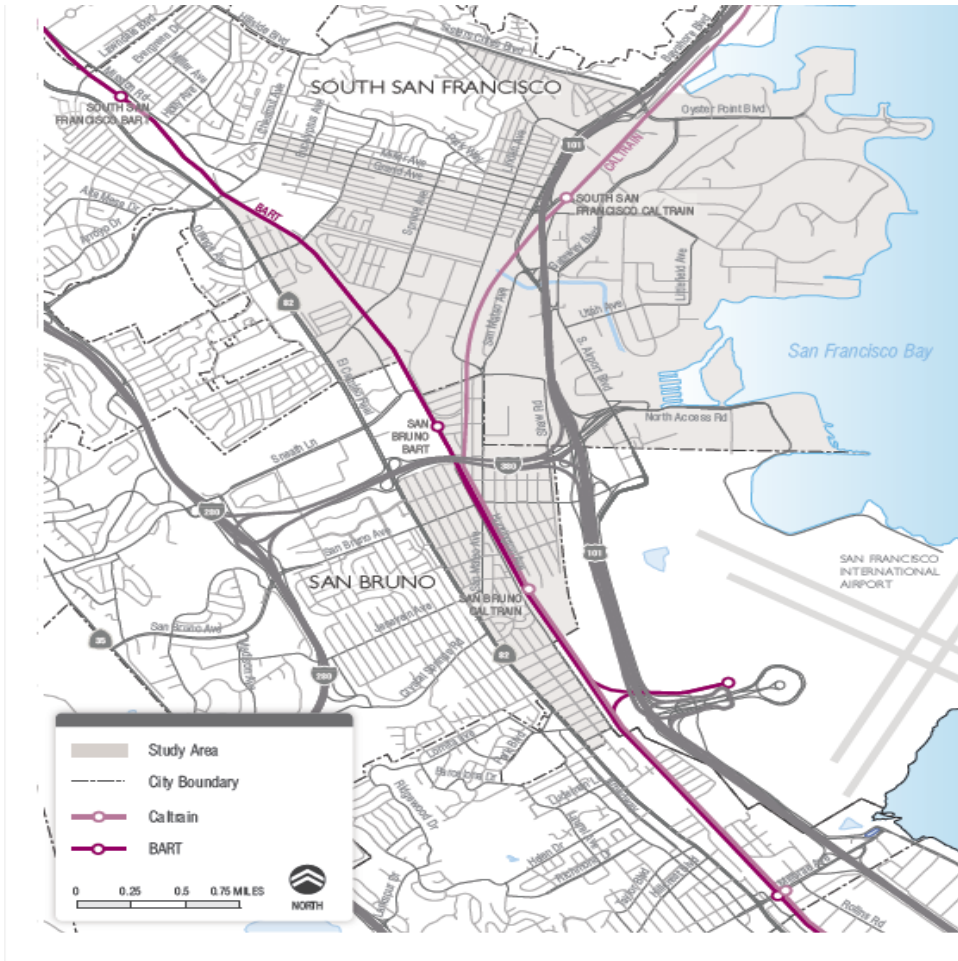
While the City participates in the RICAPS effort, South San Francisco has also developed an independent, customized Climate Action Plan for the community. With receipt of a highly competitive state grant, the City has been able to benefit from the RICAPS effort while developing effective GHG strategies tailored to the community. It is anticipated that the City may use the online Hara ESS Tool to support regional GHG tracking and monitoring.

SAN BRUNO/SOUTH SAN FRANCISCO COMMUNITY-BASED TRANSPORTATION PLAN (CBTP)

Completed in early 2012, the CBTP looks at the transportation needs of the community and recommends steps to address these needs. The project is part of the Metropolitan Transportation Commission's Community-Based Planning Program in collaboration with C/CAG, SamTrans, and the San Mateo County Human Services Agency. The CBTP provides a framework for transportation providers and various agencies to work together to better understand the transportation needs of low-income populations. Key strategies in the plan include improving transit stops and amenities, improving transit affordability, and improving access and connectivity to transit stops. Targeting the eastern portion of South San Francisco, the CBTP also informs broader community-wide strategies. The CBTP focuses on the area east of El Camino Real and Chestnut Avenue, south of Miller and Maple avenues, north of San Juan Avenue, and extending to the San Francisco Bay (see **Figure 6**).

CHAPTER 2

Figure 6: South San Francisco: Community-Based Transportation Plan Study Area



Source: C/CAG 2012

BART SERVICE BLUEPRINT

Facing a significant jump in expected ridership by 2025, the Bay Area Rapid Transit District (BART) has been working with South San Francisco and all populations it serves to accommodate new demand. In 2012, BART increased service on its Richmond-Millbrae line and released a draft study titled BART Metro: Sustainability Communities Operational Analysis. The study aims to identify necessary service and operational improvements, as well as capital programs BART needs to implement in order to prepare for the 560,000 daily riders the Metropolitan Transportation Commission predicts BART will need to carry by 2025.

SCIENTIFIC AND REGULATORY FRAMEWORK

ONE BAY AREA

One Bay Area is a joint initiative and experiment in good governance by the San Francisco Bay Area's four regional government agencies—ABAG, the BAAQMD, the San Francisco Bay Conservation and Development Commission (BCDC), and the Metropolitan Transportation Commission (MTC). One Bay Area has published several guiding documents for development in the region, including the region's Sustainable Communities Strategy (SCS), which identifies housing opportunities, a conservation strategy, emissions performance measures, and other sustainability measures to meet regional needs by 2040. One Bay Area is also responsible for developing the region's Complete Streets Policy, which aims to provide guidance to local jurisdictions on developing local complete street policies.

CEQA GUIDANCE FOR CAPS

CEQA GUIDELINE AMENDMENTS (SB 97)

SB 97, adopted in 2007, directs the Governor's Office of Planning and Research (OPR) to amend the guidelines for CEQA to address GHG emissions. The revised CEQA Guidelines were adopted in December 2009 and went into effect March 18, 2010. If the adopted CAP includes a certified environmental impact report (EIR) or other environmental document, local governments may use the CAP in a manner consistent with the CEQA Guidelines to assess the cumulative impacts of proposed projects on climate change. In order to use a CAP for this purpose, the CAP must accomplish the following:

- Quantify GHG emissions, both existing and projected over a specific time period, attributable to activities within a defined geographic area.
- Identify and analyze the GHG emissions from specific actions or categories of actions anticipated within the plan area.
- Establish a level, based on substantive evidence, below which the contribution to GHG emissions from activities covered by the CAP would not be cumulatively considerable.
- Identify 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 CAP's progress toward achieving the specific level and to require an amendment if the plan is not achieving the GHG emissions reduction goals.
- Be adopted in a public process following environmental review.

CHAPTER 2

BAAQMD GUIDANCE AND CEQA TIERING

In response to the updated CEQA Guidelines, the BAAQMD in 2010 updated its Air Quality Guidelines to include guidance on assessing GHG and climate change-related impacts as required under CEQA Section 15183.5(b). The BAAQMD also adopted thresholds of significance for GHG emissions. These thresholds can be used to determine that a proposed project's impact on GHG emissions is less than significant if the project is in compliance with a Qualified Greenhouse Gas Reduction Strategy.

This CAP follows both the state and BAAQMD CEQA guidelines by incorporating the standard elements of a Qualified GHG Reduction Strategy. As a Qualified GHG Reduction Strategy, the City can use the CAP as a tool for determining project CEQA compliance, streamlining development review.

SCIENTIFIC AND REGULATORY FRAMEWORK

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CHAPTER 3
GREENHOUSE GAS EMISSIONS
INVENTORY

CHAPTER 3

A greenhouse gas emissions inventory (Inventory) lays the groundwork for the entire Climate Action Plan (CAP) planning process. This Inventory catalogues greenhouse gas emissions for 2005 and then projects emissions levels for 2020 and 2035. In order to comply with state guidance, the CAP identifies emissions reduction targets for 2020. The difference between the emissions projection and the reduction target is the amount of greenhouse gas emissions that need to be reduced.

INVENTORY – BACKGROUND AND APPROACH

The Inventory is the foundation of South San Francisco’s CAP by informing the local government and the community of South San Francisco’s greenhouse gas (GHG) emissions sources, and therefore the primary opportunities for GHG reductions. The Inventory presents community-wide emissions caused by activities occurring within the political boundary of South San Francisco and provides a baseline against which future progress can be measured.

The Inventory presents GHGs from community-wide activities in the calendar year 2005. It forecasts how community-wide emissions will change by 2020 and 2035, both if no behavioral or regulatory changes are made (known as a business-as-usual or BAU scenario) and to account for reduction efforts mandated by the State of California such as new vehicle standards and renewable energy requirements (known as the adjusted business-as-usual or ABAU scenario). Additionally, the Inventory provides City staff, decision-makers, and Technical Advisory Committee members with adequate information to direct the development of a CAP and establish additional emissions reduction targets.

The Inventory includes all major sources of GHGs caused by activities in the jurisdictional boundary of South San Francisco and is consistent with the methodology recommended by the California Air Resources Board (CARB), ICLEI-Local Governments for Sustainability, and the Bay Area Air Quality Management District (BAAQMD). The Inventory analyzes the following emissions sources:

- Energy – Electricity and natural gas used by residential and nonresidential buildings in South San Francisco.
- Transportation – Vehicle miles traveled (VMT) within and to/from the community by on-road vehicles, as well as trips to and from the South San Francisco BART and Caltrain commuter rail stations.
- Solid Waste – Methane emissions from the decomposition of waste sent to landfills from South San Francisco.
- Landfills – Direct emissions from the Oyster Point Landfill, which is no longer operational but continues to release methane emissions.
- Water and Wastewater – The amount of energy required to extract, filter, move, and treat all water used by, as well as the wastewater produced in, South San Francisco. This sector also includes direct methane emissions caused by the treatment of South San Francisco’s wastewater at the South San Francisco/San Bruno Water Quality Control Plant located within the community.

GREENHOUSE GAS EMISSIONS INVENTORY

- Stationary Sources – Direct emissions from large, stationary, fixed emitters of GHGs permitted by the BAAQMD.
- Off-Road – Emissions from construction and lawn & garden equipment/vehicles.

The GHG emissions inventory starts with collecting activity data for each sector listed above, such as the kilowatt-hours (kWh) of electricity or therms of natural gas used for the residential, commercial, and industrial energy sectors, the vehicle miles traveled for the transportation sector, or million gallons (MG) of water used by the community in a single calendar year. These activities are converted into GHG emissions using an emissions factor or coefficient.

The Inventory measures three primary GHG emissions—carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). These greenhouse gases are then converted to carbon dioxide equivalents (CO₂e), enabling the City to consider different greenhouse gases in comparable terms. The conversion of greenhouse gases is done by comparing the global warming potential (GWP) of each gas to CO₂. For example, methane is 21 times more powerful than CO₂ on a per weight basis in its capacity to trap heat, and therefore one metric ton of CH₄ would be calculated as 21 metric tons of CO₂e.

2005 COMMUNITY-WIDE BASELINE INVENTORY RESULTS

The City of South San Francisco emitted 548,600 metric tons of carbon dioxide equivalent (MTCO₂e) in 2005, as depicted in **Table 3**. This table includes all sources of GHGs, including stationary sources, the Oyster Point Landfill, and the energy use at the headquarters of Genentech. In 2005, stationary sources were responsible for 35,580 MTCO₂e, energy use at Genentech headquarters resulted in 57,410 MTCO₂e, and the landfill contributed another 13,220 MTCO₂e. The City has very little direct control over these sources; stationary sources are regulated by the BAAQMD and CARB, the Oyster Point Landfill is already closed, and emissions resulting from Genentech will be regulated under California's cap-and-trade program. They are mentioned here as informational items only. For additional discussion of the informational items and further details about the inventory, refer to **Appendix B**.

CHAPTER 3

Table 3: 2005 Community-Wide Baseline Emissions by Sector

Sector	MTCO ₂ e	Percentage of Total
Energy	263,780	48%
Transportation	196,910	36%
Stationary Sources	35,580	6%
Off-Road	22,400	4%
Solid Waste	14,780	3%
Landfill	13,220	2%
Water and Wastewater	1,940	<1%
Total*	548,600	100%

*Due to rounding, the total may not equal the sum of the component parts.

For the purposes of the CAP, excluding informational items as mentioned above, the City of South San Francisco emitted approximately 442,400 MTCO₂e in 2005. **Table 4** and **Figure 7** report MTCO₂e by sector, rank of sector, and sector percentage of overall GHG emissions in the city. Energy use was the single largest source of emissions, responsible for 206,370 MTCO₂e, or about 47% of the community total. Emissions from transportation were the second-largest category, totaling 196,910 MTCO₂e, or about 45% of community-wide emissions. Off-road emissions were third (22,400 MTCO₂e, or 5%), emissions from solid waste came fourth (14,780 MTCO₂e, or 3% of the total), and emissions from water and wastewater were last (1,940 MTCO₂e, or less than 1%).

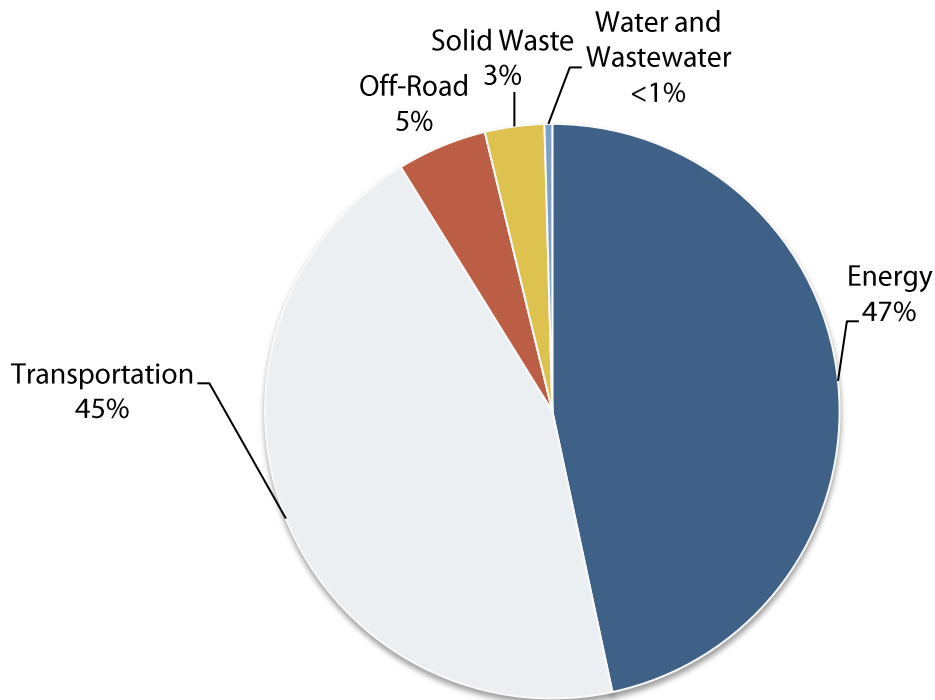
Table 4: 2005 Community-Wide Baseline Emissions, Excluding Informational Items

Sector	MTCO ₂ e	Percentage of Total
Energy	206,370	47%
Transportation	196,910	45%
Off-Road	22,400	5%
Solid Waste	14,780	3%
Water and Wastewater	1,940	<1%
Total*	442,400	100%

*Due to rounding, the total may not equal the sum of the component parts.

GREENHOUSE GAS EMISSIONS INVENTORY

Figure 7: 2005 Community-Wide Baseline Emissions, Excluding Informational Items



GHG EMISSIONS FORECAST – 2020 AND 2035

A GHG emissions forecast is an estimate of future GHG emissions for the community based on the anticipated changes in population, number of households, employment, driving behavior, and other activities. The forecast in this Inventory focuses on two target years: 2020 and 2035. 2020 is used because it is consistent with the targets for Assembly Bill (AB) 32. 2035 has been chosen for consistency with Senate Bill (SB) 375 (see **Chapter 2** for more information on these pieces of legislation).

BUSINESS-AS-USUAL GHG EMISSIONS

The business-as-usual (BAU) scenario assumes that there will be no influence on GHG emissions from local, state, or federal reduction efforts. Under the BAU scenario, figures such as the amount of energy used per job or the amount of trash generated per household remain constant; changes in the amount of emissions are largely the result of demographic changes as predicted by the Association of Bay Area Governments (ABAG). **Appendix B** and **Appendix C** provide additional information on forecast assumptions. As shown in **Table 5**, the BAU scenario anticipates that emissions will grow to 11% above baseline by 2020 and to 24% above baseline by 2035.

CHAPTER 3

Table 5: 2020 and 2035 BAU Emissions (MTCO₂e)

Sector	2005	2020	2035
Energy	206,370	226,990	255,820
Transportation	196,910	219,270	243,620
Off-Road	22,400	26,610	30,530
Solid Waste	14,780	16,310	18,190
Water and Wastewater	1,940	2,140	2,380
Total*	442,400	491,310	550,540
Percentage Increase from Baseline	–	11%	24%

*Due to rounding, the total may not equal the sum of the component parts.

ADJUSTED BUSINESS-AS-USUAL EMISSIONS

The adjusted business-as-usual (ABAU) forecast includes a number of reduction programs implemented by the State of California, as discussed below. The inclusion of these items is intended to present a more realistic estimate of South San Francisco’s future emissions. Additional information on these state actions is included in **Appendix B**. Relevant state actions assessed in the CAP include the following:

- **California’s Renewables Portfolio Standard (RPS):** One of the most ambitious renewable energy standards in the country, RPS mandates that 33% of electricity delivered in California be generated by renewable sources like solar, wind, and geothermal by 2020.
- **AB 1493 (Pavley) Vehicle Standards:** California’s Pavley regulations, established by AB 1493 in 2002, require new passenger vehicles to reduce tailpipe GHG emissions from 2009 to 2020.
- **Executive Order S-01-07, Low Carbon Fuel Standard:** Beyond including vehicle efficiency improvements through AB 1439, CARB developed a Low Carbon Fuel Standard (LCFS) to reduce the carbon intensity of transportation fuels. Under the BAAQMD’s guidance, the LCFS is likely to reduce emissions by at least 7.2%. There is a chance this regulation may be struck down as a result of a case pending in federal court.
- **Title 24, Energy Efficiency Standards:** Title 24 is a state standard, implemented at the local level by city and county agencies through project review, to increase energy efficiency in new buildings. The energy reductions quantified in the forecast are the mandatory improvements over the 2005 Title 24 code that were established by a 2008 update.

Table 6 shows the individual and cumulative impact of these state reduction efforts.

GREENHOUSE GAS EMISSIONS INVENTORY

Table 6: 2020 and 2035 ABAU Emissions (MTCO₂e)

	2005	2020	2035
BAU Emissions	442,400	491,310	550,540
RPS	–	-14,200	-22,880
Pavley and the LCFS	–	-53,580	-80,430
Title 24	–	-1,990	-1,280
Total State Reduction Efforts	–	-69,770	-104,590
ABAU Emissions*	442,400	421,540	445,950
Percentage Increase from Baseline	–	-5%	1%

** Due to rounding, the total may not equal the sum of the component parts.*

GHG REDUCTION TARGETS

South San Francisco has determined reduction targets for 2020. Achieving this reduction target is the goal of the CAP and a way of measuring its success. The community reduction target is 15% below baseline (2005) emissions by 2020. This is consistent with AB 32, which calls for a reduction of 15% below current (2005–2008) levels as the local government equivalent of 1990 GHG emissions levels. This state target also satisfies the BAAQMD’s California Environmental Quality Act (CEQA) compliance guidelines.

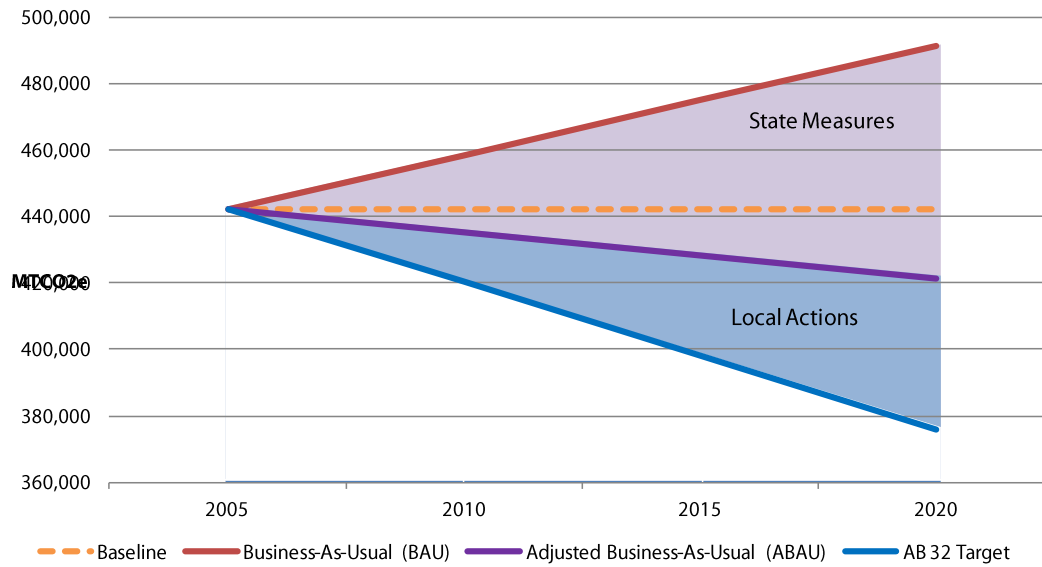
Table 7 and **Figure 8** show the comparison between 2020 emissions under the ABAU scenario and the 15% reduction target. The reduction target calls for emissions of 376,040 MTCO₂e by 2020, which would require a 45,500 MTCO₂e decrease below the projected 2020 emissions under the ABAU scenario.

Table 7: Gap Between ABAU Emissions and AB 32 Goal, 2020

	MTCO ₂ e
2005 Baseline	442,400
2020 BAU	491,310
2020 ABAU	421,540
2020 AB 32 Reduction Target	376,040
Local Reductions Needed from ABAU	45,500

CHAPTER 3

Figure 8: Comparison of Emissions Scenarios and Reduction Targets, 2005–2020 (MTCO₂e)



GREENHOUSE GAS EMISSIONS INVENTORY

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CHAPTER 4

GHG REDUCTION STRATEGY

CHAPTER 4

GHG REDUCTION SUMMARY

In order to achieve the state-recommended reduction target of 15% below 2005 emissions levels by 2020, the City of South San Francisco will implement the goals, policies, and actions set forth in this chapter. The reduction measures included in this Climate Action Plan (CAP or Plan) are a diverse mix of regulatory and incentive-based programs for both new and existing development that build off of existing policies and programs. The reduction measures also aim to reduce greenhouse gas (GHG) emissions from all sources to avoid reliance on any one strategy or sector to achieve the target.

There are two categories of reduction policies in this CAP: (1) existing activities and (2) CAP measures. Existing activities are projects and programs which will result in future GHG reductions and were enacted prior to the creation of this CAP in 2013 but after the 2005 baseline year. Such projects include municipal energy efficiency retrofits, the City’s Transportation Demand Management (TDM) program, and community-wide solar installations. CAP measures were created for this document through a collaborative planning process and will be implemented through new and existing programs.

In total, existing actions, state programs, and GHG reduction measures in this Plan are estimated to reduce GHG emissions in the City of South San Francisco in 2020 by 116,040 metric tons of carbon dioxide equivalent (MTCO_{2e}) by 2020 and by 191,540 MTCO_{2e} by 2035 (see **Table 8**), achieving the AB 32 target of a 15% emissions reduction below baseline 2005 levels by 2020. **Figure 9** compares projected emissions reductions from existing actions and CAP measures to the AB 32 reduction target and forecasts, the business-as-usual (BAU) and adjusted business-as-usual (ABAU) scenarios. **Figures 10 and 11** show the respective 2020 and 2035 GHG reductions by CAP measure topic.

Table 8: GHG Reduction Summary by Topic (MTCO_{2e})

Goal Topic	2020	2035
State Reduction Efforts	-69,770	-104,590
Existing Local Programs	-10,090	-13,020
Alternative Transportation	-4,470	-4,380
Land Use and Parking	-2,660	-2,600
Alternative-Fuel Vehicles	-2,770	-6,530
Off-Road Vehicles and Equipment	-2,670	-5,880
Energy Efficiency and Conservation	-11,810	-30,100
Renewable Energy	-5,100	-11,760
Waste Minimization	-6,720	-10,950
Water and Wastewater	-250	-530
Municipal Operations ¹	-	-

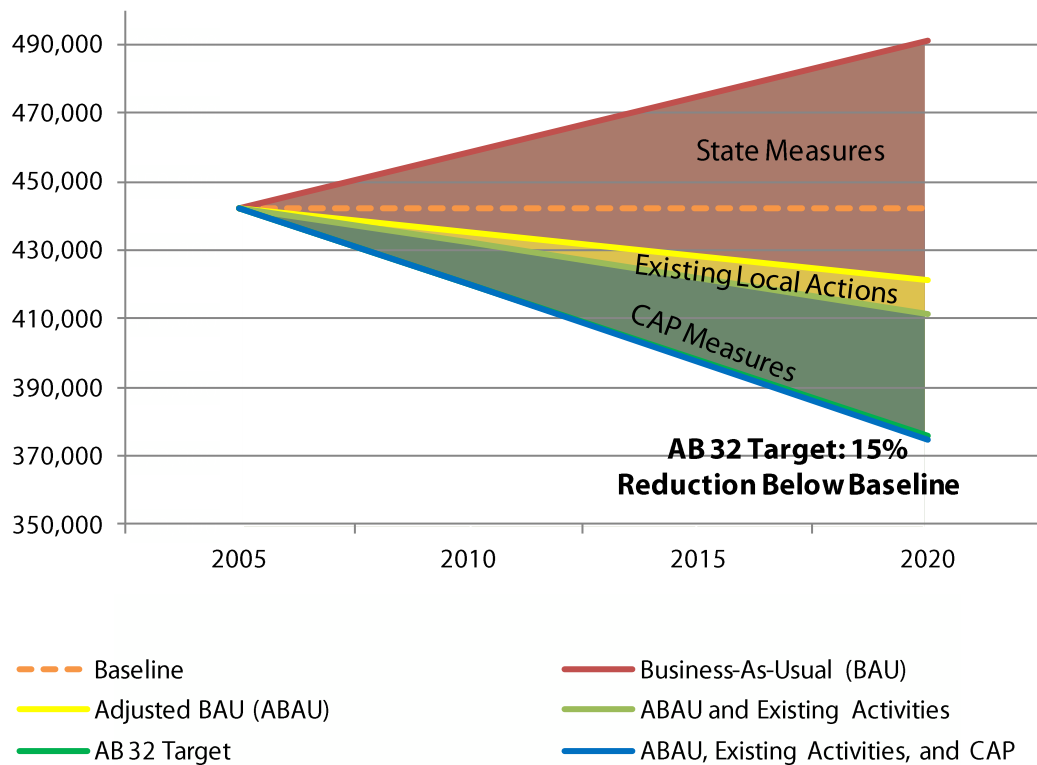
GHG REDUCTION STRATEGY

Goal Topic	2020	2035
Total GHG Reductions²	-116,310	-190,340

1. Note that existing municipal activities are quantified under existing local programs, municipal reduction measures are considered supportive, and GHG reductions are not quantified.

2. Due to rounding, totals may not equal the sum of the component parts.

Figure 9: GHG Emission Targets and Reductions (MTCO₂e)



CHAPTER 4

Figure 10: Local Reductions by Topic (MTCO₂e), 2020

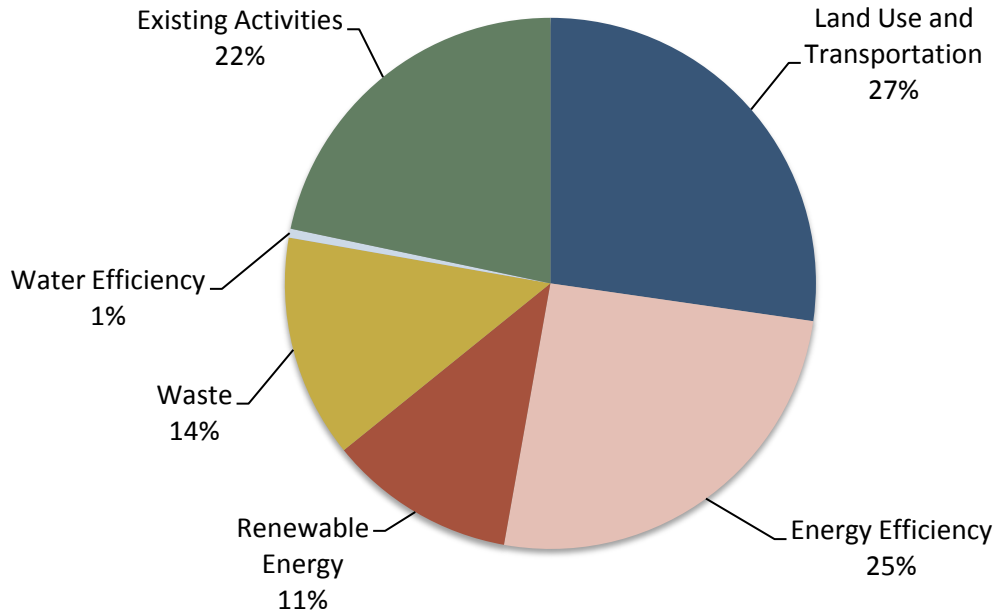
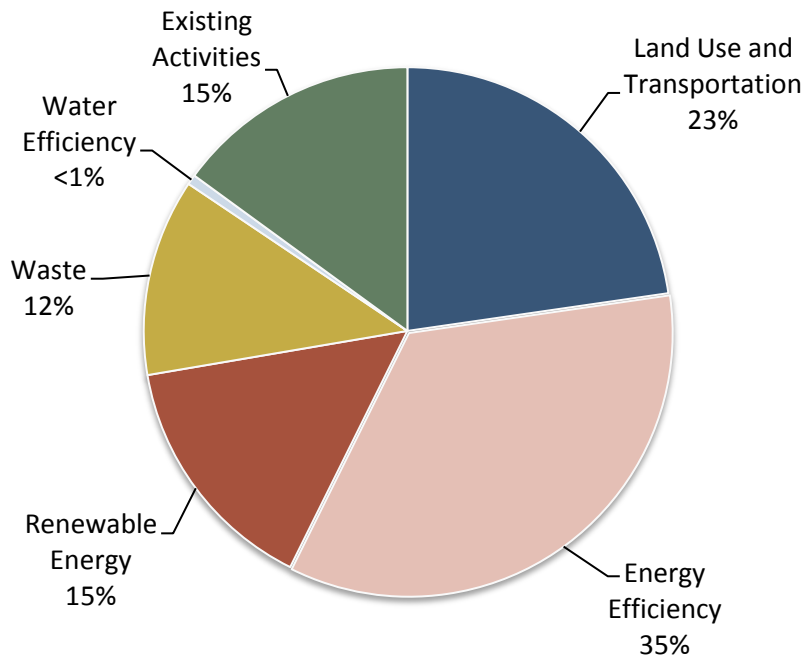


Figure 11: Local Reductions by Topic (MTCO₂e), 2035



GHG REDUCTION STRATEGY

REDUCTION STRATEGY STRUCTURE

The following chapter describes the process for developing, refining, and quantifying the GHG reduction goals, strategies, and actions identified to achieve the City's GHG reduction targets. The City's strategy is structured around nine strategy topic areas, as shown in **Figure 12**.

Figure 12: Strategy Topic Areas



Each strategy topic area has corresponding reduction measures and supporting actions necessary for implementation. The process for developing GHG reduction measures included a review of existing policies, activities, and programs; identification of topic areas or goals based on South San Francisco's emissions inventory and sustainability vision; consideration of countywide or regional initiatives; and preparation of preliminary reduction measure language with performance targets and indicators. The preliminary measures were refined through the staff and community engagement process and evaluated for political, technical, and financial feasibility. Additional information on measure quantification methods is included in **Appendix D**. See **Chapter 6** for more details on measure evaluation and implementation.

CHAPTER 4

COMMUNITY CO-BENEFITS

In addition to the GHG reductions, each measure also has one or more multiple ancillary benefits for the community. For example, a program to improve bicycle and pedestrian networks in South San Francisco will provide health benefits from increased physical activity, improve air quality by reducing dependency on cars, and increase mobility for community members who do not have reliable access to cars. The co-benefits of each measure will be noted throughout this chapter with the icons shown below.

			
Improves Air Quality	Provides Educational Opportunities	Conserves Energy	Improves Public Health
			
Supports Local Economy	Reduces Automobile Use and Fuel Consumption	Saves Money	Conserves Natural Resources
			
Promotes Equity	Implements State Law	Reduces Water Use	Adaptive Measure
			
Improves Infrastructure	Increases Housing Affordability	Promotes Infill and Compact Development	Revitalizes Urban and Community Centers

GHG REDUCTION STRATEGY

MUNICIPAL ACHIEVEMENTS

The City has taken a number of steps to reduce energy use and improve sustainability at municipal facilities and in the community. By demonstrating leadership in addressing sustainability issues and providing an example to the community of South San Francisco and other municipal governments in the Bay Area, the City is hoping to foster an environment where GHG emission considerations become a part of the City, business, and citizen decision-making process. Some of these actions have resulted in measurable GHG emissions reduction to help the community achieve its reduction target under AB 32 (discussed in greater detail in the Existing Activities section below), while others are supportive of the City's sustainability efforts and the measures put forward in this CAP. Most of the achievements discussed here were begun after the 2005 baseline; some are ongoing efforts, while others have been completed. Municipal achievements are summarized in **Table 9**.

Table 9: Municipal Energy Efficiency and GHG Reduction Projects

Project Name	Annual Reductions (MTCO ₂ e/Year)	Status
Public-Private Partnerships		
South San Francisco Unified School District-Chevron solar PV installations	460	Done
Aircraft Noise Insulation Program (ANIP)	540	Active
Bioswales at private development	Supportive	Active
Construction and demolition (C&D) waste recycling ordinance	50	Active
Transportation Demand Management (TDM) ordinance	4,210	Active
Electric vehicle charging stations and green design, Miller Avenue Parking Structure	10	Active
Green X-Ray House	Supportive	Active
Government Operations		
San Mateo County Energy Watch retrofits at City facilities (Round 1)	210	Done
San Mateo County Energy Watch retrofits at City facilities (Round 2)	100	Active
400 kW cogeneration at Water Quality Control Plant *	Supportive	Done
Solar PV panels at City Hall Annex	20	Active
Total	5,600	

* This plant has been in operation since 1992 and is reflected in the City's GHG baseline inventory.

CHAPTER 4

PUBLIC-PRIVATE PARTNERSHIPS

The first seven achievements shown in the previous table are examples of successful ventures between the City and the private sector. The City is able to take a supportive role on some of these programs, providing private organizations and companies with assistance in implementing their own sustainability actions. On other programs, the City acts as a facilitator between the private sector and community members, allowing private groups to accomplish actions that benefit the community at large, such as the installation of electric vehicle charging stations for public use. Similarly, the City has engaged as an active partner with a private waste hauler, the South San Francisco Scavenger Company, to support the transformation of food and green waste into biogenic compressed natural gas and compost. The City continues to strongly support private sector innovation to pilot GHG-reducing activities.

GOVERNMENT OPERATIONS

The municipal achievements highlighted in **Table 9** consist of actions the City has taken to improve sustainability within its own facilities and operational practices. These actions include replacing old City-owned electric devices with more energy efficient models and installing renewable energy systems on City properties. At 2010 energy rates, these programs save the City an estimated \$182,000 annually and are expected to reduce 2020 community-wide GHG emissions by 330 MTCO_{2e}. South San Francisco has also taken internal steps not shown here, including the creation of a citywide Green Committee.



EXISTING ACTIVITIES

South San Francisco is focused on sustainability. To help reach its emissions reduction goals, the City has already completed a range of notable projects and policies since 2005 and continues to implement reduction policies. Major activities undertaken by the City since the baseline year of 2005 are detailed below.

AIRCRAFT NOISE INSULATION PROGRAM (ANIP)

ANIP is an ongoing program funded by the San Francisco International Airport and the Federal Aviation Administration to insulate homes near the airport against noise. As part of the process, eligible homes have their attics insulated, doors and windows replaced with insulating models, and noise baffles installed on their roofs. Intended primarily to reduce noise inside the

home, many of the upgrades are very similar to a residential energy retrofit program and help to reduce the amount of energy needed for heating and cooling. Homes that participate in the program

Existing Activity 1: ANIP
2020 GHG Reduction (MTCO_{2e}): 540
Participation Metrics: 290 homes receiving full retrofits and 460 homes receiving partial retrofits
 

GHG REDUCTION STRATEGY

can see their energy use drop by as much as 30%. As of October 2012, about 250 homes have been upgraded under ANIP since 2005, and over 500 are expected to receive upgrades in the next several years. Emissions savings for the ANIP only account for additional improvements completed after the City's baseline year of 2005.

CONSTRUCTION AND DEMOLITION (C&D) ORDINANCE

In California, about 29% of all waste produced in the state is from construction and demolition. These materials, often called C&D waste, include lumber, metal, stone, concrete, pipes, and other common elements used in building construction. The vast majority of these materials can be reused or recycled, reducing the amount of

waste sent to landfills and making new buildings more sustainable. South San Francisco has embraced C&D recycling by requiring 100% of all inert solids (building materials) and 65% of non-inert solids (all other materials) from a construction or demolition project to be recycled. All demolition projects costing over \$5,000 are subject to this ordinance, as are construction projects of 2,000 square feet or more in size. Additionally, eligible projects must submit a Waste Management Plan.

Existing Activity 2: C&D Ordinance

2020 GHG Reduction (MTCO₂e): 50

Participation Metrics: 9,310 additional tons of recycled C&D waste



CALIFORNIA SOLAR INITIATIVE (CSI)

The CSI is a program through the California Public Utilities Commission that provides financial rebates for the installation of solar energy systems, including solar photovoltaic arrays and solar water heaters. There are also specific categories of rebates for low-income single-family homeowners and multi-family affordable housing units. The CSI began in 2007 and is expected to conclude no later than 2016.

Existing Activity 3: CSI

2020 GHG Reduction (MTCO₂e): 890

Participation Metrics: 70 solar panel arrays installed to date



MUNICIPAL ENERGY PROGRAMS

South San Francisco has made a number upgrades to municipal facilities, saving an estimated \$182,000 in energy costs each year. Some of these programs, including replacing old lights with more energy efficient models and upgrades to the

Existing Activity 4: Municipal Energy Programs

2020 GHG Reduction (MTCO₂e): 330

Participation Metrics: Not applicable



CHAPTER 4

City's computer network, allow the City to use less energy by increasing energy efficiency and reducing GHG emissions 330 MTCO_{2e} by 2020. Other programs, including the installation of a solar panel array on the City Hall Annex, allow the City to make increased use of renewable energy. At present, approximately 30 projects have been completed at municipal facilities.

COMMUNITY-BASED TRANSPORTATION PLAN


The Community-Based Transportation Plan is a collaborative planning effort with the Metropolitan Transportation Commission (MTC) to identify and address the existing transportation needs in South San Francisco, particularly for lower-income individuals. The plan includes

increased access to transit stops, improving connectivity between transit modes, and ways to make transit more affordable. It is primarily focused on the eastern portion of the community.

Existing Activity 5: Community Transportation Plan

2020 GHG Reduction (MTCO_{2e}): Supportive – Not quantified

Participation Metrics: Supportive – Not applicable



SOUTH SAN FRANCISCO UNIFIED SCHOOL DISTRICT–CHEVRON ENERGY SOLUTIONS PARTNERSHIP SOLAR PROJECT


In 2012, the South San Francisco Unified School District partnered with Chevron Energy Solutions to install the largest K–12 solar and energy efficiency program in San Mateo County. The project was funded through Measure J, a local bond measure that raised \$162 million specifically to improve school

infrastructure and enhance the student learning environment. Chevron Energy Solutions, the largest installer of solar power in the US education market, installed the system and will be responsible for operating, maintaining, and guaranteeing the solar system's performance for 20 years. The system is expected to cut utility costs by \$20 million over the next 25 years. In addition to savings for the district, the project has significantly improved the classroom learning environment through the integration of energy-efficient technologies, promoting environmental awareness and energy consciousness while increasing in-class comfort.

Existing Activity 6: SSFUSD-Chevron Partnership

2020 GHG Reduction (MTCO_{2e}): 460

Participation Metrics: Not applicable

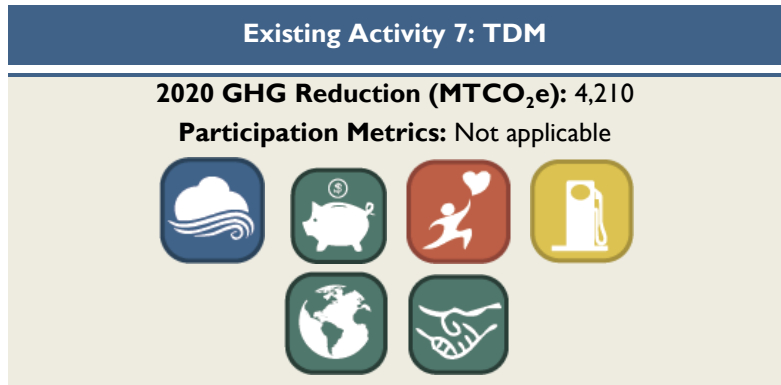


GHG REDUCTION STRATEGY

TRANSPORTATION DEMAND MANAGEMENT (TDM)

To help reduce traffic, air pollution, and emissions, and to provide greater commuting alternatives for its working community, the City of South San Francisco has implemented a Transportation Demand Management program. Adopted in 2001, TDM guidelines reduce daily vehicle trips per day by requiring that all projects that generate greater than 100 daily trips achieve a minimum 28% to 40% alternative mode use by employees

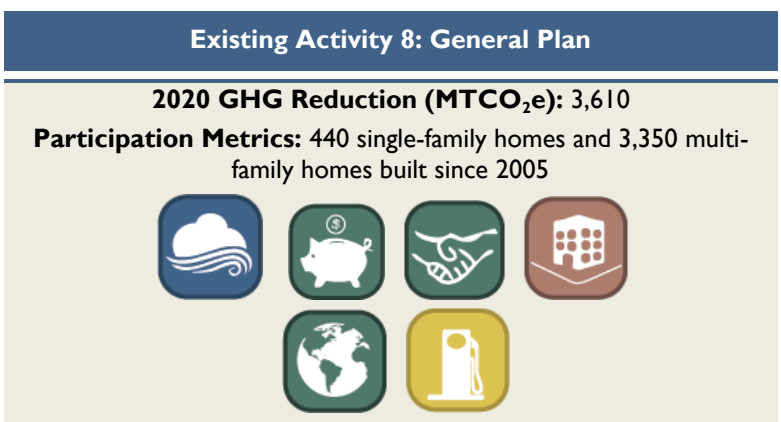
depending on intensity of development. Employers develop and implement a TDM plan with requisite carpooling, shuttle, and biking options as well as providing public transit, biking, and walking incentives to employees. Annual reports on each TDM's implementation levels are submitted to the City to ensure compliance. The TDM program is supported by a number of other efforts, including the Community-Based Transportation Plan.



MULTI-FAMILY ENERGY EFFICIENCY THROUGH GENERAL PLAN IMPLEMENTATION

Amendments to South San Francisco's General Plan throughout 2010–2011 will change the trajectory of development significantly and reduce energy use in the community. Approximately 72% of the community's existing housing stock is single-family homes. With the adoption of the recent General Plan amendments, the community is shifting to more compact, multi-family units. Approximately 88% of the post-2005 houses in South San Francisco

are expected to be multi-family, which use significantly less energy than single-family homes. This shift away from larger single-family homes to more compact multi-family units is expected to reduce 2020 GHG emissions by 3,610 MTCO₂e.



CHAPTER 4

GREEN X-RAY HOUSE

In 2009, the City of South San Francisco initiated a public-private partnership project to demonstrate a green home renovation. The goal of the project has been to demonstrate how a typical older California home can be remodeled in a green way without being too complicated or costly. The Green

X-Ray House was a small 3-bedroom, 1-bathroom bungalow built in 1952—typical of homes in the neighborhood and throughout the region, with old appliances, heat and energy leaks, and no irrigation. The City partnered with local energy service providers, green building organizations, interior designers, and green product vendors to secure over \$150,000 of green product and labor donations to renovate the house. Available for tours, the Green X-Ray House now showcases the energy analysis, on-site recycling and processing of construction materials used during renovation, a solar PV installation, insulation, recycled glass countertops, energy-efficient water heaters, and water- and energy-efficient appliances, among other features. Visitors to the house can tour the interior and exterior upgrades, and obtain information on other resources for remodeling their own homes.

Existing Activity 9: Green X-Ray House

2020 GHG Reduction (MTCO₂e): Supportive – Not quantified

Participation Metrics: Supportive – Not applicable



GHG REDUCTION STRATEGIES

LAND USE AND TRANSPORTATION

Goal LUT1: Reduce Emissions from Transportation.

Transportation is among the largest contributor of GHGs within South San Francisco and one of the most complex sectors to address. The city's location and the predominance of large-scale industrial and commercial activities with a large commuting workforce are factors that have resulted in a high number of vehicle miles traveled (VMT) and are challenges requiring a multifaceted approach. This goal builds off of a number of aggressive existing City policies to reduce VMT for employees and residents by facilitating multiple opportunities for mobility besides single-occupant vehicle travel. Through the adopted Bicycle Master Plan (2012) and Pedestrian Master Plan (2013), South San Francisco is taking a comprehensive approach to encouraging non-motorized circulation options and infrastructure. In concert with other transportation policies, the City's General Plan and Specific Plans facilitate the development of transit-oriented and mixed-use development in distinct and vital neighborhoods. This goal supplements these ongoing efforts to decrease emphasis on car-dependent lifestyles. The goal will be accomplished through measures that incentivize alternative transportation modes in residential, industrial, and office development, as well as by encouraging the location of homes near schools, public services, entertainment activities, and shopping to catalyze neighborhoods with pedestrian-scale activity and identity.

GHG REDUCTION STRATEGY

Measure 1.1: Expand active transportation alternatives by providing infrastructure and enhancing connectivity for bicycle and pedestrian access.


Actions

1. Partner with the Peninsula Alliance and other regional partners to implement the Bicycle Master Plan and the 2012 San Bruno/South San Francisco Community-Based Bicycle Transportation Plan to expand bicycle facilities and increase bicycle mode-share.
2. Work with local school districts to encourage safe pedestrian and bicycle travel for students, using programs such as Safe Routes to School and other public transportation policies to remove barriers, improve connectivity, and provide infrastructure to support bicycle and pedestrian access.
3. Following adoption of a “complete streets” policy in 2012 for transportation consistent with the C/CAG criteria for One Bay Area funding opportunities, establish citywide design standards to incorporate all modes of transportation (public transit, bicycle, pedestrian, and automobile) into “complete streets” designs.
4. Promote local bike-share or bike rental programs in key activity areas such as downtown to expand the use of bicycles for employee commutes, integrating with regional efforts and collaborating with private employers such as Genentech.

Measure 1.1: Implementation Metrics

2020 GHG Reduction (MTCO₂e): 890

Participation Metrics: Implement regional transportation plans and existing programs



Measure 1.2: Support expansion of public and private transit programs to reduce employee commutes.


Actions

1. Collaborate with the Peninsula Alliance, BART, SamTrans, Caltrain, other transit agencies, and neighboring jurisdictions to improve transit service connections and frequency.
2. Work with businesses to support and expand shuttle connections to transit.
3. Continue to enforce the City’s Transportation Demand Management (TDM) program to require employers to demonstrate achieved mode share and to continually adjust their programs to meet the requisite goals.

Measure 1.2: Implementation Metrics

2020 GHG Reduction (MTCO₂e): 3,580

Participation Metrics: Expansion of TDMs to affect 25–44% of all local employment



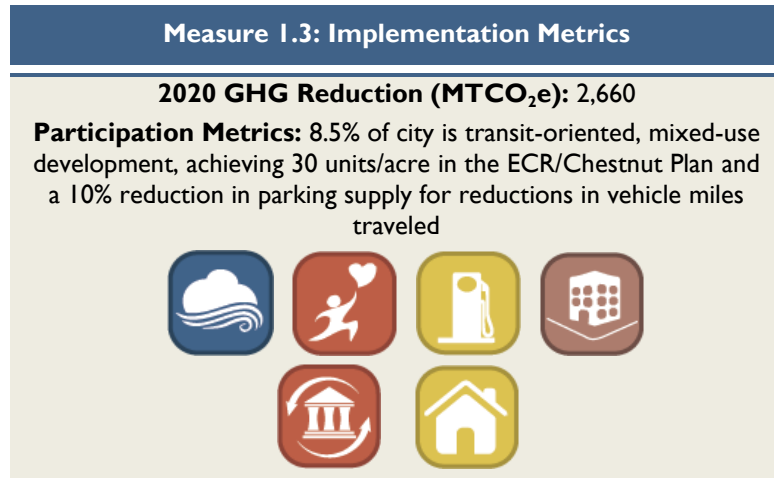
CHAPTER 4

4. Partner with local businesses to expand private shuttle programs for employee commutes, share local lessons learned, and connect businesses to shuttle resources.
5. Implement programs and encourage employers to provide additional voluntary subsidies or incentives.

Measure 1.3: Integrate higher-density development and mixed-use development near transit facilities and community facilities, and reduce dependence on autos through smart parking practices.

Actions

1. Implement Priority Development Areas and Station Area Plans, including the El Camino Real Master Plan, including the General Plan and Zoning Code amendments adopted by the City in 2010 and 2011, respectively.



2. Complete and adopt the Downtown Station Area Plan to encourage transit-oriented development in downtown.
3. Encourage ground-floor, street-oriented commercial uses in higher-density residential, industrial, and office zones.
4. Establish criteria to ensure that libraries, schools, parks, and other community facilities are available within reasonable proximity to higher-density development areas.
5. Encourage alternative transit use by continuing to zone for and facilitate the provision of diverse housing types near transit that are affordable to a range of household types.
6. Streamline permit requirements to allow for temporary uses that supply essential goods and services in accessible public areas such as parking lots, including local food programs and farmers markets that are convenient and accessible to nearby neighborhoods.
7. Revise the existing traffic impact fee for development east of US Route 101 to fund the bicycle and pedestrian improvements for the portions of the city identified in the Bicycle and Pedestrian Master Plans.
8. Provide flexibility for shared parking in areas that contain mixed-use development.
9. Establish an in-lieu parking fee to develop concentrated parking in the city's Downtown Parking District, the downtown station area, and other areas as appropriate, encouraging opportunities for car-share and public transit use.

GHG REDUCTION STRATEGY

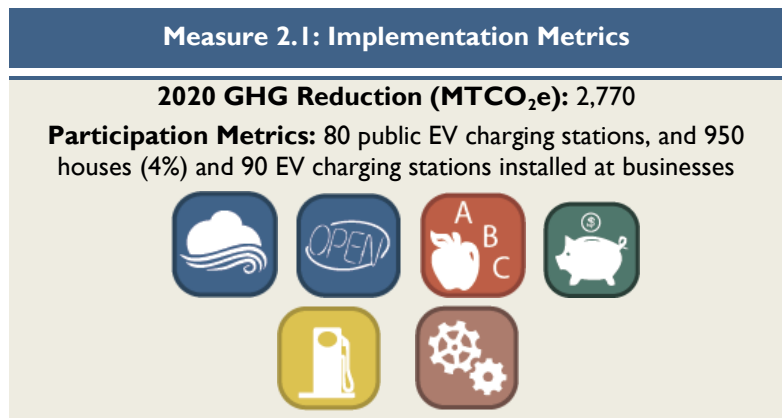
Goal LUT2: Improve Vehicle Efficiency.

While more efficient land use planning and increased circulation and transportation options will reduce vehicle trips within, and commuting to, South San Francisco, they cannot eliminate all vehicle trips. GHG emissions reductions will also rely on increases in vehicle fuel efficiency and expansion of alternative-fuel uses by providing the necessary infrastructure to support alternative-fuel and low-emissions vehicles. Although the state and federal governments hold the primary responsibility to increase the fuel efficiency standards of new vehicles and support the development of cost-competitive alternative fuels, the City of South San Francisco and neighboring cities can take several actions to further support and spur the use of more efficient vehicles, by providing the infrastructure and programs to help make use of low-emissions vehicles more feasible and easy for the community. These policies apply to on-road vehicles, as well as to off-road vehicles such as construction and landscaping equipment. Strategies under this goal include increasing the number of charging stations for electrical vehicles and reducing idling time for construction equipment.

Measure 2.1: Expand the use of alternative-fuel vehicles.

Actions

1. Adopt policies that support alternative-fuel vehicle infrastructure such as biofuels and electric vehicle charging stations.
2. Revise parking design guidelines to include designated spaces for electric vehicles, carpool vehicles, and other low-emissions vehicles.
3. Work with regional partners and electric vehicle charging companies to expand the network of electric car charging stations in public places.
4. Expand facilities for vehicle sharing at transit nodes and at business and commercial destinations.
5. Require new large-scale nonresidential developments to provide a conduit for future electric vehicle charging installations, and encourage the installation of conduits or electric vehicle charging stations for all new development.
6. Work with the South San Francisco Scavenger Company, other waste haulers, and other organizations that maintain a vehicle fleet to use less carbon-intensive fuels such as biofuels from waste oil.
7. Explore opportunities to use City franchise agreements or other mechanisms with cab and other service companies to require a minimum of 25% of clean vehicles in the company fleet.



CHAPTER 4

Measure 2.2: Reduce emissions from off-road vehicles and equipment.


Actions

1. Support the BAAQMD's voluntary exchange program and other exchange and rebate programs for garden equipment as opportunities become available. Consider adopting a leaf blower ordinance to ban or increase limitations on the use of leaf blowers.

Measure 2.2: Implementation Metrics

2020 GHG Reduction (MTCO₂e): 2,670

Participation Metrics: 1,670 lawnmowers (20%) and 430 leaf blowers (20%) traded in; 40% of equipment used in construction converted to alternative fuels and a 25% reduction in construction idling time



2. Include information on limiting idling time and regarding electric, non-powered, and other energy-efficient lawn and garden equipment in public education efforts.
3. Adopt a purchasing policy for City operations to expand the City's use of clean equipment.
4. Model the use of electric and energy-efficient equipment in City operations.
5. Work with applicants through the CEQA review process to reduce construction equipment emissions by encouraging the use of alternatively powered or grid-connected equipment.

ENERGY EFFICIENCY

Goal EE1: Increase Building Energy Efficiency.

Energy used in local homes and businesses is provided by Pacific Gas and Electric (PG&E). PG&E generates energy from a mix of nonrenewable, fossil-fuel based sources, such as coal and natural gas, and renewable sources, such as biomass, geothermal, hydroelectric, and wind. The amount of energy used in South San Francisco homes and businesses determines how much power PG&E must generate and the quantity of GHGs emitted. Energy efficiency and conservation in daily actions can reduce GHGs by reducing the amount of electricity or natural gas that PG&E needs to generate, obtain, and transmit.

The City of South San Francisco is dedicated to improving efficiency and achieving energy savings of both existing and new buildings through diverse strategies that support operations both at large industrial and biotech firms and in smaller businesses and residential development. Nonresidential energy use contributes approximately 31% of baseline emissions. Reflecting the city's strong biotechnology industry, the biotechnology and manufacturing sectors are among the highest consumers of electricity and natural gas. Top nonresidential energy sectors include biotechnology, high technology industries, food processing, offices, and hospitality. Measures for industry sector energy efficiency include partnerships with companies and businesses to identify high energy uses, and implementation of retrofits programs tailored to industry practices and facilities.

GHG REDUCTION STRATEGY

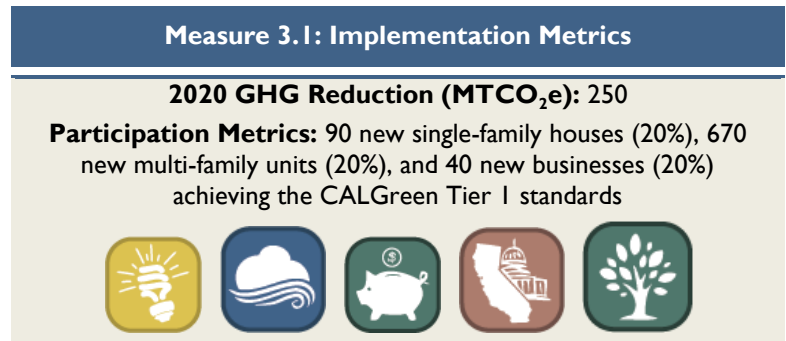
Residential energy use is responsible for approximately 16% of baseline emissions. Nonetheless, residential energy efficiency also provides the benefit of improving indoor comfort and building quality while reducing household energy costs. Measures to support residential energy efficiency focus on participation in energy efficiency programs that provide education, incentives, and financing for homeowners and aid to low-income residents to conserve energy and weatherize homes.

The City also recognizes that as a growth community, there is a significant opportunity for ensuring new development utilizes the most energy-efficient building materials and practices available. Enforcing code standards and providing incentives to encourage the use of sustainable building construction techniques will help to accomplish this goal.

Measure 3.1: Maximize energy efficiency in the built environment through standards and the plan review process.

Actions

1. Provide incentives (e.g., priority or expedited permit processing) to encourage new development to exceed Title 24 energy efficiency standards, such as expedited permitting and fee reductions, and promote utility-sponsored and statewide incentives for energy efficiency in new construction and remodels.



2. Work with developers of multi-family properties and nonprofit groups to maximize energy efficiency in new construction.
3. Encourage the use of CALGreen energy efficiency measures as a preferred mitigation for CAP streamlining.
4. Encourage the use of energy-efficient or smart-grid-integrated appliances in new development.

CHAPTER 4

Measure 3.2: Support retrofits to existing residential structures.


Actions

1. Increase residential participation in energy efficiency rebate and financing programs such as Energy Upgrade California, PACE, and the Grow American Fund.
2. Leverage home improvement funding to accomplish energy efficiency objectives, including funding for low- and moderate-income households.
3. Work with PG&E, San Mateo County Energy Upgrade, and other partners to provide free to low-cost energy audits that identify improvements which could reduce natural gas and electricity consumption.
4. Continue to seek funding to support green building and weatherization-training programs from local community colleges and partnerships like the Clean Energy Programs at the San Jose/Evergreen Community College District and the California Green Jobs Corp training.
5. Encourage all residential properties that are greater than 10 years old to provide an energy audit or EPA Home Energy Score to interested buyers at the time of sale, and encourage the implementation of recommended energy efficiency measures provided by the energy audit, home energy score, or similar program.
6. Provide resources for individuals to self-audit their homes.
7. Require alterations or additions at least 50% the size of the original building to comply with minimum CALGreen requirements.
8. Promote rebate programs for household appliances such as refrigerators, kitchen appliances, and washers and dryers as programs are available, including rebates from the Bay Area Air Quality Management District.
9. Provide educational information on the use of smart-grid-integrated appliances through the City's website and during the plan review process.

Measure 3.2: Implementation Metrics

2020 GHG Reduction (MTCO₂e): 1,900

Participation Metrics: 300 low-income homes (40%) weatherized; 1,450 households (10%) participating in the basic-level Energy Upgrade CA program, and 720 households (5%) participating in the advanced program; 990 homes (4%) upgrading appliances, and 780 new and existing homes (3%) using smart grid appliances; 40 for-sale homes (5%) receiving upgrades as part of the sales process



The icons are: 1. A glowing lightbulb with rays emanating from it. 2. A piggy bank with a dollar sign above it. 3. A map of California with a house icon. 4. The word 'OPEN' in a stylized font. 5. Two hands shaking. 6. A tree with leaves.

GHG REDUCTION STRATEGY

Measure 3.3: Encourage energy efficiency retrofits to the existing nonresidential building stock that reduce operating costs and increase industry competitiveness.

Actions

1. Work with PG&E to implement smart grid technology in nonresidential properties.
2. Encourage all nonresidential properties to provide buyers or tenants with the previous year's energy use by documenting use through the EPA's EnergyStar Portfolio Manager.
3. Adopt energy efficiency streamlining provisions that encourage energy retrofits, such as an online building permit application with minimal criteria and review.
4. Create a special business designation to recognize businesses that complete energy efficiency improvements, and create an annual voluntary competition to encourage businesses to disclose annual energy use for recognition of the highest efficiencies gained.
5. Provide self-auditing forms during the tenant improvement process that target buildings 10 years old or older, providing recommendations of potential retrocommissioning, retrofits, and deep retrofit opportunities.
6. Require nonresidential alterations or additions of at least 5,000 square feet or greater in size to comply with minimum CALGreen requirements.
7. Encourage the use of smart grid, energy-efficient, or Energy Star appliances in new development.
8. Work with utilities and third-party service providers to encourage new and replacement boilers and water heaters to exceed minimum efficiency standards.
9. Actively engage the nonresidential sector and work with PG&E to implement deep retrofits and retrocommissioning in the existing nonresidential building stock.
10. Educate businesses about financing options for energy improvements, including California FIRST property assessed clean energy financing, energy service contracts, and traditional mortgages and leases.

Measure 3.3: Implementation Metrics

2020 GHG Reduction (MTCO₂e): 9,470

Participation Metrics: 360 businesses (15%) upgrading appliances; 50 existing businesses (2%) and 10 new businesses (5%) using smart grid appliances; 3 million nonresidential square feet (20%) being retrocommissioned; 50% of all nonresidential boilers upgraded to higher-efficiency models; 470 businesses (20%) undergoing structural retrofits, and 90 businesses (4%) undergoing deep retrofits



CHAPTER 4

11. Promote free and low-cost programs, such as RightLights, which provides no-cost energy assessments in addition to energy-efficient lighting, refrigeration, and other energy-saving improvements.

Measure 3.4: Address heat island issues and expand the urban forest.


Actions

1. Encourage the use of high-albedo surfaces and technologies as appropriate, as identified in the voluntary CALGreen standards.
2. Continue to require tree planting in new development in accordance with Chapter 13.30 of the Zoning Code, and encourage tree placement to maximize building shading.
3. Continue to support private tree planting efforts through the City's urban forestry programs (e.g., adopt a tree) to maximize the tree canopy within the city and reduce the urban heat island effect.
4. Continue and expand the local commitment to the urban forest and continue to maintain South San Francisco's status as a Tree City USA.

Measure 3.4: Implementation Metrics

2020 GHG Reduction (MTCO₂e): 60

Participation Metrics: 810 existing houses (4%) and 50 existing businesses (2%), and 570 new houses (15%) and 20 new businesses (10%), reducing energy use through cooling strategies



Measure 3.5: Promote energy information and sharing, and educate the community about energy-efficient behaviors and construction.


Actions

1. Expand City education efforts through the City's Green X-Ray House, a City project with exposed green remodel improvements that showcase energy improvements.
2. Encourage South San Francisco's neighborhoods to use private networking tools such as Nextdoor to share successful energy efficiency retrofits.
3. Partner with local Realtors, the San Mateo County Association of Realtors, and regional green building groups to encourage market-based programs for green building labeling as a tool to encourage energy efficiency through property sales.

Measure 3.5: Implementation Metrics

2020 GHG Reduction (MTCO₂e): 130

Participation Metrics: 2,010 houses (10%) engaging in behavioral-based energy reduction efforts



GHG REDUCTION STRATEGY

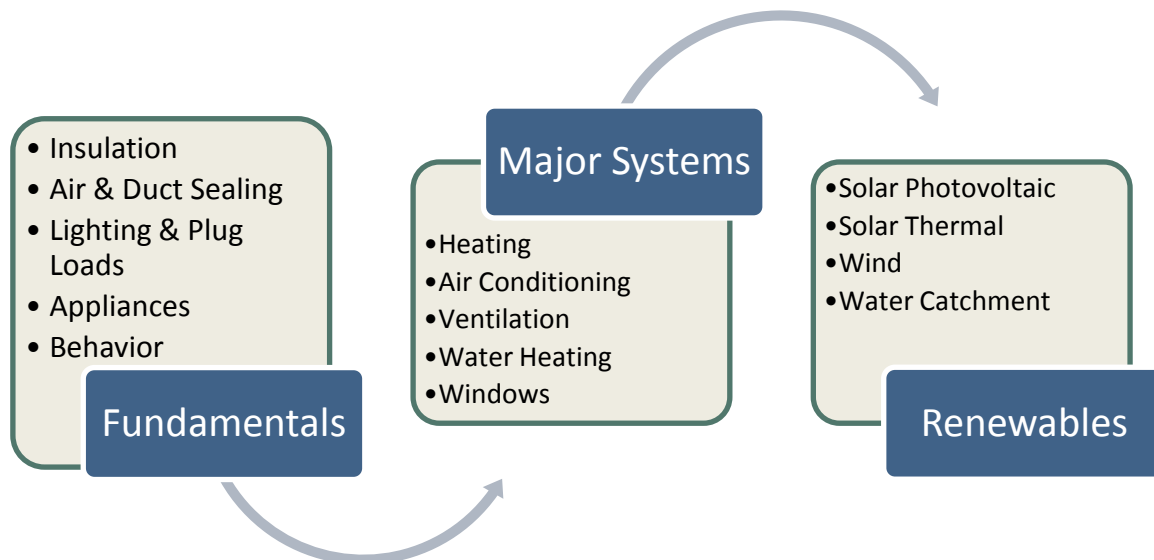
4. Provide outreach and education to encourage behavioral changes (e.g., air-drying clothes, unplugging appliances, daylighting strategies) that save energy.

Goal EE2: Increase Alternative Energy Options in South San Francisco.

To maximize energy savings and minimize added costs, the energy loading order identifies a scale of recommended actions, as shown in **Figure 13**. This goal category follows the energy loading order, providing renewable energy strategies to reduce the wedge of energy that cannot be eliminated through energy efficiency.

Before turning to the more costly strategies of renewable energy systems such as solar photovoltaic systems, the City will encourage low-cost conservation strategies that may include unplugging appliances and turning off lights when not in use or weatherization improvements. Enhancing efficiency through energy retrofits yields additional savings when conservation cannot be realized. These improvements optimize the building envelope, maximizing the efficiency of energy use. The use of renewable energy systems can then offset remaining energy. Following the loading order ensures the installation of cost-effective and appropriately sized renewable energy systems.

Figure 13: The Energy Loading Order



The City of South San Francisco’s coastal location and advanced industrial community make the community well suited to become a leader in innovative renewable energy applications. The intent of this goal is to increase the adoption of renewable energy technologies at reduced cost as well to continue growing green industries and local business opportunity. Through this goal, the City will promote the production of local, on-site, renewable energy for both residential and nonresidential uses. The goal also identifies a number of financing and streamlining policy tools that will help cut costs and spur the use of renewable energy.

CHAPTER 4

Measure 4.1: Promote installation of alternative energy facilities.

Actions


1. Continue to provide zoning that allows appropriate small and medium-sized alternative energy installations.
2. Require the construction of any new nonresidential conditioned space 5,000 square feet or more, or the conversion of unconditioned space 5,000 square feet or more, to comply with one of the following standards:

- Meet a minimum of 50% of modeled building electricity needs with on-site renewable energy sources. To calculate 50% of building electricity needs for the new conditioned space, the applicant shall calculate building electricity use as part of the Title 24 compliance process. Total electricity use shall include total use for the new conditioned space excluding process energy.
 - Participate in a power purchase agreement to offset a minimum of 50% of modeled building electricity use. Building electricity use shall be calculated using the method identified above.
 - Comply with CALGreen Tier 2 energy efficiency requirements to exceed mandatory energy efficiency requirements by 20% or more. For additions to existing development of 5,000 square feet or more, CALGreen Tier 2 shall be calculated as part of the Title 24 compliance process. Existing building space already permitted shall not be subject to CALGreen Tier 2 requirements.
3. Require all new development to install conduit to accommodate wiring for solar.
 4. Promote on-site renewable energy or distributed generation energy systems in new and existing residential and nonresidential projects. Encourage developers of multi-family and mixed-use projects to provide options for on-site renewable electricity or install distributed generation energy systems, similar to the statewide Homebuyer Solar program.

Measure 4.1: Implementation Metrics

2020 GHG Reduction (MTCO₂e): 5,100

Participation Metrics: 80,440 (2%) square feet of nonresidential roof space converted to solar panels; 1,390 (6%) houses with solar panel arrays; 38% of electricity demand for new large-scale nonresidential development supplied by on-site renewables; 1,050 houses (4%) with solar water heaters



Conditioned Space:

- Generally, enclosed space that can be heated or cooled, directly or indirectly, by natural ventilation or heating/air conditioning equipment.
- Defined precisely in the California Building Standards Code.


GHG REDUCTION STRATEGY

- Update the City's discretionary review guidelines to recommend the use of on-site renewable energy facilities for residential development as a preferred mitigation measure for environmental review and to meet a substantial amount of energy needs with on-site renewable energy systems, including solar photovoltaics or solar water heaters.
- Promote the State's CSI-Thermal program, which provides rebates to utility customers who install solar thermal systems to replace water-heating systems powered by electricity or natural gas.

Measure 4.2: Reduce the cost of alternative energy installations.

Actions

- Establish a renewable energy strategy to streamline the approval of appropriately sized residential and commercial renewable energy projects.
- Participate in regional programs to facilitate the bulk purchase of alternative energy equipment (e.g., solar panels through SunShares or similar programs) to defray the cost of installation for interested businesses, institutions, and residents.
- Continue to encourage installation of renewable energy systems through the City's participation in PACE and Energy Upgrade programs.
- Educate the community's large business operators about the benefits of tankless and solar water heaters, and consider working with partners such as San Mateo County Energy Watch and local contractors to aggregate purchasing demand and negotiate lower equipment and installation rates.

Measure 4.2: Implementation Metrics	
1. Establish a renewable energy strategy to streamline the approval of appropriately sized residential and commercial renewable energy projects.	2020 GHG Reduction (MTCO₂e): Supportive – Not quantified
	Participation Metrics: Supportive – Not applicable
	

Measure 4.3: Support green industries.

Actions

- Capitalize on the sustainability leadership of local businesses through economic recruitment and marketing to green tech and other competitive industries for the new green economy.

Measure 4.3: Implementation Metrics	
1. Capitalize on the sustainability leadership of local businesses through economic recruitment and marketing to green tech and other competitive industries for the new green economy.	2020 GHG Reduction (MTCO₂e): Supportive – Not quantified
	Participation Metrics: Supportive – Not applicable
	

CHAPTER 4

2. Create an annual awards program to recognize ten local businesses a year that have implemented energy efficiency, waste reduction, or other sustainability efforts.
3. Partner with the South San Francisco Chamber of Commerce to create a local business-to-business network, connecting local contractors to high-energy-consuming businesses with an interest in efficiency.
4. Partner with the Chamber of Commerce to promote new energy efficiency and renewable energy technologies that reduce business operation costs.

WASTE


Goal W1: Reduce Waste Disposal Rates and Volumes.

When waste is sent to a landfill, much of it will eventually decompose and emit methane gas (CH₄), which is over 20 times more potent as a GHG than CO₂. By reducing the amount of waste sent to a landfill, the GHG emissions associated with waste disposal can be cut significantly. The measures in this goal seek to divert waste away from a landfill through increased recycling and the creation of a citywide composting program. Additionally, this goal promotes the capture and use of methane emissions to generate alternative energy.

Measure 5.1: Develop a waste reduction strategy to increase recycling and reuse of materials to achieve a 75% diversion of landfilled waste by 2020.

Actions

1. Continue to work with property owners and the South San Francisco Scavenger Company to provide recycling and compost bins to all tenants.
2. Continue to enforce the existing construction and demolition recycling ordinance, requiring 100% of inert waste and 65% of non-inert waste to be recycled from all eligible projects.
3. Continue to work with the South San Francisco Scavenger Company and other waste haulers to establish new and innovative residential and commercial green waste recycling/composting services for the city.
4. Continue collaboration with waste haulers to expand educational efforts to increase recycling and decrease contamination of bins.

Measure 5.1: Implementation Metrics
2020 GHG Reduction (MTCO₂e): 6,720
Participation Metrics: 21,520 households (90%) and 2,290 businesses (90%) participating in composting program; all community residents and employees participating in the increased recycling efforts


GHG REDUCTION STRATEGY

5. Coordinate with the Chamber of Commerce, the existing Bay Area Green Business program, or CalRecycle’s WRAP to establish a program that recognizes and rewards local businesses that reduce waste associated with their products and services.
6. Implement the City’s green 2008 food packaging ordinance and the City’s 2012 reusable bag ordinance.

Measure 5.2: Reduce landfill emissions.

Actions

1. Explore opportunities to increase methane capture at the Oyster Point Landfill.
2. Encourage the use of innovative technologies to capture landfill emissions and reuse landfilled waste.

Measure 5.2: Implementation Metrics

2020 GHG Reduction (MTCO₂e): Supportive – Not quantified

Participation Metrics: Supportive – Not applicable





WATER EFFICIENCY

Goal WE1: Conserve Water.

Water consumption requires energy to pump, treat, distribute, collect, and discharge water as it is used by the community, which results in greenhouse gas emissions. Greenhouse gas emissions also occur as a direct process from wastewater treatment. Outdoor water use for landscaping in both the industrial and residential areas of South San Francisco is a significant portion of overall water consumption. Conservation and more efficient outdoor water use are the focus of strategies to reduce GHG emissions for the City.

Measure 6.1: Reduce water demand.







Actions

1. Continue to support implementation of the Urban Water Management Plan to reduce potable water use by at least 20%.
2. Revitalize implementation and enforcement of the Water Efficient Landscape Ordinance by undertaking the following:

Measure 6.1: Implementation Metrics

2020 GHG Reduction (MTCO₂e): 250

Participation Metrics: 1.03 billion gallons of water and 1,346,020 kWh saved annually

- Establishing a variable-speed pump exchange for water features.
- Limiting turf area in commercial and large multi-family projects.
- Restricting hours of irrigation to occur between 3:00 a.m. and two hours after sunrise.

CHAPTER 4

- Installing irrigation controllers with rain sensors.
 - Landscaping with native, water-efficient plants.
 - Installing drip irrigation systems.
 - Reducing impervious surfaces.
3. Work with water providers to support the installation of smart water meters on all water accounts in the city.

Measure 6.2: Provide alternative water resources for irrigation.

Actions

1. Create water policies for the stormwater management strategy that seek to capture storm runoff (e.g., bioswale, rainwater collection, and irrigation programs).
2. Continue to implement the City's Water Efficient Landscape Guidelines.
3. Continue to pursue long-term opportunities to implement the Recycled Water Project in collaboration with the City of San Bruno, the San Francisco Public Utilities Commission, and the California Water Service Company (Cal Water).

Measure 6.2: Implementation Metrics	
2020 GHG Reduction (MTCO ₂ e):	Supportive – Not quantified
Participation Metrics:	Supportive – Not applicable

MUNICIPAL OPERATIONS

Measures addressing municipal operations are important to reduce the City's own GHG emissions and stand as a model for the community. This goal includes measure to reduce City emissions from all sectors including building energy and water use, waste, and fleet activities.

Measure 7.1: Promote energy efficiency policies at municipal facilities.

Actions

1. Conduct audits of existing facilities, prioritize improvements, and upgrade facilities to save energy.
2. Continue to upgrade traffic signals, street lighting, and outdoor lighting with more efficient equipment.
3. Continue increase solar electricity use for City operations.

Measure 7.1: Implementation Metrics	
2020 GHG Reduction (MTCO ₂ e):	Supportive – Not quantified
Participation Metrics:	Supportive – Not applicable

GHG REDUCTION STRATEGY

4. Develop policies related to powering off lights and appliances after hours and after dark.
5. Continue to improve efficiency at the water treatment facility.

Measure 7.2: Conserve municipal water.

Actions

1. Install water-efficient landscaping on City properties.
2. Where possible, remove turf from municipal facilities.
3. Retrofit all municipal toilets to low-flow/water-saving models.
4. Conduct training of staff for the use and installation of water-saving irrigation technology and auditing.

Measure 7.2: Implementation Metrics

2020 GHG Reduction (MTCO₂e): Supportive – Not quantified

Participation Metrics: Supportive – Not applicable



Measure 7.3: Reduce municipal waste.

Actions

1. Create a pilot program to evaluate the issues associated with running a composting program.
2. Develop a long-term composting program for municipal facilities.

Measure 7.3: Implementation Metrics

2020 GHG Reduction (MTCO₂e): Supportive – Not quantified

Participation Metrics: Supportive – Not applicable



Measure 7.4: Establish budgeting and administrative practices that support the CAP.

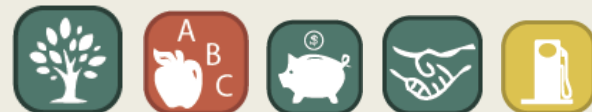
Actions

1. Establish a purchasing policy that includes:
 - Green office supplies: Purchase energy-efficient appliances, recycled-content products, and recyclable and compostable supplies.
 - Green fleet and equipment: Create purchasing orders for replacing less-efficient vehicles with fuel-efficient vehicles (e.g., hybrids, electric vehicles, and biofuel vehicles).

Measure 7.4: Implementation Metrics

2020 GHG Reduction (MTCO₂e): Supportive – Not quantified

Participation Metrics: Supportive – Not applicable



CHAPTER 4

2. Reduce municipal fleet use by a designated percentage by the year 2020.
3. Create administrative instructions to support telecommuting and flexible work hours for employees that reflect the culture and practices which are unique to South San Francisco.
4. Develop a process for sharing information on energy and water use in municipal operations with the public as an educational tool.
5. Establish budgeting and administrative practices that support the CAP.

GHG REDUCTION STRATEGY

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CHAPTER 5

ADAPTATION AND RESILIENCY

CHAPTER 5

INTRODUCTION

Even if global greenhouse gas (GHG) emissions ceased immediately, the already elevated levels of carbon dioxide (CO₂) and other GHGs in the atmosphere are expected to have significant impacts on the earth's climate. Specifically, South San Francisco is expected to experience the following impacts from climate change (see **Chapter 2** and **Appendix A** for more details):

- Greater frequency of extreme heat events
- Decline in air quality
- Greater frequency and severity of storms
- Increase in sea level
- Decrease in water and electricity supply
- Ecosystem damage

While the state and local reduction efforts discussed in this Climate Action Plan (CAP or Plan) can help to reduce the impacts of climate change on South San Francisco, the community is still likely to be affected. This chapter discusses efforts South San Francisco can take to adapt to the changing climate and become more resilient to the projected changes.

CLIMATE CHANGE AND ADAPTATION

Existing Climate Adaptation Efforts

California Climate Adaptation Strategy

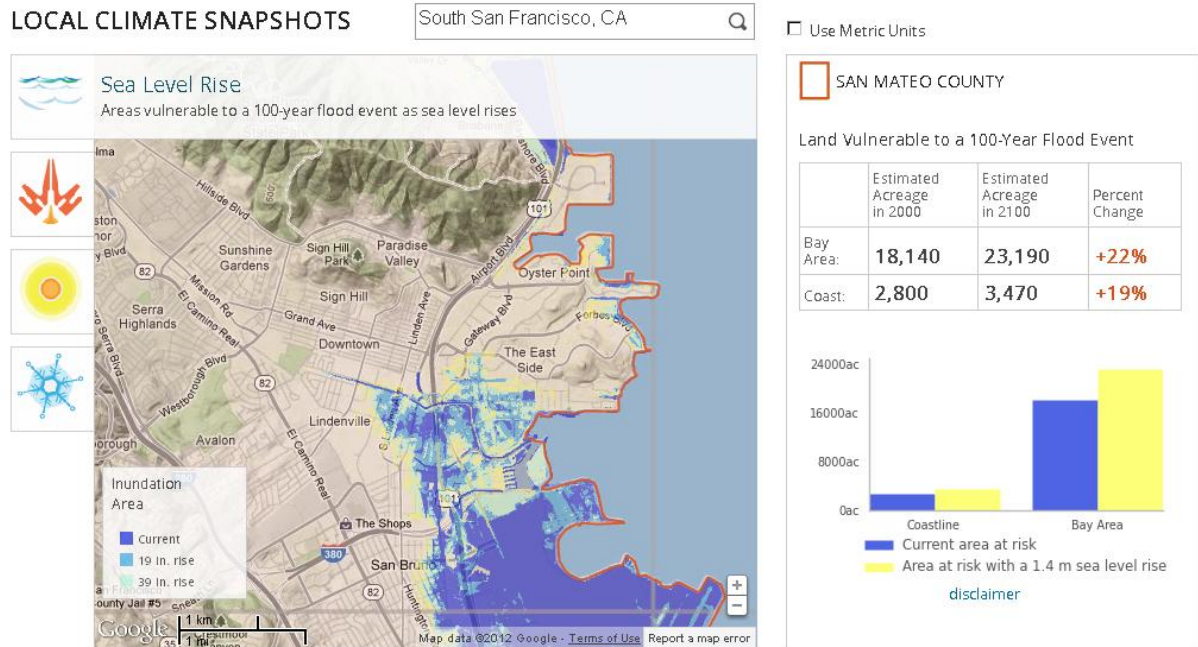
In 2009, the California Natural Resources Agency released the California Climate Adaptation Strategy as a guide to state and local agencies on appropriate strategies to adapt to the impacts of climate change. The guide discusses potential adaptation strategies for biodiversity, oceanic and coastal resources, energy infrastructure, public health, transportation networks, water management, agriculture, and forestry.

Cal-Adapt

Cal-Adapt is a website developed by the California Energy Commission and the California Natural Resources Agency, focusing on climate change effects and adaptation, that presents climate change data from historical observations and computer models. It allows users to view historic and future temperature, wildfire risk, rainfall, and other metrics at a range of scales, as shown in **Figure 14**. The tool also provides access to scholarly papers to supplement the maps and other data.

ADAPTATION AND RESILIENCY

Figure 14: Cal-Adapt Sea Level Rise Map and Projections, South San Francisco



Source: California Energy Commission 2011

As illustrated in **Figure 14**, one of the important local impacts of climate change is flooding. Because South San Francisco is located on the San Francisco Bay, much of the city’s critical infrastructure and economic activity is situated along the eastern shore and has heightened risks associated to sea level rise as a result of climate changes. It is predicted by the State of California that sea levels will rise by approximately 22% in the Bay Area. This is one of several risk areas. The discussed resources and measures in this Plan will help South San Francisco reduce its risk through adaptation.

California Climate Adaptation Planning Guide

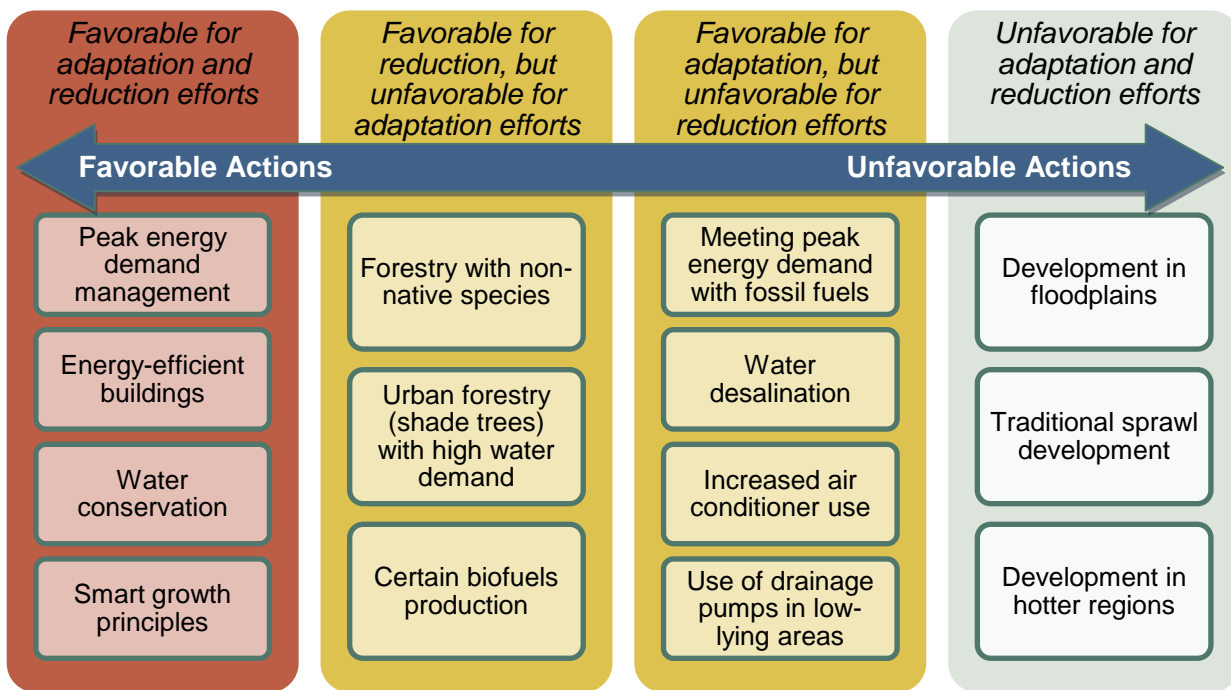
The California Climate Adaptation Planning Guide, released in 2012 by the California Natural Resources Agency, is a document intended to guide local governments in planning how best to adapt to the impacts of climate change, including discussions of how to conduct a vulnerability assessment and develop adaptation strategies. The document discusses seven key sectors that are projected to be impacted by climate change: Public Health, Socioeconomic, and Equity Impacts; Ocean and Coastal Resources; Water Management; Forest and Rangeland; Biodiversity and Habitat; Agriculture; Infrastructure. The Climate Adaptation Planning Guide includes information on the sensitivity and adaptive capability of each sector, the potential risk to each, and additional resources.

CHAPTER 5

Differentiating Reduction and Adaptation Measures

Reduction and adaptation strategies are closely tied, but whereas reduction measures address the cause of climate change (energy use, vehicle travel, etc.), adaptation measures address the effects. Some measures can be both reductive and adaptive; for example, encouraging the use of passive solar techniques in new development decreases the amount of energy used for heating and cooling (a reduction measure) and helps protect the building from extreme temperatures (an adaptive strategy). At times, reduction and adaptation measures can be in conflict (e.g., encouraging an increase in air conditioner use to address extreme heat). **Figure 15** presents examples of complementary and conflicting adaptation and reduction efforts. Not all adaptation measures are reduction measures, and vice versa.

Figure 15: Complementary and Conflicting Adaptation and Reduction Actions



Source: Bedsworth and Hanak 2008

There are two types of adaptation measures: operational changes and increase to adaptive capacity. Operational measures assess the risk from climate change on sensitive populations and infrastructure, including addressing climate adaptation in planning and public safety documents. Adaptive capacity actions help a community prepare for and address the impacts of climate change. Examples include setting up cooling centers during heat waves and encouraging the use of low-impact development to help recharge local groundwater supplies.

ADAPTATION AND RESILIENCY

The measures included in this chapter are meant to serve as a starting point for South San Francisco by directing operational changes to identify potential impacts and vulnerabilities, but the chapter does not include adaptive capacity measures to address specific climate change impacts. These measures are not harmful to or in conflict with the proposed GHG reduction efforts discussed in **Chapter 4** at this time. The adaptation measures are presented in a different format than the GHG reduction efforts, as they have not been quantified for GHG reductions or cost savings.

PROPOSED POLICIES

To help ensure that climate change adaptation is sufficiently incorporated into future planning efforts, the following measures are provided to guide the involvement of City staff in coordinating, preparing for, and educating the public on the potential impacts that climate change may have on South San Francisco.

Adaptation Measure 1: Participate in regional efforts to analyze and prepare for the impacts of climate change in the San Francisco Bay Area.

Actions

- Join regional adaptation and resiliency task forces such as that of the San Francisco Bay Conservation and Development Commission (BCDC) and the Joint Policy Committee (JPC).
- Appoint a staff liaison to attend and participate in regional meetings focusing on adaptation and resilience, and to report to staff on a regular basis.

Adaptation Measure 2: Ensure that South San Francisco is prepared for the environmental risks and hazards related to climate change, with particular emphasis on the impacts from sea level rise and the threats to vulnerable populations.

Actions

- Assess the vulnerability of City facilities and services to anticipated climate change.
- Revise the South San Francisco Local Hazard Mitigation Plan and other applicable documents, including long-range capital improvement plans, to prioritize climate change issues and best practices during required updates and as funding permits.
- Regularly train, inform, and solicit feedback from the South San Francisco Fire and Police departments, as well as other first responders, on the potential risks posed by climate change.
- Incorporate training on and discussion of climate change issues into the Community Emergency Response Team program.
- Monitor emerging science and public policy related to climate change, and regularly inform relevant stakeholders of new information.

CHAPTER 5

Adaptation Measure 3: Integrate possible and projected impacts of climate change into local planning documents and processes.

Actions

- Integrate adaptation to climate change into future updates to the South San Francisco General Plan, Zoning Code, and other related documents.
- During the development review process, consider possible impacts of climate change on the project or plan area.

Adaptation Measure 4: Engage the community in preparing for climate change through education for residents and employees in South San Francisco.

Actions

- Distribute information related to climate change on the City's website and through local media.
- Continue to promote sustainability education in the South San Francisco Unified School District.

ADAPTATION AND RESILIENCY

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CHAPTER 6

IMPLEMENTATION

CHAPTER 6

This chapter identifies the procedure South San Francisco will use to monitor implementation of this Climate Action Plan (CAP) and presents methods for evaluating the effectiveness of CAP measures as well as potentially adjusting reduction measures in the future. These procedures are consistent with California Environmental Quality Act (CEQA) Guidelines Section 15183.5(b)(1)(E) and Bay Area Air Quality Management District (BAAQMD) Guidelines Section 4. This chapter also identifies the standards South San Francisco will implement on a case-by-case basis and identifies initial milestones for the City to accomplish in using this CAP as a basis for project-level CEQA review.

To ensure the success of this Plan in reducing GHG emissions to 15% below 2005 levels by 2020, South San Francisco will integrate CAP goals, measures, and actions into other local and regional plans, programs, and activities. As the City moves forward with updates to the Zoning Code, the General Plan, Specific Plans, the Housing Element, and other planning efforts, City staff will make sure that these efforts support and are consistent with the CAP.

IMPLEMENTATION POLICIES AND ACTIONS

Implementing the CAP will require City leadership to execute these measures and report on their progress. This Plan identifies the responsible department for each measure and offers time frames for implementing each strategy. Successful implementation also requires regular reporting; staff will monitor progress toward implementing the CAP and report the progress to the City Council annually. The CAP monitoring tool being developed in conjunction with this Climate Action Plan will assist South San Francisco in tracking progress.

Implementation Policy 1: Annually monitor and report progress toward achieving the reduction target.

Actions

1. Prepare an annual progress report for review and consideration by the City Council.
2. Use the monitoring and reporting tool to assist with annual reports.
3. Identify key staff responsible for annual reporting and monitoring, including members of the South San Francisco Green Team.
4. Integrate CAP monitoring and reporting into the annual General Plan reporting process, using the CAP monitoring tool to provide metrics for the annual report to the City Council on General Plan implementation.

IMPLEMENTATION

Implementation Policy 2: Update the baseline GHG emissions inventory and Climate Action Plan every five years.

Actions

1. Prepare an inventory of 2010 community-wide GHG emissions no later than 2018.

Update the CAP no later than 2018 to incorporate the 2010 inventory and to reflect the adoption and implementation of new technologies, programs, and policies to reduce GHG emissions.

Continue to update and amend the CAP as necessary if the City finds that individual measures are not achieving the intended GHG emissions reductions.

Implementation Policy 3: Continue to develop partnerships that support implementation of the Climate Action Plan.

Actions

1. Continue formal memberships and participation in, as well as informal collaboration with, local and regional organizations that provide tools and support for energy efficiency, alternative transit, waste minimization, water conservation, renewable energy, GHG emissions reduction, climate change adaptation, sustainability education, and implementation of this Plan.
2. Work with the BAAQMD to ensure new guidelines and opportunities are integrated into the CAP.
3. Continue to participate in the Regionally Integrated Climate Action Planning Suite (RICAPS) to monitor CAP implementation and support regional progress toward GHG reductions.

Implementation Policy 4: Secure necessary funding to implement the Climate Action Plan.

Actions

1. Identify funding sources for reduction measures as part of the annual reporting.
2. Ensure implementation by including emissions reduction objectives in department budgets starting in the 2014/2015 fiscal year, the capital improvement program, and other City plans as appropriate.
3. Pursue local, regional, state, and federal grants as appropriate to support implementation.

CHAPTER 6

Implementation Policy 5: Integrate the Climate Action Plan development checklist (Appendix E) into the plan review process and assessment of progress toward Climate Action Plan goals.

Actions

1. Work with South San Francisco residents and developers to use the development checklist to ensuring project consistency with the CAP and, as appropriate, for CEQA streamlining.
2. Track development checklist metrics to monitor compliance General Plan policies and objectives, such as the increase of multi-family units in the El Camino Real area.
3. Monitor project compliance with the CAP through the development checklist and, as necessary, to guide updates to the CAP that reflect lessons learned through implementation.
4. Monitor state and BAAQMD actions to identify future changes and modifications to the state or BAAQMD CEQA guidelines that affect implementation of the CAP.
5. Create a case study highlighting the benefits, lessons learned, and feedback from implementation of the development checklist, and distribute to regional partners.

IMPLEMENTATION MATRIX

The implementation matrix below is intended to provide an overall, planning-level framework for achieving the reductions discussed in this Plan. This matrix discusses each measure, a proposed time frame for implementation, the responsible City agency, possible partner agencies, and the community-wide financial costs and savings. Note that most community costs are upfront one-time expenses, while savings are achieved each year. A measure that has a high cost but medium-high savings may be initially be more expensive to implement, but is likely to save money in the long term as annual savings are factored in.

EVALUATION CRITERIA

In order to ensure successful implementation and evaluation of the GHG reduction measures included in this Climate Action Plan, the following criteria have been identified in this Plan or the associated implementation matrix:

- Time Frame
- Responsible Department
- Partner Agencies
- Community Costs
- Community Savings

IMPLEMENTATION

Implementation Time Frame is established for each measure based on community priorities, local goals, and the availability of technological innovations to implement each measure. Time frames are presented as the following ranges:

Time Frame	Year Range
Ongoing	Existing effort that will continue to be implemented
Near-Term	Implemented between 2013 and 2015
Mid-Term	Implemented no later than 2020
Long-Term	Implemented by 2035

Responsible Department will identify the City department that will be responsible for implementing each measure, securing funding resources, reporting on annual progress, and coordinating with the supporting agencies.

Partner Agencies are the public and private local and regional entities that will be a partner or lead in the implementation of certain actions. Examples of supporting agencies are San Mateo County Energy Watch, PG&E, or the South San Francisco Scavenger Company.

Community Costs and Savings are included when applicable. This analysis identifies the added costs for purchasing or incorporating more expensive, energy-saving materials and technology such as hybrid or electric vehicles, equipment to reduce or monitor energy use, and renewable energy installations. It is anticipated that any added costs identified in this analysis should be offset through future energy, fuel, water, or other savings, providing monetary savings that outweigh the added upfront costs. These cost estimates are provided as a range or scale to emphasize the estimated nature of this indicator and allow for cross-sector comparisons. Note that municipal costs for City government activities are not estimated, since costs will vary greatly based on the range of implementation. All municipal costs will also be further analyzed through subsequent department budgets and capital improvement programs.

The following cost ranges are presented for community costs:

Costs (\$)	Range
0–1,000	Minimal
1,000–25,000	Low
25,001–100,000	Low-Mid
100,001–200,000	Medium
200,001–500,000	Medium-High
Over 500,000	High

CHAPTER 6

For some measures, there are too many uncertainties to accurately estimate costs and/or savings. Costs and savings have not been estimated for supportive measures. For more details on the specific actions of each measure, the expected savings, and the methods used to estimate costs, see **Appendix D**. The implementation matrix is presented in **Table 10**.

Table 10: Implementation Matrix

Measure		Time Frame	Responsible Department	Partner Agencies	Community Costs	Community Savings
1.1	Alternative Transportation	Mid-Term	Economic & Community Development	MTC, Peninsula Alliance, C/CAG	Minimal	High
1.2	Employee Commutes	Mid-Term	Economic & Community Development	MTC, Peninsula Alliance, BART, SamTrans, Caltrain, C/CAG	Minimal	High
1.3	High-Density and Mixed-Use Development	Long-Term	Economic & Community Development	ABAG,, MTC	Minimal	High
2.1	Alternative-Fuel Vehicles	Mid-Term	Economic & Community Development	South San Francisco Scavenger Co., South San Francisco Yellow Cab Company	High	Medium-High
2.2	Off-Road Vehicles and Equipment	Mid-Term	Economic & Community Development/ Public Works	BAAQMD	Unknown	Unknown
3.1	New Construction Energy Efficiency	Near-Term	Economic & Community Development	San Mateo County Energy Watch, PG&E	High	Medium-High
3.2	Residential Energy Efficiency	Near-Term	Economic & Community Development	PG&E, San Mateo County Energy Watch, BAAQMD, San Mateo County Association of Realtors	High	High
3.3	Nonresidential Energy	Mid-Term	Economic & Community	PG&E, BAAQMD,	High	High

IMPLEMENTATION

Measure		Time Frame	Responsible Department	Partner Agencies	Community Costs	Community Savings
	Efficiency		Development	South San Francisco Chamber of Commerce, Bay Area Green Business Program		
3.4	Urban Cooling	Mid-Term	Economic & Community Development/ Parks and Recreation	Arbor Day Foundation	Unknown	Medium-Low
3.5	Energy Efficiency Behavior and Education	Mid-Term	Economic & Community Development	PG&E, San Mateo County Association of Realtors	High	Medium-High
4.1	Alternative Energy	Long-Term	Economic & Community Development	PG&E	Unknown	High
4.2	Alternative Energy Cost	Near-Term	Economic & Community Development	PG&E, San Mateo County Energy Watch	Supportive – Not quantified	Supportive – Not quantified
4.3	Green Industry	Mid-Term	Economic & Community Development	South San Francisco Chamber of Commerce	Supportive – Not quantified	Supportive – Not quantified
5.1	Waste Reduction	Mid-Term	Public Works	South San Francisco Scavenger Co., South San Francisco Chamber of Commerce, CalRecycle	Minimal	Minimal
5.2	Landfill Emissions	Mid-Term	Public Works		Supportive – Not quantified	Supportive – Not quantified
6.1	Water Demand	Near-Term	Public Works	Cal Water, Westborough Water District	Minimal	High
6.2	Irrigation	Long-Term	Public Works/ Economic and	SFPUC, Cal Water, City of	Supportive – Not quantified	Supportive – Not quantified

CHAPTER 6

Measure		Time Frame	Responsible Department	Partner Agencies	Community Costs	Community Savings
			Community Development	San Bruno		
7.1	Municipal Energy Efficiency	Near-Term	Public Works	San Mateo County Energy Watch, PG&E	Supportive – Not quantified	Supportive – Not quantified
7.2	Municipal Water Conservation	Near-Term	Public Works	San Mateo County Energy Watch, C/CAG, PG&E	Supportive – Not quantified	Supportive – Not quantified
7.3	Municipal Waste Reduction	Mid-Term	Public Works	South San Francisco Scavenger Co.	Supportive – Not quantified	Supportive – Not quantified
7.4	Municipal Administration	Near-Term	City Manager	San Mateo County Energy Watch	Supportive – Not quantified	Supportive – Not quantified

DEVELOPMENT CHECKLIST

City staff will take a lead role integrating CAP actions into plans, programs, and policies. In addition, City staff will use the development checklist provided in **Appendix E** to identify applicable CAP measures for ministerial and discretionary projects. The checklist serves as a tool for City staff to identify required mitigation standards. The checklist also helps project applicants understand additional voluntary measures that would support sustainability. City staff will use the checklist to encourage optimal development patterns within the community.

The checklist serves as the summary of project-level standards from the CAP, functioning as the City’s one-stop shop for greenhouse gas analysis and mitigation under CEQA. The City will ensure appropriate use of the CAP for CEQA streamlining by maintaining the prerogative to identify appropriate mandatory and voluntary measures to integrate into project design or mitigation on a project-by-project basis. The City will use the development checklist and work with project applicants to determine the appropriate use of the CEQA benefits of the Climate Action Plan.

For discretionary projects seeking to use CEQA streamlining provisions, the City may require measures in this CAP as mandatory conditions of approval or as mitigation identified in a mitigated negative declaration or in an environmental impact report, as appropriate, on a project-by-project basis. This approach allows the City to ensure that new development can benefit from CEQA streamlining provisions while also ensuring that the City can achieve the reduction targets outlined in this Plan.

While the checklist is an important tool to assist City staff with CAP implementation, City staff will use it in conjunction with the CAP monitoring tool described earlier. The development checklist allows the

IMPLEMENTATION

City to track compliance for projects through the plan review process. Other individual and private actions do not go through plan review, such as behavioral changes in energy use or increased public transit ridership. The City will estimate the impact of these actions through the CAP monitoring tool described above.

MONITORING AND UPDATING THE PLAN

South San Francisco will use the multiple tools provided by this CAP to track, monitor, and update the Plan. As the City reports implementation progress, staff will evaluate the effectiveness of each measure to ensure that the anticipated GHG reductions are occurring. In the event that GHG reductions are less significant than expected, South San Francisco is able to modify existing policies or add additional policies to the CAP in order to ensure that the community achieves its local reduction target.

The City of South San Francisco has multiple opportunities to track and implement this CAP. In addition to the CAP monitoring tool, implementation matrix, and development checklist, the City is also participating in the Regionally Integrated Climate Action Planning Suite (RICAPS) effort led by San Mateo County Energy Watch and the City/County Association of Governments of San Mateo County (C/CAG). The City will use outputs from the CAP monitoring tool to participate in the regional RICAPS implementation effort. RICAPS will provide an online platform to track regional GHG reductions. Additionally, RICAPS will also serve as a forum for ongoing regional partnerships. Together with other agencies participating in the RICAPS effort, the City will work to identify new opportunities to support CAP implementation.

GLOSSARY

GLOSSARY

GLOSSARY

Air Basin: A land area with generally similar meteorological and geographic conditions throughout. To the extent possible, air basin boundaries are defined by the California Air Resources Board (CARB) along political boundary lines and include both the source and receptor areas. California is currently divided into 15 air basins. South San Francisco is in the San Francisco Bay Area Air Basin.

Air Pollutants: Amounts of foreign and/or natural substances occurring in the atmosphere that may result in adverse effects to humans, animals, vegetation, and/or materials.

American Recovery and Reinvestment Act (ARRA): Commonly referred to as the Stimulus Plan or Recovery Act, ARRA is an economic stimulus package enacted by the federal government in 2009. The intent of the stimulus is to create jobs and promote investment and consumer spending during the economic recession.

Assembly Bill (AB) 32, California Global Warming Solutions Act of 2006: Establishes a comprehensive program of regulatory and market mechanisms to achieve real, quantifiable, cost-effective reductions of greenhouse gases (GHG) for the State of California. AB 32 designates the California Air Resources Board (CARB) as the responsible agency for monitoring and reducing statewide GHG emissions to reduce emissions to 1990 levels by 2020.

Assembly Bill (AB) 811: Authorizes all cities and counties in California to designate areas within which willing property owners may finance the installation of distributed renewable energy generation, as well as energy efficiency improvements, through low-interest loans. These financing programs are commonly referred to as Property Assessed Clean Energy, or PACE, programs.

Association of Bay Area Governments (ABAG): The regional planning agency for the 9 counties and 101 incorporated cities in the San Francisco Bay Area.

Buildout: Development of land to its full potential or theoretical capacity as permitted under current or proposed planning or zoning designations.

Business-as-Usual (BAU): A business-as-usual projection forecasts greenhouse gas emissions without regulatory or technical intervention to reduce GHG emissions.

California Air Resources Board (CARB): A division of the California Environmental Protection Agency charged with protecting public health, welfare, and ecological resources through the reduction of air pollutants.

California Climate Adaptation Strategy (CAS): Summarizes the best-known science on climate change impacts to California and provides recommendations on how to manage the risks.

California Environmental Quality Act (CEQA): A state law requiring state and local agencies to regulate activities with consideration for environmental protection. If a proposed activity has the potential for a significant adverse environmental impact, an environmental impact report (EIR) must

GLOSSARY

be prepared and certified as to its adequacy before action can be taken on the proposed project. General plans require the preparation of a program EIR.

California Green Building Standards Code (CALGreen): The 2010 California Green Building Standards Code, commonly referred to as the CALGreen Code, is a statewide mandatory construction code that was developed and adopted by the California Building Standards Commission and the Department of Housing and Community Development. The CALGreen standards require new residential and commercial buildings to comply with mandatory measures under the topics of planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, and environmental quality. CALGreen also provides voluntary tiers and measures that local governments may adopt that encourage or require additional measures in the five green building topics.

California Solar Initiative (CSI): Allows the California Public Utilities Commission (CPUC) to provide incentives to install solar technology on existing residential, commercial, nonprofit, and governmental buildings if they are customers of the state's investor-owned utilities: Pacific Gas & Electric (PG&E), San Diego Gas & Electric (SDG&E), or Southern California Edison (SCE).

Carbon Dioxide (CO₂): A colorless, odorless gas that occurs naturally in the earth's atmosphere. Significant quantities are also emitted into the air by fossil fuel combustion.

Carbon Dioxide Equivalent (CO₂e): A metric measure used to compare the emissions from various greenhouse gases based on their global warming potential (GWP). The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated GWP.

Carbon Sequestration: The process through which agricultural and forestry practices remove carbon dioxide (CO₂) from the atmosphere. The term "carbon sinks" is also used to describe agricultural and forestry lands that absorb CO₂.

Car Sharing: A type of car rental where people rent cars for short periods of time, often by the hour.

Clean Air Act: Requires the US Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards for six common air pollutants, known as "criteria pollutants," that are found all over the United States: particle pollution (particulate matter), ground-level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. The EPA regulates the pollutants by developing human health-based and/or environmentally based criteria (science-based guidelines) for setting permissible levels.

Clean Car Fuel Standards (AB 1493, Pavley): Signed into law in 2002 and commonly referred to as Pavley standards. Requires carmakers to reduce GHG emissions from new passenger cars and light trucks beginning in 2011. CARB anticipates that the Pavley standards will reduce GHG emissions from new California passenger vehicles by about 22% in 2012 and by about 30% in 2016, all while improving fuel efficiency and reducing motorists' costs.

Climate Action Plan (CAP): A strategic plan that establishes policies and programs for reducing (or mitigating) a community's GHG emissions and adapting to the impacts of climate change.

GLOSSARY

Climate Change (also referred to as global climate change): The term “climate change” is sometimes used to refer to all forms of climatic inconsistency, but because the earth’s climate is never static, the term is more properly used to imply a significant change from one climatic condition to another. In some cases, climate change has been used synonymously with the term “global warming”; scientists, however, tend to use the term in the wider sense to also include natural changes in climate.

Climate Change Adaptation: The adjustment in natural or human systems to respond to actual or expected climate changes to minimize harm or take advantage of beneficial opportunities.

Climate Change Mitigation: A technical or behavioral intervention to reduce the sources of greenhouse gas emissions in order to reduce the potential effects of climate change.

Climate Zone: The California Energy Commission (CEC) has classified the distinct climates throughout California by climate zone to recognize the variability in energy use based on local weather patterns. The CEC uses these climate zones to determine energy budgets for new and renovated buildings and prescriptive packages for each climate zone to ensure that they meet the State’s Title 24 energy efficiency standards.

Co-Benefits: An additional benefit occurring from the implementation of a GHG reduction measure that is not directly related to reducing greenhouse gas emissions.

Complete Streets: Complete streets policies ensure that transportation planners and engineers consistently design and operate the entire roadway with all potential users in mind. This includes private vehicles, bicyclists, public transportation vehicles and riders, and pedestrians of all ages and abilities. In 2007, the State of California adopted AB 1358, which directs the legislative body of a city or county, upon revision of the circulation element of its general plan, to identify how the jurisdiction will provide for the routine accommodation of all users.

Compressed Natural Gas (CNG): A fossil fuel substitute for gasoline, diesel, or propane that can be used in passenger and heavy-duty vehicles.

Conditioned Space: An enclosed space capable of being heated or cooled. Directly conditioned space contains heating and/or cooling equipment of a set capacity. Indirectly conditioned space is either naturally ventilated or is located adjacent to a directly conditioned space and allows for sufficient heat transfer. Precisely defined in the California Building Standards Code.

Conservation: Planned management of a natural resource to prevent exploitation, destruction, or neglect.

Construction and Demolition Waste (C&D): C&D materials consist of the waste generated during the construction, demolition, or renovation of buildings, roads, and other construction projects. C&D materials may include heavy, bulky materials such as concrete, glass, wood, and metal, among other materials.

GLOSSARY

Deep Retrofit: A building retrofit that includes extensive upgrades to a building's shell and distributed systems, including heating/ventilation/air conditioning (HVAC) and lighting. Deep retrofits require more resources than a standard retrofit, but result in greater energy and cost savings.

Distributed Energy Resources (DER): Small, modular, energy generation and storage technologies that provide electric capacity or energy located where it's needed. DERs typically produce less than 10 megawatts (MW) of power and include wind turbines, photovoltaic (PV), fuel cells, micro turbines, reciprocating engines, combustion turbines, cogeneration, and energy storage systems. DER systems may be either connected to the local electric power grid or isolated from the grid in stand-alone applications.

Emission Standard: The maximum amount of pollutant legally permitted to be discharged from a single source, either mobile or stationary.

Energy Conservation: Reducing energy waste, such as turning off lights, heating, and motors when not needed.

Energy Efficiency: Doing the same or more work with less energy, such as replacing incandescent light bulbs with compact fluorescent light bulbs or buying an Energy Star appliance to use less energy for the same or greater output.

Energy Efficiency and Conservation Block Grant (EECBG): The EECBG program was funded through the American Recovery and Reinvestment Act and is managed by the US Department of Energy to assist cities, counties, states, and territories to develop, promote, and implement energy efficiency and conservation programs and projects.

Energy Efficiency Standards (Title 24, Part 6): Title 24 standards were first adopted in 1978 and established minimum energy efficiency standards for residential and nonresidential buildings. These standards are updated continually by providing more stringent energy budgets for new buildings in an effort to reduce California's energy consumption.

Energy Star: A joint program of the US Environmental Protection Agency and the US Department of Energy to provide consumers with information and incentives to purchase the most energy-efficient products available.

Energy Star Portfolio Manager: An online management tool that allows nonresidential building owners and tenants to track and assess energy and water use over time. Benchmarking energy and water use allows building owners to identify investment priorities, determine underperforming buildings, and verify efficiency improvements.

Environment: In CEQA, "the physical conditions which exist within the area which will be affected by a proposed project, including land, air, water, mineral, flora, fauna, noise, and objects of historic or aesthetic significance."

Environmental Impact Report (EIR): A report required by the California Environmental Quality Act (CEQA) that assesses all the environmental characteristics of an area and determines what effects or

GLOSSARY

impacts will result if the area is altered or disturbed by a proposed action or project. See California Environmental Quality Act (CEQA).

Environmentally Preferable Purchasing (EPP): California law requires state government to practice environmentally preferable purchasing, which is the procurement of goods and services that have a reduced impact on human health and the environment as compared to other goods and services serving the same purpose.

Feasible: Capable of being accomplished in a successful manner within a reasonable time taking into account economic, environmental, social, and technological factors.

Fossil Fuel Facilities: Include, but are not limited to, oil and gas wells, separators, and refineries.

Global Warming Potential (GWP): An index used to translate the level of emissions of various gases into a common measure in order to compare the relative potency of different gases without directly calculating the changes in atmospheric concentrations. Greenhouse gases are expressed in terms of carbon dioxide equivalent. Global warming potentials are expressed in terms relative to carbon dioxide, which has a global warming potential of 1.

Graywater: Wastewater collected from showers, bathtubs, bathroom sinks, and clothes washing machines that is reused on site for irrigation purposes.

Green Building: Sustainable or “green” building is a holistic approach to design, construction, and demolition that minimizes the building’s impact on the environment, the occupants, and the community. See the California Green Building Standards Code for green building regulations in California.

Greenhouse Gas or Greenhouse Gases (GHG): Gases which cause heat to be trapped in the atmosphere, warming the earth. Greenhouse gases are necessary to keep the earth warm, but increasing concentrations of these gases are implicated in global climate change. Greenhouse gases include all of the following: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The majority of greenhouse gases come from natural sources, although human activity is also a major contributor.

Greenhouse Gas Inventory: A greenhouse gas (GHG) inventory provides estimates of the amount of GHGs emitted to and removed from the atmosphere by human activities. A city or county that conducts an inventory looks at both community emission sources and emissions from government operations. A base year is chosen and used to gather all data from that year. Inventories include data collection from such things as vehicle miles traveled (VMT), energy usage from electricity and gas, and waste. Inventories include estimates for carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulfur hexafluoride (SF₆), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs), which are referred to as the six Kyoto gases.

Green Waste: Refers to lawn, garden, or park plant trimmings and materials and can be used in home composters or picked up curbside by municipal waste haulers.

GLOSSARY

Indicator: Types of data or information that can be used to determine the progress or success of each reduction measure.

LEED: Leadership in Energy and Environmental Design, a standard established by the US Green Building Council.

Life-Cycle Costing (LCC): The process of evaluating the total overall costs and benefits of buildings or equipment over time, including initial costs of design and construction; operating costs; long-term costs of maintenance, repair, and replacement; and other environmental or social costs over its full life, rather than simply based on purchase cost alone.

Light-Emitting Diode (LED): A lower energy consuming and longer-lasting alternative to incandescent and compact fluorescent light bulbs.

Low Carbon Fuel Standard (S-01-07): An executive order from former Governor Schwarzenegger, the Low Carbon Fuel Standard established the goal of reducing the carbon intensity of transportation fuels in California by 10% by 2020.

Low Impact Development (LID): An innovative stormwater management approach with a basic principle to design the built environment to remain a functioning part of an ecosystem rather than exist apart from it. LID's goal is to mimic a site's predevelopment hydrology by using design techniques that infiltrate, filter, store, evaporate, and detain runoff close to its source.

Metropolitan Planning Organization (MPO): A federally funded transportation planning organization comprising representatives from local government agencies and transportation authorities. See Association of Bay Area Governments (ABAG) for more information on the local MPO.

Mixed Use: Properties on which various uses such as office, commercial, institutional, and residential are combined in a single building or on a single site in an integrated development project with significant functional interrelationships and a coherent physical design. A single site may include contiguous properties.

National Ambient Air Quality Standards: The prescribed level of pollutants in the outside air that cannot be exceeded legally during a specified time in a specified geographical area.

Native Species: A species within its natural range or natural zone of dispersal, i.e., within the range it would or could occupy without direct or indirect introduction and/or care by humans.

Neighborhood Electric Vehicle (NEV): Small, battery-powered, low-speed electric vehicles. NEVs are typically limited to streets with a posted speed limit of 25 mph or less. NEVs are classified by the California Air Resources Board as zero-emissions vehicles, as they do not produce any tailpipe emissions.

Nonattainment: The condition of not achieving a desired or required level of performance. Frequently used in reference to air quality.

GLOSSARY

Nonrenewable Energy: Energy from sources that use a nonrenewable natural resource such as uranium or fossil fuels such as coal, oil, or natural gas.

Operations and Maintenance (O&M): Refers to the activities related to the routine, preventive, predictive, scheduled, and unscheduled actions aimed at preventing equipment failure or decline with the goal of increasing efficiency, reliability, and safety.

Ordinance: A law or regulation set forth and adopted by a governmental authority, usually a city or county.

Ozone: Produced when gases or vapors created by cars, solvents, factories, and pesticides mix and react in the presence of sunlight. This results in certain health effects such as breathing difficulties, lung damage, coughing, and chest pains.

Particulate Matter (PM₁₀) and Fine Particulate Matter (PM_{2.5}): Fine mineral, metal, smoke, soot, and dust particles suspended in the air. In addition to reducing visibility, particulate matter can lodge in the lungs and cause serious, long-term respiratory illness and other health problems. The smaller the size of the particle, the deeper it can penetrate into the lungs and the more difficult it is to expel.

Preservation: To keep safe from injury, harm, or destruction.

Property Assessed Clean Energy (PACE): See Assembly Bill 811.

Recycled Water: Wastewater from tubs, toilets, and sinks inside homes and offices that is cleaned through a treatment process, producing non-potable water that is safe for landscapes, raw vegetable crops, and agricultural crops.

Reduction Measure: A goal, strategy, program, or set of actions that target and reduce a specific source of greenhouse gas emissions.

Regional Transportation Plan (RTP): A long-term blueprint of the region's transportation systems. The RTP is a federally mandated comprehensive long-range regional planning document that identifies the region's transportation needs, sets forth an action plan of projects, determines actions and programs to address the needs and issues, and documents the financial resources needed to implement the RTP.

Renewable Energy: Energy from sources that regenerate and are less damaging to the environment, such as solar, wind, biomass, and small-scale hydroelectric power.

Renewables Portfolio Standard (RPS): A regulation requiring utility companies in California to increase the production of renewable energy from solar, wind, biomass, or geothermal sources.

Retrofit Upon Sale: Requirements on real property to replace inefficient water or energy fixtures as a condition of escrow. Retrofit upon sale requirements typically require a certificate or other form of verification from local government agencies to ensure that the fixtures are replaced and meet minimum efficiency requirements.

GLOSSARY

Regionally Integrated Climate Action Planning Suite (RICAPS): A project led by the County of San Mateo Public Works Department and the City/County Association of Governments of San Mateo County (C/CAG) to provide GHG reduction measures and tools for quantification to jurisdictions in San Mateo County.

Safe Routes to School (SR2S or SRTS): A national movement aimed at providing safe environments to encourage walking and bicycling surrounding local schools through engineering, enforcement, education, encouragement, and evaluation. Safe Routes to School programs are typically funded through federal, state, and local grants. SR2S is the California program; SRTS is the national program.

San Mateo County Energy Watch: A partnership between the City/County Association of Governments of San Mateo County (C/CAG) and PG&E to promote energy efficiency programs, including energy audits, trainings, and the installation of energy-efficient appliances.

Senate Bill (SB) X7-7: Passed in 2009, SB X7-7 requires the state to achieve a 20% reduction in per capita water use by 2020. This law also requires local water providers to set an interim 2015 and a final 2020 community-wide target and demonstrate that projected water use is in compliance with that target, otherwise funding will be affected.

Senate Bill (SB) 97: Requires lead agencies to analyze GHG emissions and climate change impacts under CEQA.

Senate Bill (SB) 375: Directs the metropolitan planning organizations in California to create a Sustainable Communities Strategy as part of the Regional Transportation Plan. The SCS will demonstrate how the region will achieve the 2020 and 2035 GHG reduction targets for the region set by CARB.

Senate Bill (SB) 1016: Adopted in 2008, SB 1016 establishes per capita waste disposal rate requirements and goals for local agencies in California. The requirements are expressed in a pounds per person per day measurement.

Smart Grid: The smart grid delivers electricity from suppliers to consumers using two-way digital communications. The smart grid is envisioned to overlay the ordinary electrical grid with an information and net metering system, which includes smart meters. Smart meters will allow consumers to become more aware of their energy use and in the future will allow smart grid enabled appliances to be pre-programmed to operate at a time when electricity use or costs are lowest.

Sustainability: Community use of natural resources in a way that does not jeopardize the ability of future generations to live and prosper.

Sustainable Communities Strategy (SCS): The land use element of each MPO's Regional Transportation Plan as required by SB 375. The SCS will demonstrate how the region will achieve the 2020 and 2035 VMT and GHG reduction targets for the region set by CARB.

Sustainable Development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

GLOSSARY

Transit-Oriented Development (TOD): A mixed-use residential or commercial area designed to maximize access to transit options.

Transportation Demand Management (TDM) Plan: A voluntary or mandatory program developed by local agencies, large employers, or high traffic commercial services to limit the amount of congestion and pollution related to transportation demand. TDM plans may include incentives, regulations, and education about transportation alternatives.

Unbundled Parking: A parking strategy in which parking spaces are rented or sold separately, rather than automatically included with the rent or purchase price of a residential or commercial unit.

Urban Heat Island: The term “heat island” describes built-up areas that are hotter than nearby rural areas. On a hot, sunny summer day, roof and pavement surface temperatures can be 50–90°F (27–50°C) hotter than the air, while shaded or moist surfaces remain close to air temperatures. These surface urban heat islands, particularly during the summer, have multiple impacts and contribute to atmospheric urban heat islands. Heat islands can affect communities by increasing summertime peak energy demand, air conditioning costs, air pollution and greenhouse gas emissions, heat-related illness and mortality, and water quality.

Urban Reserve: An area outside of an urban service area but within an urban growth boundary, in which future development and extension of municipal services are contemplated but not imminent.

Vehicle Miles Traveled (VMT): A key measure of overall street and highway use. Reducing VMT is often a major objective in efforts to reduce vehicular congestion and achieve regional air quality goals.

Vulnerable Populations: There are three primary segments of vulnerable populations: those at risk to adverse climate change impacts due to exposure, sensitivity, or adaptive capacity.

Exposure: Physical conditions may put particular populations at risk to the impacts of climate change. For instance, populations living in low-lying or coastal areas may be more exposed to flooding events and sea level rise, while those who work outside may suffer from health-related issues due to increased temperatures and decreased air quality.

Sensitivity: Certain populations, including young children and those over the age of 65, are physiologically more sensitive to extreme temperatures and increased instances of air pollution.

Adaptive Capacity: The adaptive capacity of lower-income and institutionalized populations can be limited due to lower access to the resources necessary to prepare for or react to the long-term impacts of climate change and the increased frequency of disasters.

Water Conservation: Reducing water use, such as by turning off taps, shortening shower times, and reducing outdoor irrigation demand.

Water-Efficient Landscape: Native or low-water-using landscapes. Water-efficient landscapes are required by law in all cities and counties in California to conserve water.

GLOSSARY

Water Use Efficiency: Replacing older technologies and practices in order to accomplish the same results with less water, for example, by replacing toilets with new high efficiency models and by installing “smart controllers” in irrigated areas.

REFERENCES

REFERENCES

- Bedsworth, L., and E. Hanak. 2008. Preparing California for a Changing Climate. San Francisco: Public Policy Institute of California. http://www.ppic.org/content/pubs/report/R_1108LBR.pdf.
- Bromirski, et al. 2012. Coastal Flooding – Potential Projections: 2000–2100. CEC-500-2012-011. Sacramento: CEC. <http://www.energy.ca.gov/2012publications/CEC-500-2012-011/CEC-500-2012-011.pdf>.
- California Air Resources Board (CARB). 2012. Additional Auction 1 Summary Statistics. Sacramento: CARB. http://www.arb.ca.gov/cc/capandtrade/auction/november_2012/auction1_summary_statistics_2012q4nov.pdf.
- California Energy Commission (CEC). 2006a. *Our Changing Climate: Assessing the Risks to California*. Web document. Sacramento: CEC.
- . 2011. Cal-Adapt: Exploring California’s Climate Research. Sacramento: CEC. <http://cal-adapt.org/>.
- . 2012. *Our Changing Climate 2012: Vulnerability & Adaptation to the Increasing Risks from Climate Change in California*. CEC-500-2012-007. Sacramento: CEC. <http://www.energy.ca.gov/2012publications/CEC-500-2012-007/CEC-500-2012-007.pdf>.
- California High-Speed Rail Authority. 2012. Interactive Route Map. Sacramento. http://www.cahighspeedrail.ca.gov/trip_planner.aspx.
- California Integrated Waste Management Board. 2009. California 2008 Statewide Waste Characterization Study. Sacramento. <http://www.calrecycle.ca.gov/Publications/Documents/General/2009023.pdf>.
- California Natural Resources Agency (CNRA). 2009. 2009 California Climate Adaptation Strategy. Sacramento: CNRA. http://resources.ca.gov/climate_adaptation/docs/Statewide_Adaptation_Strategy.pdf.
- . 2012. California Climate Adaptation Planning Guide. Sacramento: CNRA. http://resources.ca.gov/climate_adaptation/local_government/adaptation_policy_guide.html.
- Cayan, D., et al. 2012. Climate Change and Sea Level Rise Scenarios for California Vulnerability and Adaptation Assessment. CEC-500-2012-008. Sacramento: CEC. <http://www.energy.ca.gov/2012publications/CEC-500-2012-008/CEC-500-2012-008.pdf>.
- City/County Association of Governments of San Mateo County (C/CAG). 2012. San Bruno/South San Francisco Community-Based Transportation Plan.
- City of South San Francisco. 2010. South San Francisco Zoning Ordinance. South San Francisco, CA. <http://zoning.ssf.net/zopdfs/complete.pdf>.

REFERENCES

- . 2011. City of South San Francisco General Plan. South San Francisco, CA. <http://www.ssf.net/index.aspx?NID=360>
- . 2012. Aircraft Noise Insulation Program. South San Francisco, CA. <http://ssf.net/index.aspx?NID=249>.
- . 2012. Green X-Ray House. South San Francisco, CA. <http://www.ssf.net/index.aspx?NID=1027>.
- . 2012. October 2012 Genentech Draft Supplemental EIR & Appendices. South San Francisco, CA. www.ssf.net/DocumentCenter/View/4054.
- . 2012. August 2012 Genentech Final Supplemental EIR. South San Francisco, CA. <http://www.ssf.net/DocumentCenter/View/3911>.
- . n.d. South San Francisco Fast Facts. South San Francisco, CA.
- Ekstrom, J. A., and S. C. Moser. 2012. Climate Change Impacts, Vulnerabilities, and Adaptation in the San Francisco Bay Area: A Synthesis of PIER Program Reports and Other Relevant Research. CEC-500-2012-071. Sacramento: CEC. <http://www.energy.ca.gov/2012publications/CEC-500-2012-071/CEC-500-2012-071.pdf>.
- Feely, R. A., et al. 2004. Impact of Anthropogenic CO₂ on the CaCO₃ System in the Oceans. *Science* 305 (5682): 362–366.
- Garbarino, R. 2012. Industrial City's Sustainability Initiatives. The Daily Energy Report. <http://www.dailyenergyreport.com/industrial-citys-sustainability-initiatives/>.
- Genentech, Inc. 2012. Annual Report 2012: Genentech Facilities Ten Year Master Plan. South San Francisco, CA.
- Hadley Centre for Climate Protection and Research. 2009. Exeter, Devon, United Kingdom: Met Office. <http://www.metoffice.gov.uk/climate-change/resources/hadley>.
- Hansen, J., et al. 2008. Target atmospheric CO₂: Where should humanity aim? *Atmospheric and Oceanic Physics* 2: 217–231.
- Heberger, M., et al. 2009. The Impacts of Sea-Level Rise on the California Coast. CEC-500-2009-024-F. Sacramento: CEC. <http://www.energy.ca.gov/2009publications/CEC-500-2009-024/CEC-500-2009-024-F.PDF>.
- Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007 Synthesis Report: Contribution of Working Groups I, II, and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland: IPCC.
- Jacobson, M. Z. 2005. Correction to control of fossil-fuel particulate black carbon and organic matter, possibly the most effective method of slowing global warming. *Journal of Geophysical Research* 110: 5.

REFERENCES

- Margolis, H., A. Gershunov, T. Kim, and R. Trent. 2008. "2006 California Heat Wave High Death Toll: Insights Gained from Coroner's Reports and Meteorological Characteristics of Event." *Epidemiology* 19 (6): 363–364.
http://journals.lww.com/epidem/Fulltext/2008/11001/2006_California_Heat_Wave_High_Death_Toll_1000.aspx.
- National Oceanic and Atmospheric Administration (NOAA). 2008. National Climactic Data Center. Asheville, NC: NOAA. <http://www.ncdc.noaa.gov/>.
- One Bay Area. 2012. Final Jobs-Housing Connection Strategy (May 16, 2012). One Bay Area. <http://onebayarea.org/regional-initiatives/plan-bay-area/plan-elements/Housing-and-Jobs.html>.
- Roland-Holst, D., and F. Kahrl. 2008. California Climate Risk and Response. San Francisco: Next 10. <http://www.next10.org/california-climate-risk-and-response>.
- San Mateo County RecycleWorks. n.d. Understanding C&D Recycling Requirements. Redwood City, CA. http://www.recycleworks.org/pdf/CD_office_guide_pg_4_5.pdf.
- US Census Bureau. 2010. 2010 Census, Table DP-1: Profile of General Population and Housing Characteristics, South San Francisco, CA. Suitland, MD: US Census Bureau.
- . 2012. On the Map: South San Francisco, CA. Suitland, MD: US Census Bureau. <http://onthemap.ces.census.gov/>.

INVENTORY SOURCES

- Association of Bay Area Governments (ABAG). 2009. South San Francisco Population Projections. Oakland, CA: ABAG.
- Bay Area Air Quality Management District (BAAQMD). 2012. 2008 South San Francisco GHG Inventory. San Francisco: BAAQMD.
- Bay Area Rapid Transit District (BART). 2008. BART Greenhouse Gas Inventory Results Report. Oakland, CA: BART. http://www.bart.gov/docs/BART_Greenhouse_Gas_Inventory_Report.pdf.
- . 2010. August 2010 Monthly Ridership Report. Oakland, CA: BART. http://173.236.146.14/ridership/Ridership_August2010.xlsx.
- Bay Area Water Supply & Conservation Agency. 2010. Annual Survey and Water Conservation Report. San Mateo, CA: BAWSCA. http://bawasca.org/docs/BAWSCA_Survey_08_09_FINAL_rev_5_3.pdf.
- California Air Resources Board (CARB). 2010. Clean Car Standards – Pavley, Assembly Bill 1493. <http://www.arb.ca.gov/cc/ccms/ccms.htm>.
- . 2010. Local Government Operations Protocol, Version 1.1. http://www.arb.ca.gov/cc/protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf.

REFERENCES

- . 2010. OFFROAD 2007. <http://www.arb.ca.gov/msei/offroad/offroad.htm>.
- . 2011. Landfill Emissions Tool, Version 1.3. http://www.arb.ca.gov/cc/protocols/localgov/pubs/landfill_emissions_tool_v1_3_2011-11-14.xls.
- . 2012. Assembly Bill 32: Global Warming Solutions Act. <http://www.arb.ca.gov/cc/ab32/ab32.htm>.
- . 2012. EMFAC2011. <http://www.arb.ca.gov/msei/modeling.htm>.
- . 2012. Low Carbon Fuel Standard Program. <http://www.arb.ca.gov/fuels/lcfs/lcfs.htm>.
- . 2012. Mandatory GHG Reporting Data: Emissions Reported for Calendar Year 2008. http://www.arb.ca.gov/cc/reporting/ghg-rep/reported_data/mandatory_reporting_facility_2008_summary_2012-03-12.xlsx.
- California Department of Resources Recycling and Recovery (CalRecycle). 2010. Disposal Reporting System: Facility Reports. <http://www.calrecycle.ca.gov/LGcentral/Reports/DRS/Origin/FacSummary.aspx>.
- California Energy Commission (CEC). 2005. California's Water – Energy Relationship. <http://www.energy.ca.gov/2005publications/CEC-700-2005-011/CEC-700-2005-011-SF.PDF>.
- . 2006. Refining Estimates of Water-Related Energy Use in California. <http://www.energy.ca.gov/2006publications/CEC-500-2006-118/CEC-500-2006-118.PDF>.
- . 2012. Building Energy Efficiency Program. <http://www.energy.ca.gov/title24/>.
- California Public Utilities Commission (CPUC). 2012. California Renewables Portfolio Standard (RPS). <http://www.cpuc.ca.gov/PUC/energy/Renewables/index.htm>.
- Caltrain. 2006. 2005 Annual Passenger Counts. http://www.caltrain.com/Assets/Stats+and+Reports/Ridership/2005_Caltrain_Ridership_Counts.pdf.
- Federal Transit Administration. 2009. National Transit Database: San Francisco Bay Area Rapid Transit District (BART) 2008 Agency Profile. http://www.ntdprogram.gov/ntdprogram/pubs/profiles/2008/agency_profiles/9003.pdf.
- Fehr & Peers. 2010. South San Francisco Transportation Baseline and Future Year Inventory Memorandum. San Francisco: Fehr & Peers.
- Gabewell, Inc. 2000. Final Closure and Post-Closure Maintenance Plan, Oyster Point Landfill. San Francisco: Gabewell, Inc.
- ICLEI – Local Governments for Sustainability USA. 2009. City of South San Francisco 2005 Government Operations Greenhouse Gas Emissions Inventory. Oakland, CA: ICLEI. <http://ca-southsanfrancisco.civicplus.com/DocumentCenter/Home/View/2473>.

REFERENCES

National Resources Defense Council. 2004. Energy Down the Drain: The Hidden Cost of California's Water Supply. New York City: NRDC. <http://www.nrdc.org/water/conservation/edrain/edrain.pdf>.

Pacific Gas and Electric (PG&E). 2010. Rate Data Analysis: GHG Phase 1 Gas and Electric GHG Summary for South San Francisco. San Francisco: PG&E.

———. 2011. Greenhouse Gas Emission Factors Info Sheets.
http://www.pge.com/includes/docs/pdfs/shared/environment/calculator/pge_ghg_emission_factor_info_sheet.pdf.

US Census Bureau. 2011. 2009–2011 American Community Survey, Table S2504: Physical Housing Characteristics for Occupied Housing Units, South San Francisco, CA. Suitland, MD: US Census Bureau. http://factfinder2.census.gov/bkmk/table/1.0/en/ACS/11_3YR/S2504/1600000US0673262.

US Department of Housing and Urban Development. n.d. SOCDS Building Permit Database. Washington, D.C.: HUD. <http://socds.huduser.org/permits/index.html>.

REFERENCES

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APPENDIX A
SCIENTIFIC AND REGULATORY
BACKGROUND

APPENDIX A

APPENDIX - A: SCIENTIFIC AND REGULATORY BACKGROUND

In order to develop and implement meaningful and effective strategies for greenhouse gas reduction and climate adaptation, it is necessary to understand the science of climate change and the associated policy framework. This appendix summarizes the scientific research of the causes of climate change and its global implications, providing the rationale behind climate planning efforts. The discussion of federal, state, regional, and local regulations regarding climate change from **Chapter 2** should be considered in tandem with this appendix as the background of this Climate Action Plan's development.

CLIMATE CHANGE OVERVIEW

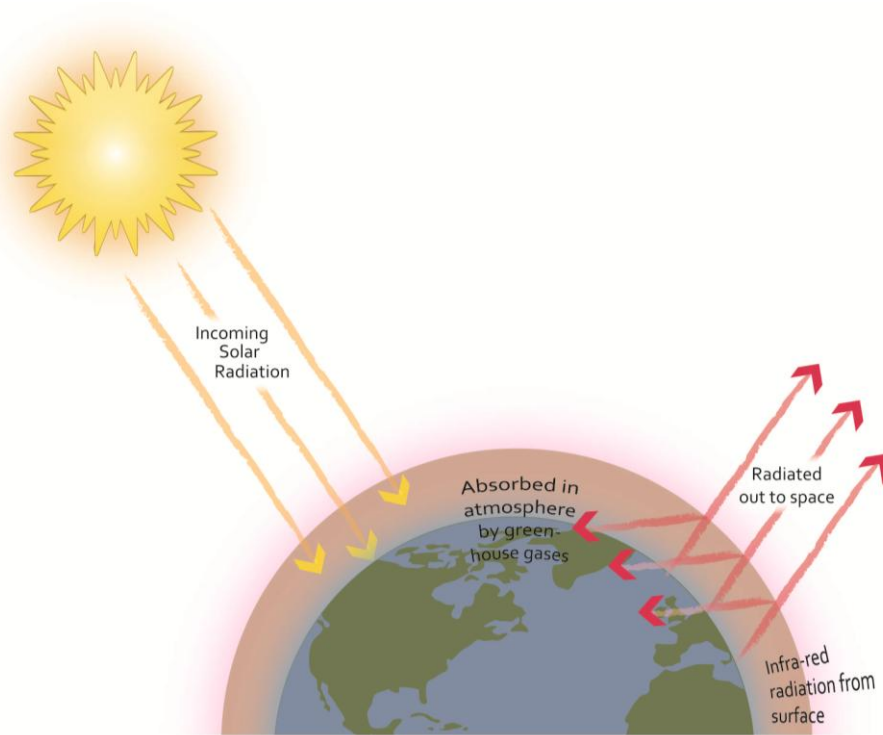
The earth's atmosphere contains a number of gases that are collectively known as greenhouse gases, or GHGs. When sunlight hits the earth, a portion of it is absorbed and radiated back into the atmosphere as heat. GHGs reflect some of this heat energy into the atmosphere and down toward the earth's surface instead of allowing it all to escape into space, a process known as the greenhouse effect as shown in **Figure A-1**. The greenhouse effect is a natural and necessary process, as the planet's average temperature would be about -2 degrees Fahrenheit without the influence of GHGs. However, it is scientific consensus that human activities are rapidly increasing the concentration of GHGs in the atmosphere, resulting in a warming planet. Because the earth's climate system is driven by the flow of heat, the increasing temperatures result in changes to the global climate.

THE SIX INTERNATIONALLY RECOGNIZED GREENHOUSE GASES:

- Carbon Dioxide (CO₂)
- Methane (CH₄)
- Nitrous Oxide (N₂O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulfur Hexafluoride (SF₆)

SCIENTIFIC AND REGULATORY BACKGROUND

Figure A-1: The Greenhouse Effect



Source: National Oceanic and Atmospheric Administration 2008

These changes are often interchangeably referred to as “climate change” and “global warming,” although there is an appreciable difference. Global warming refers to the average increase of the earth’s temperature caused by increased GHG emissions. Climate change refers to any significant, lasting, and measurable change in climate caused by either natural factors or human activities. Climate change is becoming the more prevalent term because it encompasses all changes to the climate and not only temperature.

Prior to the Industrial Revolution, the concentration of CO₂ in the earth’s atmosphere was approximately 280 parts per million (ppm). In 2012, the average global atmospheric CO₂ level was 394 ppm, an increase of about 40%. The Intergovernmental Panel on Climate Change (IPCC) has noted that this is far above CO₂ levels at any time in the past 650,000 years and likely for much longer. Numerous scientists have advocated that CO₂ levels should be reduced to 350 ppm to avoid the most significant effects of climate change. See **Chapter 2** for a discussion of regional climate change impacts.

LEGISLATIVE BACKGROUND AND REGULATORY FRAMEWORK

In order to lessen the impacts discussed above, efforts are under way at the federal, state, regional, and local levels. This section discusses the GHG reduction actions of the federal and state governments. See **Chapter 2** for information on regional and local efforts.

APPENDIX A

FEDERAL FRAMEWORK

Currently, the federal government has not adopted a comprehensive GHG reduction program. However, there have been a number of efforts, using existing regulations and programs, to reduce nationwide emissions. The federal government also supports to the efforts of state and local governments, businesses, and individual residents to reduce their GHGs and plan for climate change, including by providing educational resources, funding, and analytical tools.

American Reinvestment and Recovery Act – Energy Efficiency and Conservation Block Grants

Some of the funds authorized by the American Reinvestment and Recovery Act (ARRA, also referred to as the federal stimulus) of 2009 has been used to support GHG reduction activities as part of the Energy Efficiency and Conservation Block Grant (EECBG) funding. This program, managed by the US Department of Energy, has provided about \$3.2 billion to cities and counties across the country for energy efficiency and fossil fuel use reductions in buildings and vehicles, reducing GHG emissions in the process.

Clean Air Act

The Clean Air Act, first signed in 1963, is a federal law used to regulate air pollution at the national level. One section of the Clean Air Act requires the US Environmental Protection Agency (EPA) to regulate and set emission standards “applicable to the emission of any air pollutant from...new motor vehicles...which...cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.” In 2003, the EPA declared that CO₂ and other GHGs were not air pollutants and could not be regulated under the act. Several states, including California, filed suit to reverse this determination. In 2007 the US Supreme Court ruled that GHGs were defined as an air pollutant under the Clean Air Act, ultimately leading to the EPA reversing its decision.

In 2012, the EPA released a draft set of regulations for new power plants, known as the Carbon Pollution Standard, requiring all future power plants to release less than a certain volume of GHGs per amount of electricity generated. These regulations are currently being reviewed and are anticipated to be implemented in 2013. The EPA has also indicated that it may seek to regulate other sources of greenhouse gases under the Clean Air Act.

CALIFORNIA LEGISLATIVE FRAMEWORK

California is the fourteenth-largest emitter of GHGs in the world and the second-largest emitter of any US state. However, California’s per capita emissions are lower than all but four states as a result of an aggressive, proactive, and long-running effort to address climate change at the state level. In 1988, Assembly Bill (AB) 4420 designated the California Energy Commission as the state’s lead agency for climate change. Since that time, and particularly in the past ten years, there have been numerous efforts to evaluate, mitigate, and adapt to the impacts of climate change. Some of the primary orders and laws are summarized below.

SCIENTIFIC AND REGULATORY BACKGROUND

Executive Order S-3-05

Signed in 2005, Executive Order S-3-05 set the following GHG emissions reduction targets:

- Reduce emissions to 2000 levels by 2010
- Reduce emissions to 1990 levels by 2020
- Reduce emissions to 80% below 1990 levels by 2050

S-3-05 also required California's Environmental Protection Agency (CalEPA) to coordinate with numerous other state agencies and officials to meet these targets.

California Global Warming Solutions Act of 2006

The California Global Warming Solutions Act of 2006, commonly known as AB 32, is the most well known of the state's climate change efforts. This landmark piece of legislation requires the California Air Resources Board (CARB) to develop the regulatory and market-based mechanisms that will allow the state to meet the goal of reducing GHG emissions to 1990 levels by 2020. There are a number of mandatory actions in AB 32, including:

- Identifying and adopting early actions to begin reducing GHG emissions by 2010. CARB put forward nine separate measures, including capturing methane from landfills, requiring large diesel ships to reduce emissions while docked at California ports, and reducing GHG emissions from air conditioners.
- The creation of a scoping plan, identifying the most technically feasible and cost-effective ways to reduce GHGs. This scoping plan, approved in 2008, includes measures such as the Renewables Portfolio Standard (RPS), the Pavley vehicle emissions standards, and a cap-and-trade program. The plan identifies local governments as a strategic partner in achieving the statewide GHG emissions reduction targets. The scoping plan also establishes a 15% reduction below 2005 GHG emissions levels as being the local equivalent of returning to 1990 emissions levels.
- Requiring the largest industrial sources of GHGs in California to annually report and verify their emissions.

Sustainable Communities and Climate Protection Act

The Sustainable Communities and Climate Protection Act, or Senate Bill (SB) 375, is an effort linking land use, transportation, and housing planning with GHG emissions to support California's reduction targets. It requires the state's 18 metropolitan planning organizations (MPOs) to include a Sustainable Communities Strategy (SCS) in their regional transportation plans. The SCS is intended to show how the region will achieve the GHG reduction target set by CARB through various planning-related strategies.

APPENDIX A

Cap and Trade

Cap and trade is a mechanism that uses market forces to reduce GHG emissions. Under this type of program, a government agency sets an enforceable limit on the amount of emissions that can be produced by a particular source (the “cap”). The agency then allocates a certain number of emissions allowances to each source, representing the total number of emissions that the source is allowed to produce. A source that emits less than its cap can auction its extra allowances to another source, which can use the purchased allowances to temporarily exceed its cap.

In California, a cap-and-trade program was identified as a statewide GHG emissions reduction measure in the AB 32 scoping plan. CARB, the government agency responsible for the program, developed California’s cap-and-trade mechanism over a multiyear process. Large industrial sources, including power plants, oil refineries, and factories, are directly responsible for 85% of California’s GHG emissions and will be regulated under the cap-and-trade program. Beginning in 2013, CARB will set a cap on the participating emission sources, which will be 2% below each source’s 2012 emissions levels. CARB plans to reduce the cap by 2–3% annually to help achieve the statewide reduction target. CARB will collect a percentage of the sale price from each allowance auction, which is estimated to create \$1 billion in state revenue for the 2012–2013 auction period and up to \$10 billion annually by 2020. The first auction, which was held on November 14, 2012, resulted in the auction of over 23 million allowances with a mean price of \$15.60 each.

The California Global Warming Solutions Act of 2006 Greenhouse Gas Reduction Fund (AB 1532), signed in 2012, guides the revenue generated by the cap-and-trade program. It requires these funds to be allocated toward measures that meet specific criteria and would be implemented in specific areas, including:

- Areas in close proximity to sources that produce toxic levels of air pollution and other hazards that can lead to negative public health effects.
- Areas that contain or produce materials posing a significant hazard to human health and safety.
- Areas with an elevated concentration of people who experience low income, high unemployment, low levels of homeownership, high costs of rent, and other socioeconomic challenges.

Another measure, SB 535, expands upon the effort created by AB 1532. SB 535 requires 10% of the revenue from cap and trade to be allocated for projects located within the disadvantaged communities as identified by AB 1532. Of the revenue from cap and trade, 25% must be allocated to projects that benefit such disadvantaged communities.

Senate Bill 97

In 2007, California adopted Senate Bill (SB) 97, which directed the Governor’s Office of Planning and Research (OPR) to amend the guidelines for the California Environmental Quality Act (CEQA) to address GHG emissions. These guidelines went into effect in 2010 and allow a local government to use an adopted plan to reduce GHG emissions that is consistent with the CEQA Guidelines in order to

SCIENTIFIC AND REGULATORY BACKGROUND

address the cumulative impact of projects on climate change, provided that the reduction plan includes a certified environmental impact report or other environmental document. In order to benefit from this streamlining process, a GHG reduction plan must accomplish the following:

- Quantify GHG emissions attributable to activities within a defined geographic area (such as a city), both existing and projected for future dates.
- Identify and analyze the GHG emissions resulting from specific actions or categories of actions that are anticipated within the set geographic area.
- Use substantive evidence to establish a level for GHG emissions below which the contribution to GHG emissions from activities covered by the reduction plan would not be cumulatively considerable.
- Establish measures, including performance standards, that substantial evidence shows would collectively reduce GHG emissions to the set level if implemented on a project-by-project basis.
- Create a mechanism to monitor the reduction plan's progress toward achieving the level, and to require amendments if the plan is not achieving the specific levels.
- Be adopted in a public process following environmental review.

BAAQMD Guidance and CEQA Tiering

In response to the updated CEQA Guidelines, the Bay Area Air Quality Management District (BAAQMD) has developed CEQA Air Quality Guidelines to assist a lead agency in evaluating air quality impacts for projects and plans in the San Francisco Bay Area Air Basin. These guidelines were updated in 2010 to establish thresholds of significance for impacts related to GHG emissions. These thresholds can be used to assess plan-level and project-level impacts, allowing a lead agency to determine that a project's impact on GHG emissions is less than significant if it is in compliance with a Qualified Greenhouse Gas Reduction Strategy.

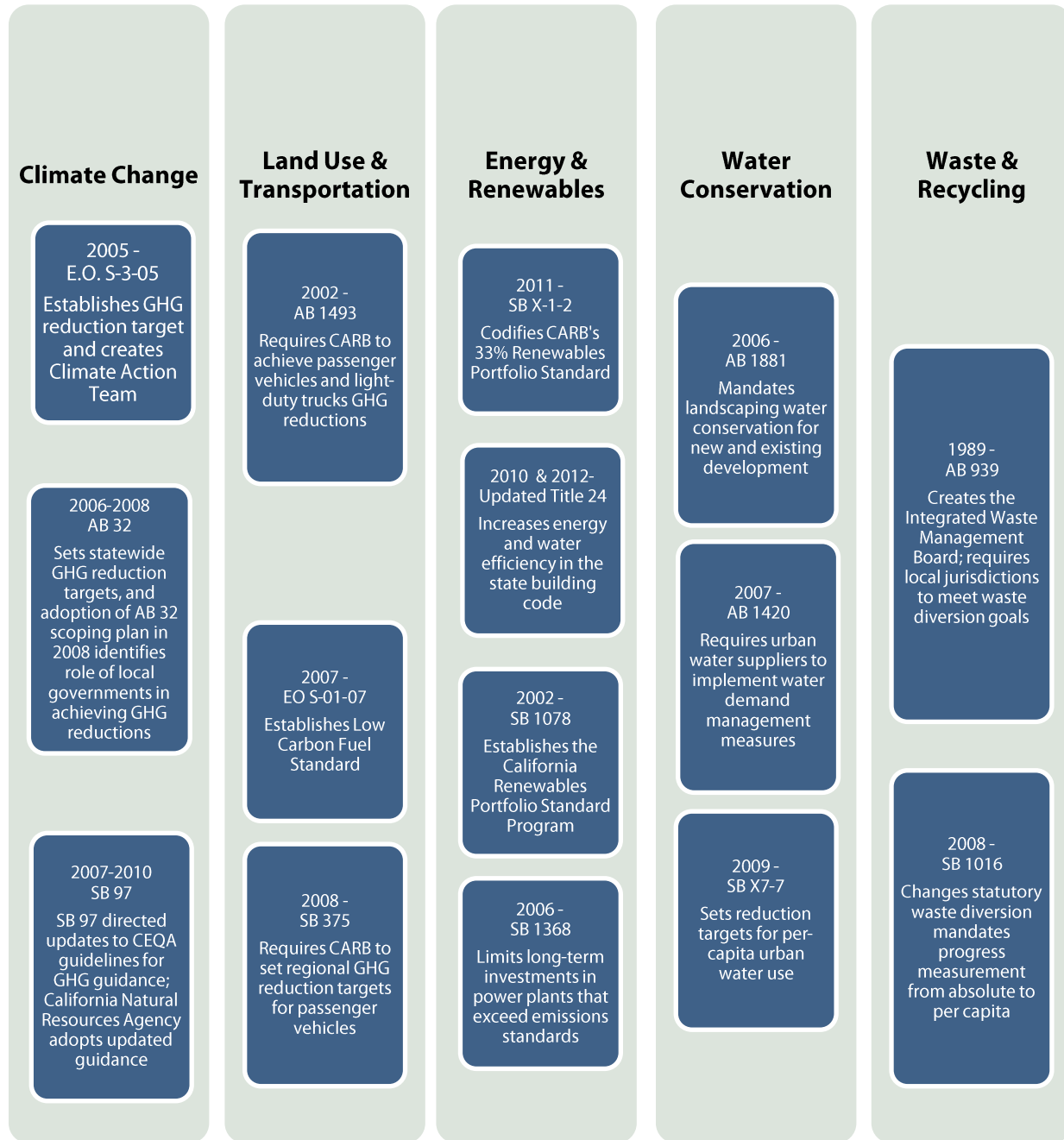
This CAP has been written to follow both the state CEQA Guidelines and the BAAQMD Guidelines by incorporating the standard elements of a Qualified Greenhouse Gas Reduction Strategy. Because the Climate Action Plan satisfies the BAAQMD's requirements for a Qualified GHG Reduction Strategy, the City will be able to determine that future development projects in South San Francisco will have a less than significant impact on GHG emissions if they comply with this CAP. See **Appendix C** for details on how this CAP meets the BAAQMD requirements.

Further State Efforts

In addition to these efforts, the state has enacted legislation on a variety of topics, including energy efficiency, water use, and solid waste. A summary of recent state efforts by issue area is shown in **Figure A-2**.

APPENDIX A

Figure A-2: California Regulatory Framework



SCIENTIFIC AND REGULATORY BACKGROUND

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APPENDIX B
GHG INVENTORY AND
FORECAST REPORT

APPENDIX B

APPENDIX - B: GHG INVENTORY AND FORECAST REPORT

This appendix is intended to discuss the greenhouse gas (GHG) emissions inventory in greater detail, as well as to provide transparency to the Inventory, outline the limitations to the data used in the Inventory, and provide guidance for future City inventories to maintain consistency in the methods used. The inventory itself summarizes the results of the City of South San Francisco's baseline GHG emissions, GHG emissions forecasts, and the setting of GHG emissions reduction targets. Specifically, the Inventory in this appendix presents the findings and recommendations of the following:

- 2005 Baseline Community-Wide GHG Inventory
- 2020 and 2035 Community-Wide GHG Inventory Forecasts
- GHG reduction targets

This Inventory is a revised draft that incorporates new methods for quantifying emissions, makes use of newly available data, and is intended to be consistent with current Bay Area Air Quality Management District (BAAQMD) guidance. For more information on BAAQMD compliance, see **Appendix C**. The following changes have been made:

- A methane capture rate has been attributed to landfill emissions, reducing GHGs from solid waste by 75%. This change was made to comply with standard protocol.
- Direct wastewater emissions (methane produced at the South San Francisco/San Bruno Water Quality Control Plant) have been added.
- The coefficients used for converting electricity and natural gas activity into GHGs have been adjusted slightly because PG&E has produced revised figures.
- Point source data, which previously was from the California Air Resources Board (CARB), has been replaced with data from the BAAQMD for improved accuracy.
- The 2020 and 2035 adjusted business-as-usual (ABAU) scenarios were re-evaluated to include savings from the implementation of the Low Carbon Fuel Standard (LCFS) and updates to Title 24.
- Emissions resulting from energy use at the Genentech campus have been removed.

BASELINE GHG EMISSIONS INVENTORY BACKGROUND

Purpose

The Inventory is the foundation of South San Francisco's CAP by informing the local government and the community of South San Francisco's GHG emissions sources, and therefore the primary opportunities for GHG reductions. The Inventory presents community-wide emissions caused by activities occurring within the political boundary of South San Francisco and provides a baseline against which future progress can be measured.

GHG INVENTORY AND FORECAST REPORT

The Inventory presents GHGs from community-wide activities in the calendar year 2005. It forecasts how community-wide emissions will change by 2020 and 2035, both if no behavioral or regulatory changes are made (known as a business as usual or BAU scenario) and to account for reduction efforts mandated by the State of California such as new vehicle standards and renewable energy requirements (known as the ABAU scenario). Additionally, the Inventory provides City staff, decision-makers, and Technical Advisory Committee members with adequate information to direct the development of a CAP and establish additional emissions reduction targets.

The Inventory includes the major sources of GHGs caused by activities in South San Francisco in a manner consistent with the methods recommended by CARB, ICLEI-Local Governments for Sustainability, and the BAAQMD. The Inventory analyzes the following emissions sources:

- **Energy:** Electricity and natural gas used by residential and nonresidential buildings in South San Francisco.
- **Transportation:** Vehicle miles traveled (VMTs) within and to/from the community by on-road vehicles, as well as trips to and from the South San Francisco Bay Area Rapid Transit (BART) and Caltrain commuter rail stations.
- **Solid Waste:** Methane emissions from the decomposition of waste sent to landfills from South San Francisco.
- **Landfills:** Direct emissions from the Oyster Point Landfill located within South San Francisco, which is no longer in operation but continues to release methane emissions.
- **Off-Road:** Emissions from construction and lawn & garden equipment and vehicles.
- **Water and Wastewater:** The amount of energy required to extract, filter, move, and treat all water used by, as well as the wastewater produced in, South San Francisco. This sector also includes direct methane emissions caused by the treatment of South San Francisco's wastewater at the South San Francisco/San Bruno Water Quality Control Plant located within the community.
- **Stationary Sources:** Direct emissions from industrial processes located in the city that are permitted by the BAAQMD.

Relationship to Municipal Inventory

In 2009, the City partnered with ICLEI-Local Governments for Sustainability to create a 2005 GHG inventory caused by the operations of South San Francisco's municipal government. Many of the activities and resulting emissions presented in the municipal inventory are part of the categories in this Inventory (emissions from the municipal vehicle fleet are part of community VMT, energy use at City facilities is part of community-wide nonresidential energy use, etc.). One source of emissions from the municipal inventory, direct wastewater, has been called out in this Inventory and presented as a separate category, as emissions from this activity would not have been represented otherwise.

APPENDIX B

Data Parameters

The Inventory was developed using the best-available tools, data, and methods. However, as with any GHG inventory, there are limitations to representing all sources of emissions in a local jurisdiction. The main factors that limit GHG inventories include data availability, privacy laws, and the lack of a sufficient method. This section highlights data that cannot be included in the Inventory for these reasons. Activities excluded due to data availability and privacy laws are expected to total less than 5% of community-wide emissions, and therefore it is anticipated that their exclusion will have a minimal impact. Emissions from activities excluded due to the lack of sufficient methods may be considerable, but it is not possible to estimate their impact on South San Francisco's community inventory as a result of method constraints.

Data Availability

GHG emissions from the following activities could not be calculated due to the lack of available data.

- Propane use: Except for storage and safety issues, propane is generally unregulated in California, and so no data is collected on sales or usage. Propane is known to be used in South San Francisco, but an accurate calculation cannot be made. Because propane use is likely to be quite low in the community, it is expected to contribute only minimally to total emissions.
- Refrigerants: Many refrigerants are potent GHGs and can be released into the atmosphere through leaks or other activities. Because refrigerant sales are not tracked, similar to propane, emissions resulting from refrigerants cannot be determined.

Privacy Laws

- Commercial, industrial, and institutional electricity and natural gas are combined into a nonresidential category due to the California 15/15 rule, which requires that any aggregated information provided by the utilities must include at least 15 customers and that a single customer's load must be less than 15% of an assigned category. If the number of customers in the compiled data is below 15, or if a single customer's load is more than 15% of the total data, categories must be combined before the information is released. The rule further requires that if the 15/15 Rule is triggered for a second time after the data has been screened already using the 15/15 Rule, the customer must be dropped from the information provided.

Lack of Sufficient Methods

- Industry protocol at this time does not recommend inclusion of life-cycle emissions in community-wide local government GHG inventories. Life-cycle emissions are emissions associated with the production and disposal of items consumed by a community (sometimes called "cradle-to-grave"). For instance, a life-cycle assessment of vehicle emissions would include those from designing, extracting raw materials, producing, delivering, and disposing of each car in the city. In contrast, this Inventory only captures how much that car is driven in the community, in a manner consistent with standard protocols. A method for estimating life-cycle emissions is still under development at this time.

GHG INVENTORY AND FORECAST REPORT

- A variety of off-road equipment, including airplanes, marine vessels, and various recreational vehicles, contributes to South San Francisco's GHG emissions. However, as of yet, no method has been devised that would accurately reflect the impacts of these activities.

Informational Items

This category includes emissions from activities that occur within South San Francisco and can be accurately calculated, but are excluded from the Inventory because the City has little or no ability to influence the emissions.

- **Landfill:** The Oyster Point Landfill opened in 1956 and accepted 1.4 million tons of solid waste before closing at the end of 1969. Although no more waste is being deposited at the site, material already in place continues to decompose, releasing methane in the process. In the baseline year of 2005, the Oyster Point Landfill emitted approximately 13,220 MTCO₂e. These emissions will decrease over time and eventually cease automatically. The landfill has been covered and partially developed, with additional development expected in the future, further limiting the City's ability to reduce emissions.
- **Point Sources:** Point sources are large, fixed emitters of GHGs (oil refineries, power plants, and other significant industrial activities). In 2005, point sources in South San Francisco were directly responsible for 35,580 MTCO₂e. These facilities are regulated by the BAAQMD and CARB.
- **Genentech:** South San Francisco is home to the headquarters of Genentech, a large biotechnology firm. The Genentech campus will be covered under California's cap-and-trade program, administered by CARB, which is set to reduce the emissions from large sources significantly by 2020 (see **Chapter 2** for more on cap and trade). Based on data from Genentech's publicly available sustainability reports,¹ the company's South San Francisco campus emitted 57,410 MTCO₂e in 2005 from electricity and natural gas use. Because the authority for regulating Genentech's emissions lies with CARB, Genentech's emissions related to energy use have been removed from the Inventory.² Additionally, so that Genentech's growth does not affect the forecast, Genentech's current and projected future employment numbers have been removed from the community's job figures. For more detail on how Genentech was removed from the inventory and forecast, see **Appendix C**.

Key Terms and Timelines

The following terms are used throughout this Inventory and are fundamental to understanding its contents.

¹ Sustainability reports available at: <http://www.gene.com/good/sustainability>

² Based on consultation between the City's consultant, PMC, and BAAQMD during CAP preparation.

APPENDIX B

Baseline year: The baseline year helps to set the target for GHG reduction efforts, as well as giving the City a point of comparison for future inventories. This Inventory uses the calendar year 2005 as a baseline, due to data availability and consistency with Assembly Bill 32 (AB 32).

Carbon dioxide equivalent (CO₂e): A means for representing the six different GHGs (see definition below) in a single unit by converted the potency of each gas into the equivalent amount of carbon dioxide. CO₂e is often expressed in metric tons (MT), equal to about 2,205 pounds.

Greenhouse gases (GHGs): Gases that trap heat in the earth's atmosphere rather than allowing it to escape into space, a process known as the greenhouse effect. While this is a naturally occurring process, human activities are rapidly increasing the concentration of these gases, increasing the amount of heat held in the atmosphere and affecting global climate patterns. The six common GHGs are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆), although others exist. GHGs are often measured in terms of carbon dioxide equivalent (CO₂e).

Sector: Emissions are grouped by the type of activity that was responsible for the emissions (transportation, energy use, etc.), known as sectors. Each sector may have multiple subsectors; for example, the energy sector contains the subsectors for residential and nonresidential electricity and natural gas use.

BASELINE COMMUNITY GHG INVENTORY

Summary

Emissions from South San Francisco in the baseline year of 2005 totaled 442,400 MTCO₂e, excluding informational items, as shown in **Figure B-1** and **Table B-1**. Energy use was the single largest source of emissions, responsible for 206,370 MTCO₂e, or about 47% of the community total. Emissions from transportation were the second-largest category, totaling 196,910 MTCO₂e, or about 45% of community-wide emissions. Off-road emissions were third, at 22,400 MTCO₂e (5% of community emissions). Emissions from solid waste came fourth (14,780 MTCO₂e, or 3% of the total), with emissions from water and wastewater coming in last (1,940 MTCO₂e, or less than 1%).

GHG INVENTORY AND FORECAST REPORT

Figure B-1: 2005 Community-Wide Emissions by Sector

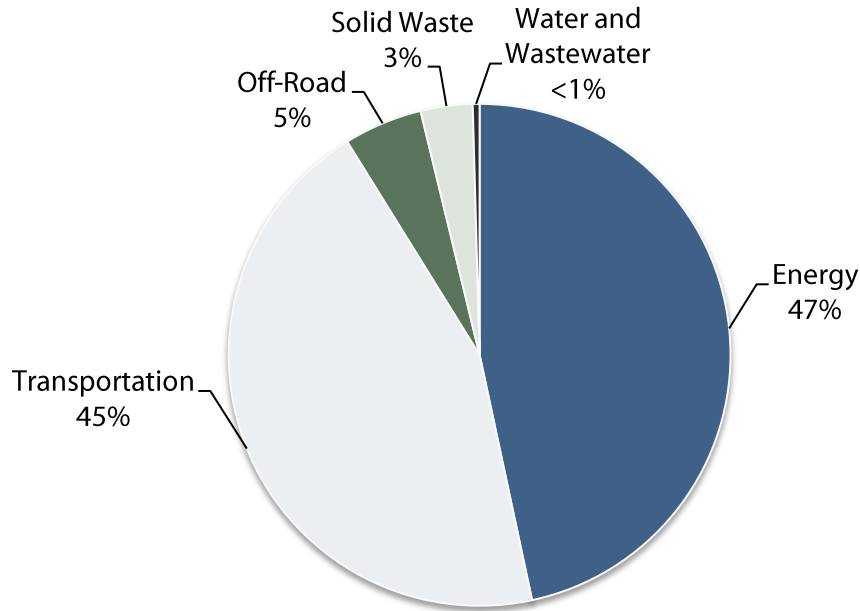


Table B-1: Community-Wide Emissions by Sector

Sector	MTCO ₂ e	Percentage of Total
Energy	206,370	47%
Transportation	196,910	45%
Solid Waste	14,790	3%
Off-Road	22,400	5%
Water and Wastewater	1,940	<1%
Total*	442,400	100%

* Due to rounding, the total may not equal the sum of the component parts.

As noted previously, individual sectors can often be divided into multiple subsectors. **Table B-2** illustrates the activities and emissions from each subsector in the baseline year. On-road transportation is responsible for the most GHG emissions, contributing 195,790 MTCO₂e, or 44% of all community emissions. Nonresidential natural gas use is second (79,810 MTCO₂e, or 18% of the total) and nonresidential electricity use is third (56,190 MTCO₂e, or 13% of the total). Emissions from residential natural gas (47,920 MTCO₂e, 11%) and residential electricity (22,450 MTCO₂e, 5%) are fourth and fifth, respectively. All the remaining activities are responsible for a combined 40,240 MTCO₂e, or about 9% of the total.

APPENDIX B

Table B-2: 2005 Community-Wide Activity, Emissions, and Data Sources by Subsector

Sector	Subsector	Activity	Coefficient Source	MTCO ₂ e	Percentage of Total Emissions
Energy	Residential Electricity	100,353,340 kWh	PG&E	22,450	5%
	Residential Natural Gas	9,007,350 therms	PG&E	47,920	11%
	Nonresidential Electricity	251,184,690 kWh	PG&E	56,190	13%
	Nonresidential Natural Gas	15,003,610 therms	PG&E	79,810	18%
Transportation	On-Road Transportation	400,243,680 VMT	Fehr & Peers	195,790	44%
	BART	20,339,850 PMT	BART	610	<1%
	Caltrain	7,612,510 PMT	CARB	510	<1%
Solid Waste	Community-Generated Solid Waste	85,090 tons	CalRecycle, CARB	14,110	3%
	ADC- Green Waste	110 tons	CalRecycle, CARB	10	<1%
	ADC - Sludge	10,720 tons	CalRecycle, CARB	660	<1%
Off-Road	Lawn and Garden		CARB	1,100	<1%
	Construction		CARB	21,300	5%
Water and Wastewater	Indirect Water and Wastewater	7,053,910 kWh	PG&E	1,580	<1%
	Direct Wastewater		ICLEI	360	<1%
Total*				442,400	100%

*Due to rounding, the total may not equal the sum of the parts.

GHG INVENTORY AND FORECAST REPORT

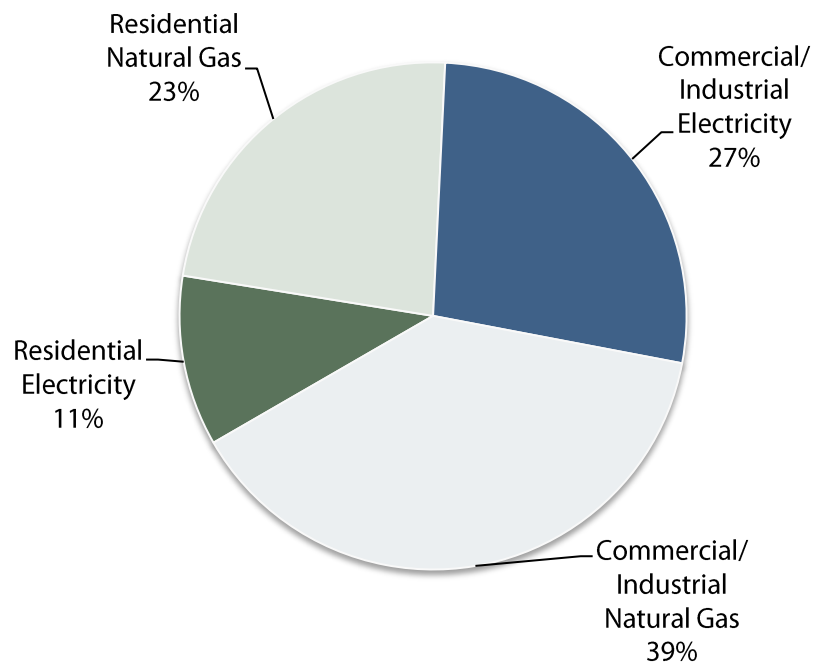
SECTOR DETAILS

Energy

Energy use in the built environment (excluding point sources) is the single largest contributor to GHG emissions in South San Francisco, as it is responsible for about 47% of the community total. The built environment includes residential and nonresidential buildings, and energy use includes electricity and natural gas. As shown in **Figure B-2**, nonresidential natural gas use is responsible for the greatest amount of emissions within the energy sector (79,810 MTCO₂e, or 39% of energy-related emissions). Nonresidential electricity, residential natural gas, and residential electricity use are a respective second, third, and fourth (27%, 23%, and 11% of energy-related emissions).

Pacific Gas and Electric (PG&E) provided data on electricity and natural gas consumption on August 30, 2010. Commercial and industrial electricity were combined in the nonresidential category due to the California 15/15 Rule (see Privacy Laws subsection). PG&E also provided a 2005 CO₂ coefficient for electricity and natural gas. Emissions coefficients for CH₄ and nitrous oxide (N₂O) emissions were provided by CARB's Local Government Operations Protocol (LGOP) version 1.1 and were converted into carbon dioxide equivalents and added to the CO₂ coefficient to create a CO₂e coefficient. To remove Genentech energy use, data from the company-wide 2005 sustainability report was used to determine electricity and natural gas use at the South San Francisco campus. These figures were converted to carbon dioxide equivalents using the CO₂e coefficient discussed above.

Figure B-2: 2005 Energy Emissions by Subsector



APPENDIX B

Transportation

Emissions from transportation (comprising on-road transportation, BART, and Caltrain) are the second largest source of GHGs attributable to South San Francisco. Emissions from this sector totaled 196,910 MTCO₂e, or about 45% of the community total. On-road transportation is by far the largest subsector in this group, responsible for 195,790 MTCO₂e (more than 99% of transportation-related emissions), with BART and Caltrain each making up less than 1% of transportation-related emissions, as illustrated in **Figure B-3**.

A transportation demand model provided by the City/County Association of Governments of San Mateo County (C/CAG) and the Performance Measurement System (PeMS) data provided by the California Department of Transportation (Caltrans) was used to determine the number and distance of vehicle trips in three categories:

- Trips that remained within the boundaries of South San Francisco for the entire duration (internal-internal). Emissions from these trips are attributed entirely to South San Francisco.
- Trips beginning in South San Francisco but ending elsewhere, or trips beginning outside of the community but ending in it (internal-external/external-internal). Half of the emissions from these trips are attributed to South San Francisco.
- Trips beginning and ending elsewhere, but passing through South San Francisco (external-external). None of the emissions from these trips are attributed to South San Francisco.

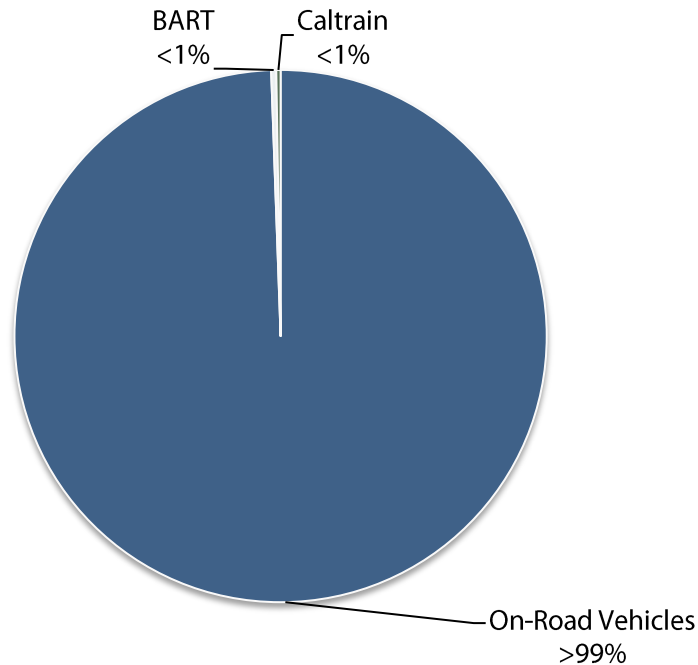
Emissions from on-road transportation were calculated using the CARB Emissions Factor (EMFAC) 2011 software, which provides daily carbon dioxide emissions according to the vehicle composition of each county in California. These figures were converted to annual emissions using a conversion factor of 347 days per year, accounting for decreased travel on weekends. Individual GHGs were converted to CO₂e by multiplying the CO₂ emissions by a conversion factor of 100/95.

Emissions from BART activity are the result of electricity and natural gas used to operate the agency's trains and facilities. BART ridership data from August 2010 was used to determine the number and length of trips beginning and ending at the South San Francisco BART station. Weekday, Saturday, and Sunday trips were summed to determine the number of annual trips and miles traveled to or from South San Francisco. Half of each trip was attributed to South San Francisco (the other half would be attributed to the origin or destination community). Total emissions were determined by multiplying attributed passenger miles traveled by a coefficient as reported in the BART 2008 GHG Inventory.

Caltrain emissions are the result of burning diesel fuel to power the system's locomotive fleet. 2005 annual weekday ridership counts were used to identify the number of trips and trip lengths beginning or ending at the South San Francisco Caltrain station. Weekday trips were summed to determine the annual number of trips and trip lengths. Half of each trip was attributed to South San Francisco (the other half attributed to the origin or destination community). GHGs were calculated by multiplying attributed passenger miles by a diesel locomotive emissions coefficient provided by the Local Government Operations Protocol.

GHG INVENTORY AND FORECAST REPORT

Figure B-3: 2005 Transportation Emissions by Subsector



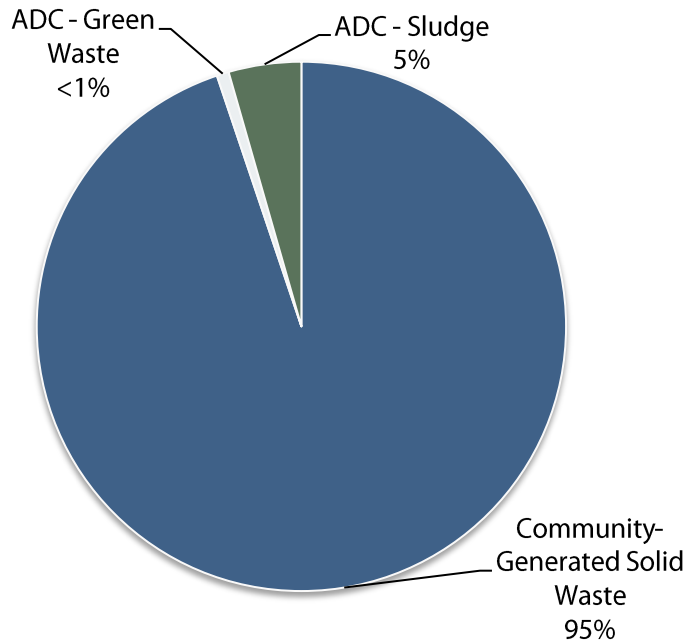
Solid Waste

Solid waste is made up of three distinct subsectors: community-generated solid waste (materials thrown away in a trash can), average daily cover (ADC) – green waste (organic material laid down on top of the landfill to cover up other material), and ADC – sludge (waste material that serves the same purpose). The waste sector is responsible for 3% of all community emissions. Community-generated solid waste is responsible for about 95% of the solid waste sector’s GHG emissions, followed by ADC – sludge (5%) and ADC – green waste (<1%), as shown in **Figure B-4**.

In 2005, South San Francisco sent 85,090 tons of solid waste to various landfills across the state. Cover for the community-generated solid waste comprised 110 tons of green waste and 10,720 tons of sludge. Methane generation from the decomposition of this waste was calculated using the CARB Landfill Emissions Calculator v1.3 and an average methane recovery or capture factor of 75%, which is consistent with commonly accepted methods.

APPENDIX B

Figure B-4: 2005 Solid Waste Emissions by Subsector



Off-Road

The off-road sector comprises emissions from two subsectors: lawn and garden (lawnmowers, leaf blowers, chain saws, etc.) and construction equipment (bulldozers, tractors, cranes, etc.). These emissions account for 5% of all community emissions. As shown in **Figure B-5**, construction is the larger of the two subsectors, being responsible for 95% of all off-road emissions.

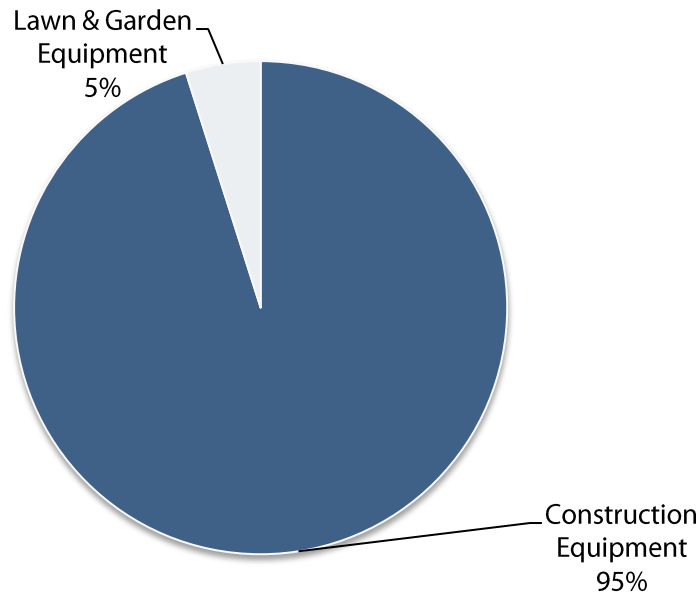
CARB's OFFROAD 2007 model provides construction and lawn & garden activity for each county in California, along with fuel consumption and emissions output for each type of equipment. Although other types of off-road equipment contribute to emissions, as noted previously, the lack of an effective method prevents them from being included. For construction and lawn & garden equipment, the BAAQMD provided guidance to calculate emissions at a jurisdiction level.

Total city construction equipment emissions were determined using the US Department of Housing and Urban Development's (HUD) State of the Cities Data Systems building permit inventory to ascertain how many new San Mateo County structures were built in South San Francisco.

Total lawn & garden emissions were attributed using the proportion of existing households within the community compared to all of San Mateo County, based on California Department of Finance population figures.

GHG INVENTORY AND FORECAST REPORT

Figure B-5: 2005 Off-Road Emissions by Subsector



Water and Wastewater

The water and wastewater sector is responsible for less than 1% of South San Francisco's 2005 GHG emissions. It comprises two subsectors: indirect water and wastewater (energy needed to move and treat the water used in, and the wastewater produced by, the community) and direct wastewater (methane emissions from the treatment of the community's water in the South San Francisco/San Bruno Water Quality Control Plant). Some of the energy included in the indirect subsector was not used within the borders of South San Francisco. Of this sector's emissions, 81% is the result of indirect activities, as shown in **Figure B-6**.

While this sector may potentially double-count electricity captured in the energy sector, water and wastewater emissions are calculated separately to comply with BAAQMD guidance. Due to the small size of this sector, any overlap is expected to have a negligible effect on the Inventory.

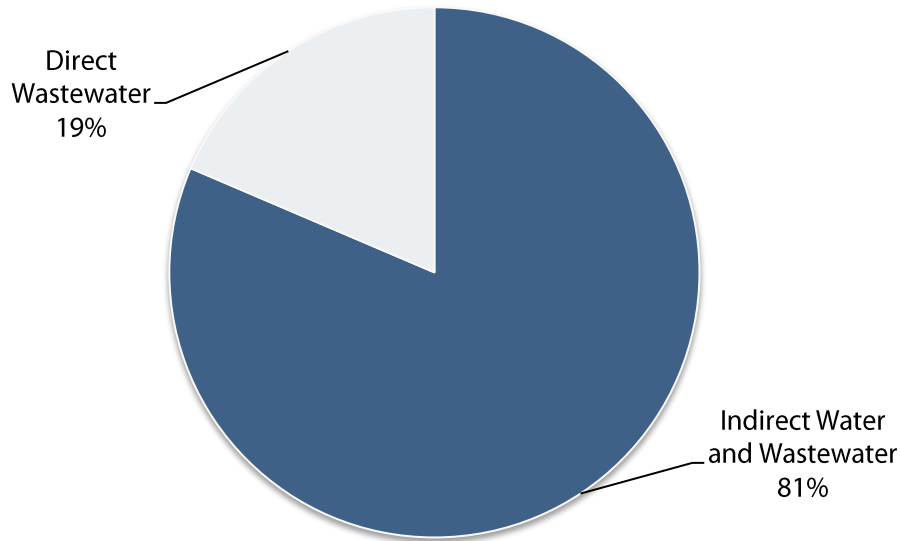
Most of the water used in South San Francisco is purchased by the California Water Service Company (Cal Water) and the Westborough Water District from the San Francisco Public Utilities Commission (SFPUC), which delivers water from the Hetch Hetchy Reservoir in Yosemite National Park. Information related to SFPUC-delivered water is provided by the Bay Area Water Supply and Conservation Agency (BAWSCA) for 2005. The electricity per gallon of delivered water coefficient is provided in the California Public Utilities Commission's 2010 water intensity study and the California Energy Commission's (CEC) 2006 water-related energy inventory.

The South San Francisco/San Bruno Water Quality Control Plant collects and treats wastewater from South San Francisco before discharging the water into the San Francisco Bay. Electricity used in the process of treating and moving the wastewater is part of the indirect emissions sector. The direct

APPENDIX B

emissions as a result of South San Francisco’s wastewater rely on the 2005 municipal GHG inventory for the City.

Figure B-6: 2005 Water and Wastewater Emissions by Subsector



GHG EMISSIONS FORECAST

A GHG emissions forecast is an estimate of South San Francisco’s future emissions, based on projected changes in population, household, and job (excluding Genentech, see **Appendix C**) numbers, as shown in **Table B-3**. Emissions are forecast for 2020 and 2035. Population projections were provided by the Association of Bay Area Governments (ABAG), while the number of households and jobs are taken from ABAG’s Final Jobs-Housing Connection Strategy, which was adopted in May 2012 for preparation of the Bay Area’s Sustainable Communities Strategy. As the One Bay Area plan provides 2040 projections, 2020 and 2035 figures were extrapolated using 2040 growth rates and the results from the 2010 Census. For consistency with the Inventory’s exclusion of Genentech emissions, all jobs associated with Genentech have been excluded from the community-wide forecast.

GHG INVENTORY AND FORECAST REPORT

Table B-3: Demographic Projections for South San Francisco, 2005–2035

	2005	2020	2035	2005–2035 Change	Forecast Source
Population	61,700	69,700	77,700	26%	Association of Bay Area Governments
Households	20,130	23,910	27,440	36%	One Bay Area
Total Jobs	42,240	49,650	55,360	20%	One Bay Area
Genentech Jobs	9,000	14,600	16,280	54%	Estimated, based on Genentech Master Environmental Impact Report
Net Jobs, Excluding Genentech	33,240	35,050	39,080	18%	
Service Population	94,940	104,750	116,780	23%	

Business-as-Usual GHG Emissions Forecast

A business as usual (BAU) forecast analyzes how emissions are projected to grow if per capita behavior and efficiencies remain at the 2005 level while the number of jobs, households, and people in South San Francisco continues to grow. The BAU scenario represents the status quo before state reduction efforts are accounted for, as shown in **Table B-4** and **Figure B-7**. Under the BAU growth scenario, South San Francisco’s overall GHG emissions are projected to increase 11% by 2020 and 24% by 2035 compared to the baseline 2005 levels. BAU emissions associated with energy, water and wastewater, off-road equipment, BART, Caltrain, and solid waste are projected to grow linearly with household, employment, and service population growth. BAU emissions associated with on-road transportation were determined by running the C/CAG transportation model to 2030 and extrapolating 2020 and 2035 vehicle miles traveled by linearly interpolating between the 2005 and 2030 results.

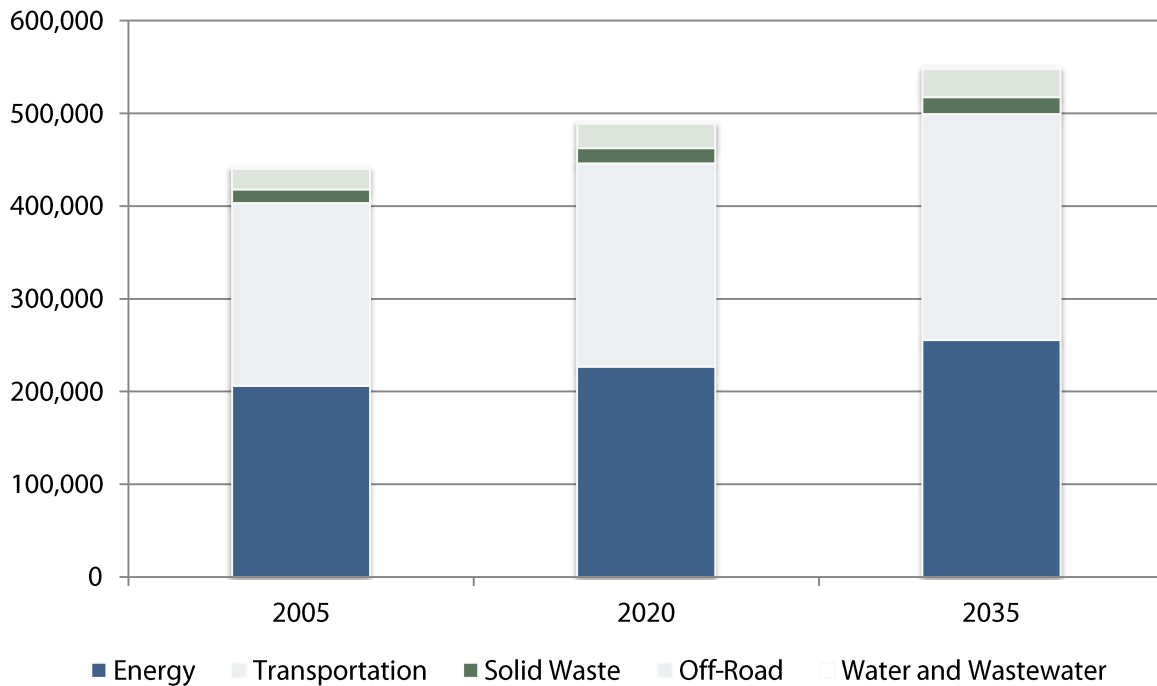
APPENDIX B

Table B-4: BAU Emissions by Sector, 2005–2035 (MTCO₂e)

Sector	2005	2020	2035	2005–2035 Percentage Change
Energy	206,370	226,990	255,820	24%
Transportation	196,910	219,270	243,620	24%
Solid Waste	14,780	16,310	18,190	23%
Off-Road	22,400	26,610	30,530	36%
Water and Wastewater	1,940	2,140	2,380	23%
Total*	442,400	491,310	550,540	
Total Percentage Change	–	11%	24%	

* Due to rounding, the total may not equal the sum of the component parts.

Figure B-7: BAU GHG Emissions, 2005–2035 (MTCO₂e)



GHG INVENTORY AND FORECAST REPORT

Adjusted Business-as-Usual GHG Emissions Forecast

The State of California has been proactive in reducing GHG emissions. A number of regulations and efforts at the state level, including changes to vehicle fuel standards, building codes, and the renewable energy content of electricity, are expected to lessen South San Francisco's future GHG emissions. The adjusted business-as-usual (ABAU) forecast, as illustrated in **Table B-5**, shows the projected impacts of state actions on South San Francisco's 2020 and 2035 GHG emissions. The actions incorporated into the ABAU scenario are discussed below.

California's Renewables Portfolio Standard (RPS): A majority of states have passed renewable energy standards, with California's being one of the most ambitious. The California RPS mandates that 33% of the electricity delivered in California be generated by renewable sources (solar, wind, geothermal, etc.) by 2020. The California RPS was first codified in 2002 by Senate Bill 1078, requiring 20% of electricity to be generated from renewable sources by 2010. In April 2011, Senate Bill X 1-2 added the 2020 target.

AB 1493 (Pavley) Vehicle Standards: AB 1493, known as the Pavley standard, was passed in 2002 and requires new passenger vehicles to reduce tailpipe GHG emissions from 2009 to 2020. Changes to vehicle emissions as a result of the Pavley standard are included in the emissions coefficients generated by the EMFAC 2011 model.

Executive Order S-01-07, Low Carbon Fuel Standards (LCFS): In 2007, then-Governor Schwarzenegger signed Executive Order S-01-07, requiring that the carbon intensity of all fuels used for transportation in California be reduced at least 10% by 2020. The 10% reduction is included in the emission coefficients generated by the EMFAC 2011 model, but following guidance from the BAAQMD, the standard has been adjusted to account for a 7.2% reduction. As of September 2013, the LCFS is being challenged in federal court. It was overturned by a district court in December of 2011 and the case is currently pending before the 9th Circuit Court of Appeals. It remains in effect, but there is a reasonable chance this regulation may be overturned.

Title 24 Energy Efficiency Standards: Title 24 is an energy efficiency standard for new buildings, applied at the local level through project review. Title 24 was updated in 2008; these new standards went into effect in 2010 and represent an improvement over the 2005 Title 24. The reductions quantified in the ABAU scenario are due to the increase in the Title 24 efficiency standards and assume that all growth in electricity and natural gas use is a result of new construction.

APPENDIX B

Table B-5: GHG Impacts of State Reduction Efforts, 2020 and 2035 (MTCO₂e)

State Reduction Effort	2020	2035
Renewables Portfolio Standard	14,200	22,880
AB 1493 (Pavley) and Low Carbon Fuel Standard	53,580	80,430
Title 24	1,990	1,280
Total*	69,770	104,590

* Due to rounding, the total may not equal the sum of the component parts

These state actions will have a significant impact on South San Francisco’s future GHG emissions, as shown in **Tables B-6** and **B-7**. In 2020, state actions are expected to keep the community’s GHG emissions below baseline levels despite the increases in household, population, and employment. In 2035, GHG emissions are projected to rise despite state actions, although emissions are expected to remain well below the levels forecast in the BAU scenario.

Table B-6: ABAU Emissions by Sector, 2005–2035 (MTCO₂e)

Sector	2005	2020	2035	2005–2035 Percentage Change
Energy	206,370	211,080	232,110	12%
Transportation	196,910	168,340	165,100	-16%
Solid Waste	14,790	16,310	18,190	23%
Off-Road	22,400	23,960	28,620	28%
Water and Wastewater	1,940	1,860	1,930	-1%
Total*	442,400	421,540	445,950	1%
Total Percentage Change	–	-5%	1%	

* Due to rounding, the total may not equal the sum of the component parts.

GHG INVENTORY AND FORECAST REPORT

Table B-7: Comparison of BAU and ABAU Emission Scenarios, 2005–2035 (MTCO₂e)

	2005	2020	2035
BAU Emissions Scenario	442,400	491,310	550,540
Sum of State Reduction Efforts	–	-69,770	-104,590
ABAU Emissions Scenario	442,400	421,540	445,950
Percentage Increase from Baseline	–	-5%	1%

GHG Reduction Targets

AB 32 recommends a reduction of 15% below current (2005–2008) emissions by 2020 as the local government equivalent of the statewide reduction target, which calls for California to return to 1990 levels by 2020. The AB 32 local government goal is used as the 2020 reduction target in this CAP and is a way to measure the CAP’s success. This target also satisfies the BAAQMD’s California Environmental Quality Act (CEQA) compliance guidelines.

California has not currently adopted any GHG reduction goals beyond 2020, although former Governor Schwarzenegger signed Executive Order S-03-05 in 2005, calling for the state to reduce GHG emissions 80% below 1990 levels by 2050. The equivalent of this target for South San Francisco is a 95% reduction below 2005 levels by 2050.

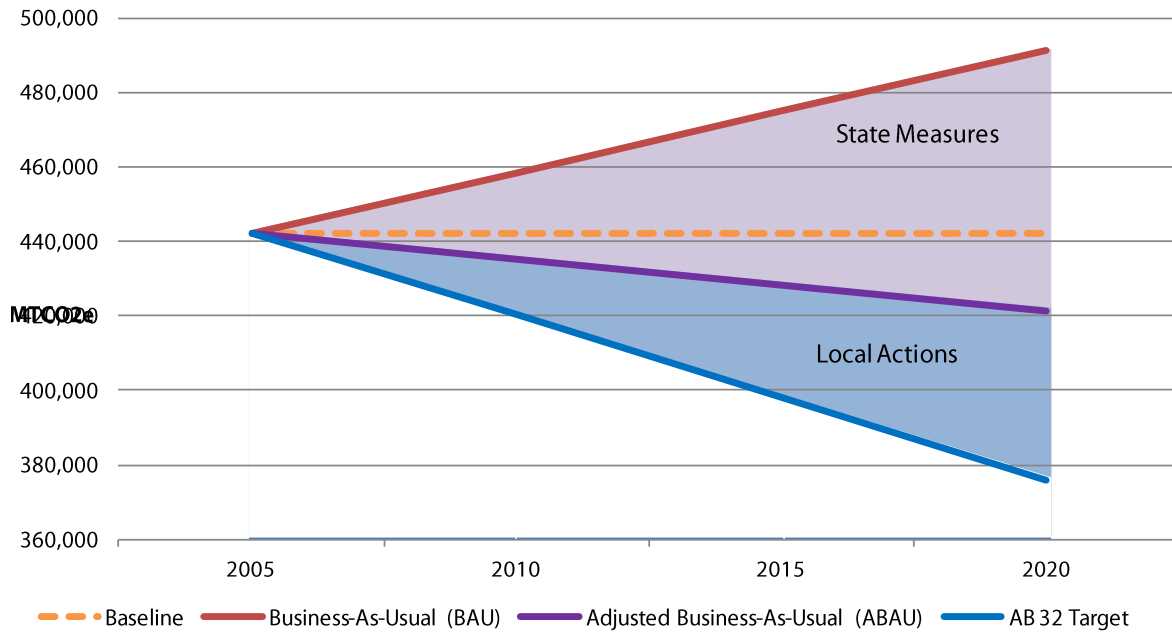
Table B-8 and **Figure B-8** show the comparison between the 2020 ABAU emissions scenario and the 15% reduction target. The reduction target calls for South San Francisco to emit 376,040 MTCO₂e by 2020, 40,560 MTCO₂e below the projected 2020 GHG emissions under the ABAU scenario. This CAP identifies local reduction efforts that will allow South San Francisco to achieve this target.

Table B-8: ABAU Emissions and AB 32 Goal, 2020

	MTCO ₂ e
2005 Baseline	442,400
2020 BAU	491,310
2020 ABAU	421,540
2020 AB 32 Reduction Target	376,040
Local Reductions Needed	45,500

APPENDIX B

Figure B-8: Comparison of Emission Scenarios and Reduction Targets, 2005–2020 (MTCO₂e)



GHG INVENTORY AND FORECAST REPORT

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APPENDIX C

BAAQMD COMPLIANCE

APPENDIX C

APPENDIX - C :BAAQMD COMPLIANCE

The City of South San Francisco developed this Climate Action Plan (CAP or Plan) to meet the requirements of the Bay Area Air Quality Management District's (BAAQMD) criteria for a Qualified Greenhouse Gas Reduction Strategy, as defined in the BAAQMD's California Environmental Quality Act (CEQA) Air Quality Guidelines. The CEQA Air Quality Guidelines were updated in 2010 in response to the passage of Senate Bill 97 (SB 97), which requires all projects subject to CEQA to analyze and mitigate the greenhouse gas (GHG) emissions that are expected to occur.

The purpose of the BAAQMD CEQA Air Quality Guidelines is to assist lead agencies in evaluating the air quality impacts of proposed projects and plans within the San Francisco Bay Area Air Basin. The guidelines were updated to establish thresholds of significance for impacts related to GHG emissions, in order to be consistent with the requirements of CEQA. These thresholds can be used to assess plan-level and project-level impacts, and allow a lead agency to determine that a project's impact on GHG emissions is less than significant if the project is in compliance with a Qualified GHG Reduction Strategy.

South San Francisco's CAP follows both the state CEQA Guidelines and the BAAQMD's guidelines by incorporating the standard elements of a Qualified GHG Reduction Strategy into the Plan. The standard elements of a Qualified GHG Reduction Strategy include the following steps:

1. Quantify GHG emissions resulting from activities within a defined geographic range, both existing and projected over a specific time period.
2. Establish a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable.
3. Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated within the defined geographic area.
4. Specific measures or a group of measures, including performance standards that, if implemented on a project-by-project basis, would collectively achieve the specified emissions level as demonstrated by substantial evidence.
5. Monitor the plan's progress.
6. Adopt the GHG reduction strategy in a public process following environmental review.

This appendix describes in detail how South San Francisco's CAP has been developed to satisfy the requirements of the BAAQMD's guidelines on the standard element of a Qualified GHG Reduction Strategy. Because it satisfies those requirements, the Climate Action Plan will allow the City to determine that future development projects have a less than significant impact on GHG emissions as long as they are in compliance with the CAP.

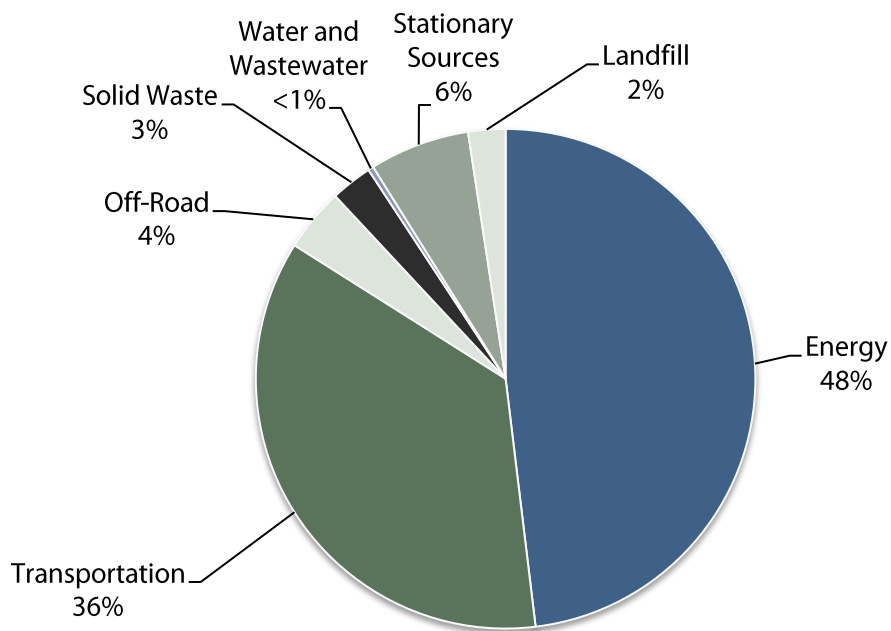
BAAQMD COMPLIANCE

GHG EMISSIONS INVENTORY

The first component of a Qualified GHG Reduction Strategy is to conduct an inventory of GHG emissions within a specific geographic boundary. The City of South San Francisco's GHG inventory uses a base year of 2005 to inventory carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) generated from the activities of the community.

The emissions sources calculated in South San Francisco include residential and nonresidential energy use, transportation (on-road vehicles, BART, and Caltrain), disposal of solid waste, energy use and biogenic methane emissions related to water and wastewater, off-road equipment used for construction and landscaping purposes, and stationary sources. The emissions from these sources, totaling 548,600 metric tons of carbon dioxide equivalent (MTCO₂e), are detailed in **Figure C-1** and **Table C-1**.

Figure C-1: Community-Wide 2005 Emissions by Sector



APPENDIX C

Table C-1: Community-Wide 2005 Emissions by Sector

Sector	MTCO ₂ e	Percentage of Total
Energy	263,780	48%
Transportation	196,910	36%
Off-Road	22,400	4%
Solid Waste	14,790	3%
Water and Wastewater	1,940	<1%
Stationary Sources	35,580	6%
Landfill	13,220	2%
Total*	548,600	100%

* Due to rounding, the total may not equal the sum of the component parts.

Three emissions sources presented here are included for informational purposes only: stationary sources, direct landfill emissions (a subset of the solid waste sector), and facilities subject to cap and trade.

Stationary sources are fixed emitters of pollutants, including power plants, refineries, and other large industrial activities. 2005 data was unavailable for the stationary sources in South San Francisco, and so 2008 data from the BAAQMD, totaling 35,580 MTCO₂e, has been used as a proxy. Emissions from stationary sources are most effectively addressed and regulated by the BAAQMD or by federal and state programs. Direct landfill emissions result from the decomposition of waste in a landfill within the borders of South San Francisco, regardless of where the waste originated. The only landfill within the community, the closed Oyster Point landfill, emitted 13,220 MTCO₂e in 2005. As the waste continues to decompose, emissions from this source will decline and eventually cease.

The third informational item is the volume of emissions as a result of energy use at facilities subject to the cap-and-trade program being administered by the California Air Resources Board (CARB). South San Francisco has elected to exclude the energy use at such facilities from the GHG inventory and forecast for the following reasons:

- These facilities are subject to air quality and emissions standards set by the US Environmental Protection Agency (EPA), CARB, and the BAAQMD. The approach of excluding energy use from sources that are outside of the City's jurisdictional control is consistent with ICLEI's Draft Community-Wide Protocol.
- Cap and trade is a new program which provides multiple avenues for compliance, including options that will be shaped by market factors and the preferences of the individual participating entities. The City is therefore limited in its ability to accurately estimate how

BAAQMD COMPLIANCE

facilities subject to cap and trade will comply with the program. The inclusion of such facilities, lacking an accurate reflection of how cap and trade will reduce GHG emissions, would make it difficult for South San Francisco to set an achievable GHG reduction target that matches the Assembly Bill 32 (AB 32) goal or to use this CAP for future CEQA tiering or streamlining.

- The cap-and-trade program is a method to achieve the statewide reduction goal set forth in AB 32. Excluding the emissions from facilities subject to this program from South San Francisco's local reduction target does not conflict with the overall AB 32 reduction target, but instead allows the City to focus on the emissions sectors that are otherwise not as directly influenced by AB 32.
- Excluding energy use of local facilities regulated by cap and trade more accurately reflects the electricity and natural gas use from nonresidential customers in South San Francisco and allows the City to focus on actions that are within its control.

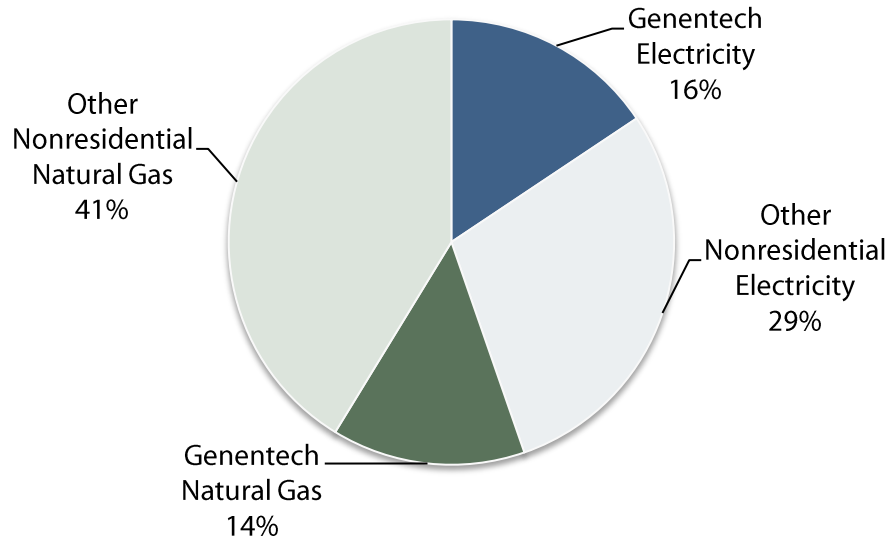
CARB's list of entities covered by cap and trade was used to identify the entities in South San Francisco that will be subject to this program. Sufficient data was available to remove energy-related emissions from the headquarters of the biotechnology firm Genentech, which is located in South San Francisco and is subject to cap and trade.³ In order to isolate Genentech's GHG emissions from the rest of the nonresidential electricity and natural gas emissions, the publicly available Genentech 2009 Corporate Sustainability Update report was used to identify how much electricity and natural gas were used by the South San Francisco campus.⁴ In 2005, Genentech was responsible for 35% of all nonresidential electricity use and 25% of nonresidential natural gas use, or about 30% of all nonresidential energy GHG emissions as shown in **Figure C-2**. Genentech's 2020 and 2035 energy-related emissions were removed from the forecast using Genentech's projected employment, which was determined using One Bay Area projections from the Association of Bay Area Governments (ABAG) and the firm's expected change in employment for environmental review purposes.

³ Consistent with the verbal direction provided by Abby Young, Principal Environmental Planner, Bay Area Air Quality Management District (November 27, 2012).

⁴ The 2009 Genentech Corporate Sustainability Update is available at: <http://www.gene.com/gene/about/environmental/past-reports/>. According to the report, the South San Francisco Genentech campus is responsible for 68% of total Genentech GHG emissions from all facilities. Similarly, it was assumed that the South San Francisco campus was responsible for 68% of total Genentech Scope 1 and Scope 2 emissions from energy use. The calculated energy emissions associated with the South San Francisco campus were then excluded from the baseline inventory.

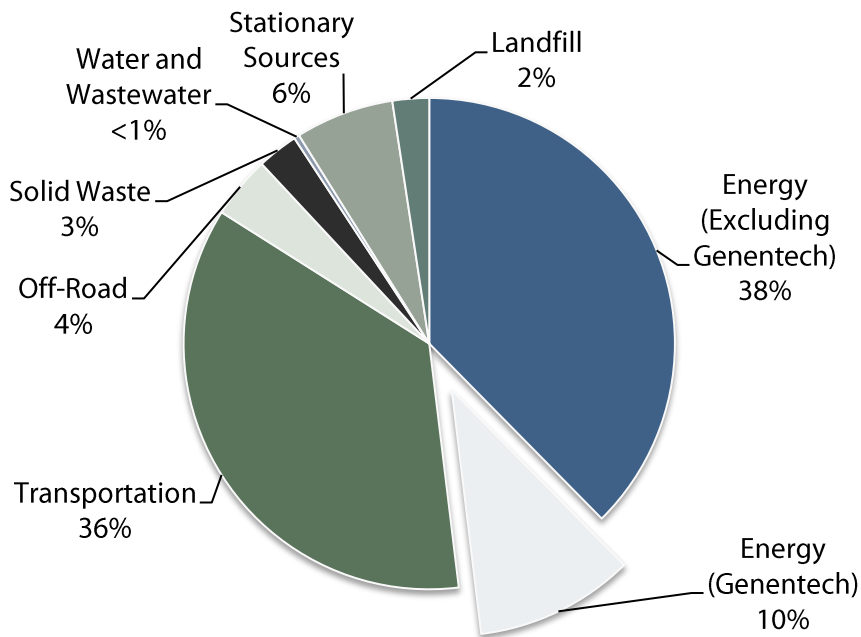
APPENDIX C

Figure C-2: Nonresidential 2005 Energy Emissions, Genentech Separate (MTCO₂e)



When included as part of the overall community-wide inventory, Genentech's energy use accounts for 10% of all GHG emissions attributable to South San Francisco, as shown in **Figure C-3**.

Figure C-3: Community-Wide 2005 Emissions by Sector, Genentech Separate (MTCO₂e)



BAAQMD COMPLIANCE

The official Inventory discussed in the remainder of this appendix and in all other sections of this CAP excludes emissions from landfills, Genentech, and other stationary sources. A summary of emissions excluding the informational sources is given in **Figure C-4** and **Table C-2**.

Figure C-4: 2005 Community-Wide Emissions by Sector, Excluding Informational Items (MTCO₂e)

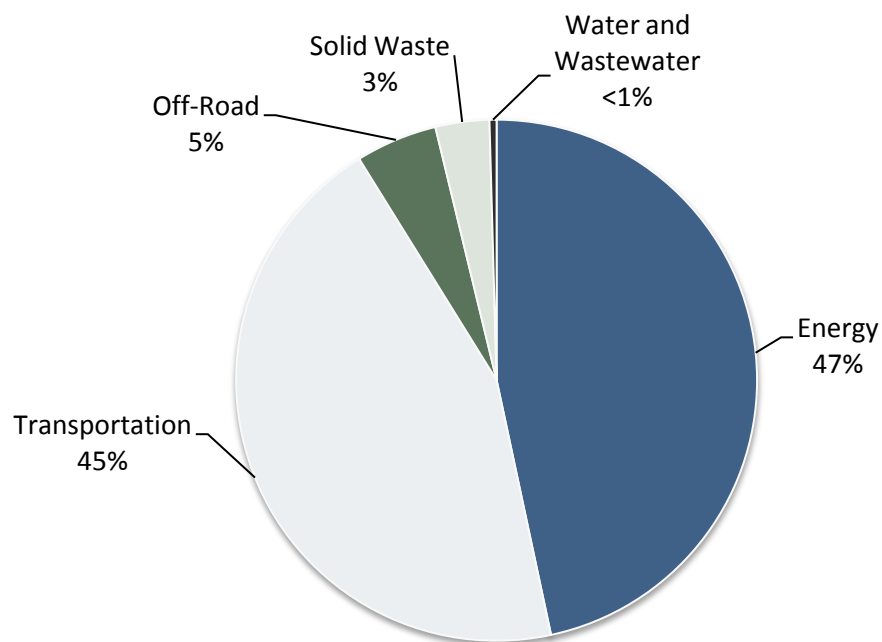


Table C-2: 2005 Community-Wide Emissions by Sector, Excluding Informational Items

Sector	MTCO ₂ e	Percentage of Total
Energy	206,370	47%
Transportation	196,910	45%
Solid Waste	14,790	3%
Off-Road	22,400	5%
Water and Wastewater	1,940	<1%
Total*	442,400	100%

* Due to rounding, the total may not equal the sum of the component parts.

APPENDIX C

GHG EMISSIONS PROJECTIONS

The basis for all growth scenarios is a business-as-usual (BAU) projection. The BAU scenario reflects South San Francisco’s growth projections without any regulatory, behavioral, or technical intervention to reduce GHG emissions. The BAU forecast is based on projections for population, housing, employment, and vehicle miles traveled for 2020 and 2035. The population, housing, and employment forecasts are based on demographic projections from ABAG as shown in **Table C-3**, while vehicle miles traveled (VMT) projections are derived from the City/County Association of Governments of San Mateo County (C/CAG) Transportation Demand Model. To prevent growth at Genentech from influencing the employment figures and the forecasts as a result, employees at Genentech have been removed from this table. Refer to **Appendix B** and **Table B-3** for additional discussion.

Table C-3: South San Francisco Community Growth Indicators

	2005	2020	2035	2005–2035 Change
Population	61,700	69,700	77,700	26%
Households	20,130	23,910	27,440	36%
Jobs, excluding Genentech	33,240	35,050	39,080	18%
Service Population	94,940	104,750	116,780	23%

These indicators are applied to the 2005 GHG emissions inventory to determine emissions under the BAU scenario. The BAU forecast projects that community-wide emissions will grow to 491,310 MTCO₂e (an 11% increase) by 2020 and to 550,540 MTCO₂e (a 24% increase) by 2035. These projections are illustrated in **Figure C-5** and **Table C-6**.

BAAQMD COMPLIANCE

Figure C-5: BAU GHG Comparison, 2005–2035

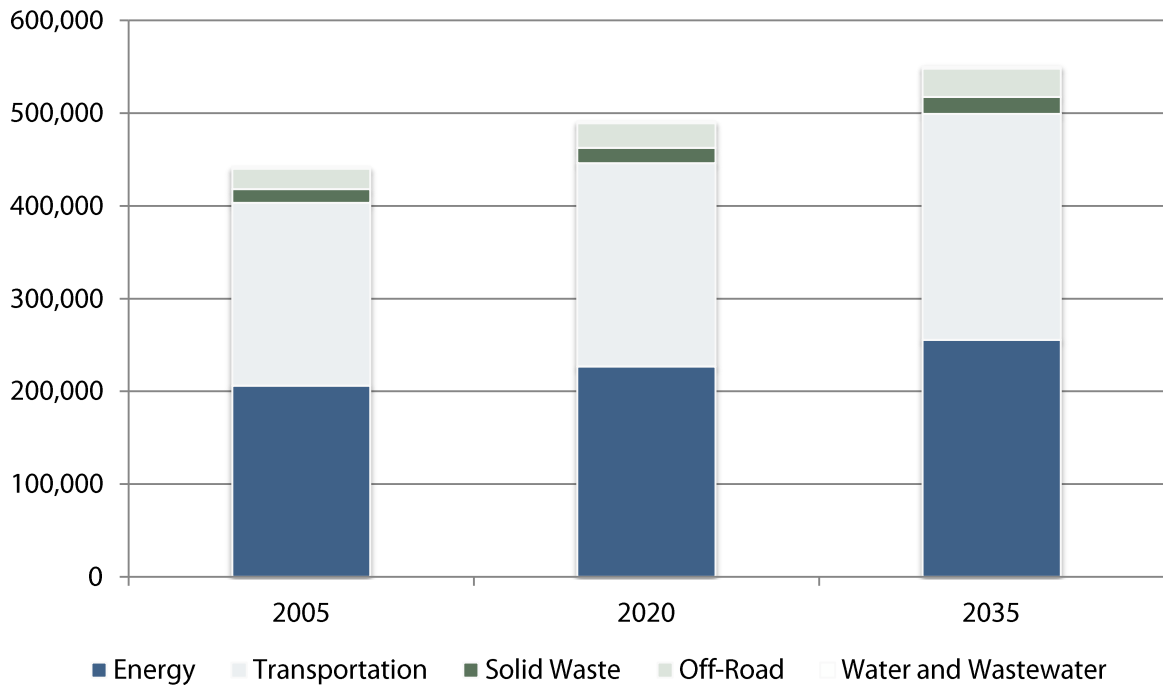


Table C-4: BAU GHG Emissions Comparison by Sector, 2005–2035

Sector	2005	2020	2035	2005–2035 Percentage Change
Energy	206,370	226,990	255,820	24%
Transportation	196,910	219,270	243,620	24%
Solid Waste	14,790	16,310	18,190	23%
Off-Road	22,400	26,610	30,530	36%
Water and Wastewater	1,940	2,140	2,380	23%
Total*	442,400	491,310	550,540	24%
Total Percentage Change	–	11%	24%	

* Due to rounding, the total may not equal the sum of the component parts.

APPENDIX C

In addition to AB 32, California has adopted and begun to implement several statewide programs that will help reduce local GHG emissions. To effectively determine the emissions reductions that will need to be implemented at the local level in order to meet South San Francisco’s emissions reduction target, the impact of these state-level programs has been incorporated into a scenario known as the adjusted business-as-usual (ABAU) forecast. The state-level programs included in the ABAU scenario are the Renewables Portfolio Standard (RPS), the implementation of the Clean Car Fuel Standard (often called the Pavley standard), the Low Carbon Fuel Standard (LCFS),⁵ and updates to the Title 24 Energy Efficiency Standards. The impacts of these programs, shown in **Table C-7**, play a critical role in helping South San Francisco achieve its GHG reduction target.

Table C-5: Summary of State Reductions, 2005–2035 (MTCO₂e)

	2005	2020	2035
BAU Scenario	442,400	491,310	550,540
Renewables Portfolio Standard	–	-14,200	-22,880
AB 1493 (Pavley) and Low Carbon Fuel Standard	–	-53,580	-80,430
Title 24	–	-1,990	-1,280
Summary of State Reduction Efforts	–	-69,770	-104,590
ABAU Scenario*	442,400	421,540	445,950
Percentage Change from 2005 Levels	–	-5%	1%

*Due to rounding, the total may not equal the sum of the component parts

GHG EMISSIONS REDUCTION TARGET

Following the Local Scoping Plan for AB 32, the City of South San Francisco is seeking to achieve a GHG emissions reduction target of 15% below the baseline 2005 levels by 2020.

The GHG reduction measures included in this CAP demonstrate South San Francisco’s ability to reach the GHG reduction target outlined above. Emissions reductions were quantified for 2020 and 2035, and are the potential reductions that could be achieved through implementation of these measures. The GHG reduction strategies are classified by goal or topic area, as shown in **Figure C-6**, to correspond with the sectors and sources of GHG emissions.

⁵ The LCFS is currently being implemented, but is facing legal challenges in federal court.

BAAQMD COMPLIANCE

Figure C-6: GHG Reduction Topics



It is important to identify how South San Francisco will meet or exceed the minimum GHG reduction target of 15% below baseline 2005 levels by 2020, in order to ensure the City can use the CAP as a Qualified GHG Reduction Strategy. This Plan identifies a clear path to allow the City to reach the community-wide target, which meets the state target as well.

The reduction measures included in this Plan are a diverse mix of regulatory and incentive-based programs. The reduction measures aim to reduce GHG emissions from each source to avoid reliance on any one strategy or sector. In total, state programs, existing local actions, and GHG reduction measures in this Plan are projected to reduce GHG emissions in South San Francisco in 2020 by 116,070 MTCO₂e by 2020, equal to a 15% reduction and consistent with the AB 32 reduction target (see **Figure C-7** and **Table C-8**). **Figure C-8** Identifies the local reduction strategies in the CAP by topic area.

APPENDIX C

Figure C-7: 2020 Local and State GHG Reductions (MTCO₂e)

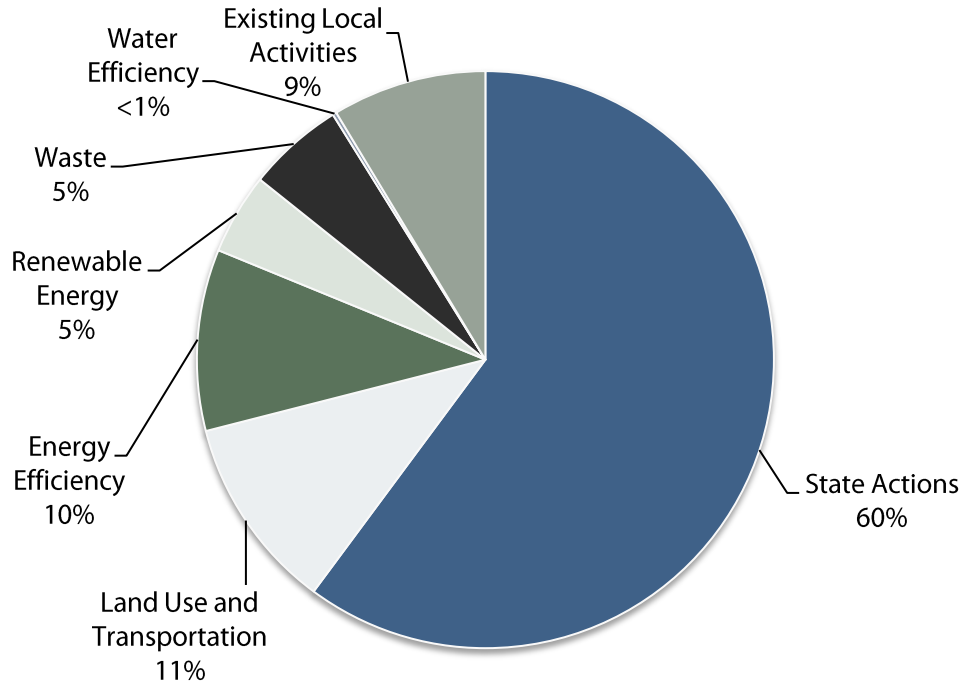


Table C-6: GHG Reduction Summary by Topic

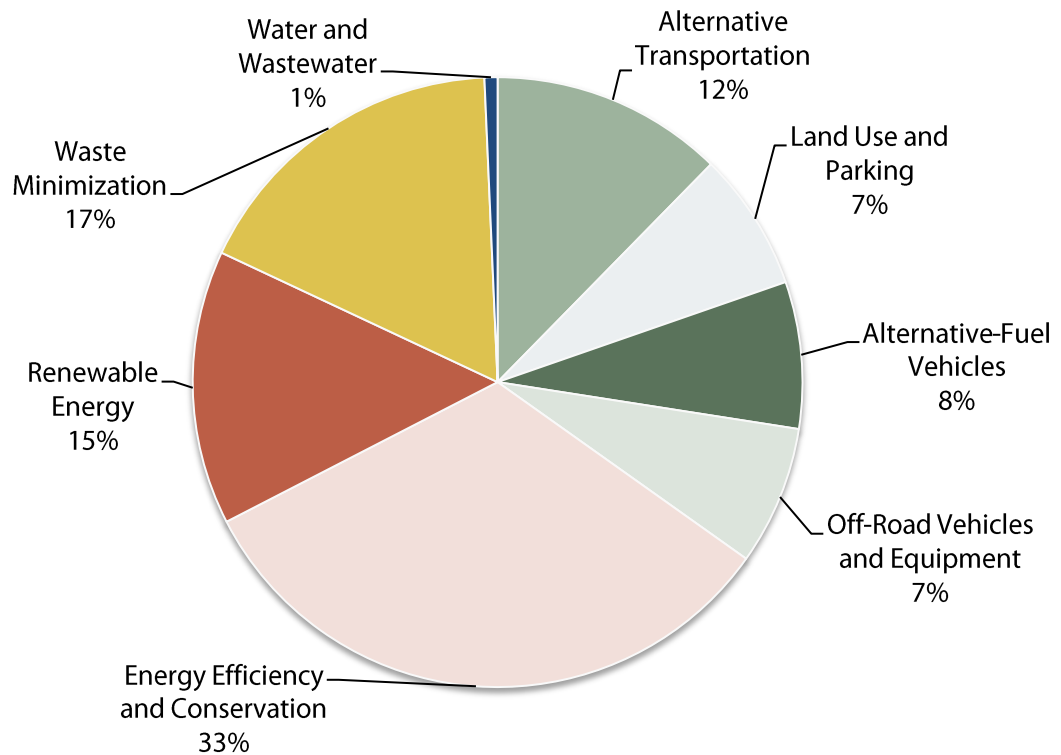
Goal Topic	2020	2035
BAU Scenario	491,310	550,540
State Reduction Efforts	-69,770	-104,590
<i>Existing Local Programs</i>	<i>-10,090</i>	<i>-13,020</i>
<i>Alternative Transportation</i>	<i>-4,470</i>	<i>-4,380</i>
<i>Land Use and Parking</i>	<i>-2,660</i>	<i>-2,600</i>
<i>Alternative Fuel Vehicles</i>	<i>-2,770</i>	<i>-6,530</i>
<i>Off-Road Vehicles and Equipment</i>	<i>-2,670</i>	<i>-5,880</i>
<i>Energy Efficiency and Conservation</i>	<i>-11,810</i>	<i>-30,100</i>
<i>Renewable Energy</i>	<i>-5,100</i>	<i>-11,760</i>
<i>Waste Minimization</i>	<i>-6,720</i>	<i>-10,950</i>
<i>Water and Wastewater</i>	<i>-250</i>	<i>-530</i>

BAAQMD COMPLIANCE

Goal Topic	2020	2035
<i>Municipal Operations¹</i>	–	–
Total Local GHG Reductions²	-46,540	-85,750
Total Local and State Reductions²	-116,310	-190,340

1. Note that municipal reduction measures are considered supportive and GHG reductions are not quantified.
2. Due to rounding, totals may not equal the sum of the component parts.

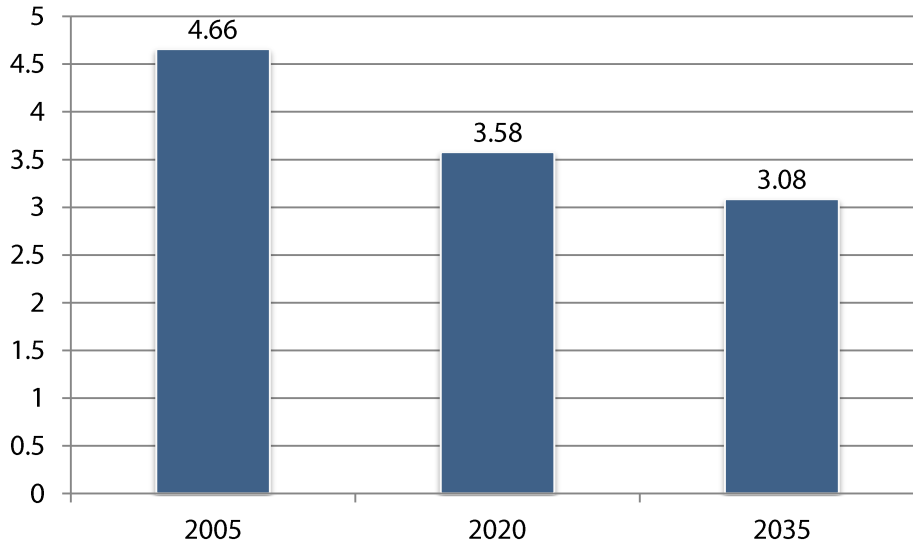
Figure C-8: 2020 CAP GHG Reductions by Topic (MTCO₂e)



Achievement of South San Francisco’s target by 2020 will meet state recommendations and BAAQMD threshold requirements for developing a Qualified GHG Reduction Strategy. Implementation of this Plan will decrease per capita emissions from 4.66 MTCO₂e annually in 2005 to 3.49 MTCO₂e in 2020 and 3.07 MTCO₂e in 2035. These decreases are illustrated in **Figure C-9**.

APPENDIX C

Figure C-9: GHG Emissions per Service Population, 2005–2035 (MTCO₂e)



In addition to quantifying the emissions reductions associated with each measure in the CAP, the BAAQMD recommends that the City clearly specify the measures within the CAP that are applicable to new construction projects in order to demonstrate compliance with South San Francisco’s GHG emissions reduction strategy and determine that the project’s GHG emissions are less than significant. To ensure that each new construction project complies with South San Francisco’s CAP, a checklist has been developed to be submitted by an applicant for each new development project (see **Appendix E**).

IMPLEMENTATION AND MONITORING

To ensure the timely implementation of South San Francisco’s CAP, the City will identify staff to coordinate and track implementation of GHG reduction strategies and progress toward GHG reduction targets and to prepare annual reports to the City Council on CAP implementation and progress. To assist in this reporting, the City has developed CAP monitoring tool that identifies the major implementation milestones and the necessary actions to be taken for each reduction measure. This tool enables the City to quickly update the GHG emissions inventory and streamline the annual reporting of CAP implementation. The monitoring tool also outlines the necessary procedures to update the inventory and reduction measures every three to five years. This tool will serve as the primary instrument in measuring South San Francisco’s progress toward achieving emissions reduction targets and to ensure timely implementation occurs.

BAAQMD COMPLIANCE

PUBLIC PROCESS AND ENVIRONMENTAL REVIEW

The final requirement of a Qualified GHG Reduction Strategy is to adopt the Climate Action Plan through a public hearing process following environmental review. South San Francisco has involved numerous stakeholders throughout the development of the CAP. This Plan will undergo environmental review as part of the public hearing and adoption process.

During the development of the CAP, the City has engaged stakeholders and interested community members through public meetings, workshops, and other events. The public has also had opportunities to participate in the development at Bicycle Pedestrian Advisory Committee (BPAC), Planning Commission, and City Council meetings.

In order to operate effectively as a programmatic tiering document, the California Attorney General's Office and the BAAQMD both recommend integration of components of the GHG emissions reduction strategy into the General Plan. The GHG emissions reduction strategy will contribute to the General Plan's policies and will serve as mitigation for South San Francisco's GHG emissions.

APPENDIX D

GHG METHODS AND

ASSUMPTIONS

APPENDIX D

APPENDIX - D: GHG METHODS AND ASSUMPTIONS

OVERVIEW AND PURPOSE

This appendix summarizes the data sources and methods used to calculate GHG emissions reductions for the South San Francisco Climate Action Plan, as well as the performance metrics and expected rates of participation. These calculations are primarily supported by four types of data and research: (1) GHG emissions and activity data from the South San Francisco emissions inventory and forecast, (2) government agency tools and reports, (3) case studies in similar jurisdictions, and (4) scholarly research.

Activity data from the inventory, including vehicle miles traveled, kWh and therm use, and tons of waste disposed, forms the basis for the quantification of each measure. Activity data was combined with the performance targets and indicators to calculate the GHG reduction benefit of each measure. This approach ensures that South San Francisco's GHG reductions are tied to the baseline and to future activities that are actually occurring within the community. Furthermore, this approach to quantification is consistent with the guidance provided by the BAAQMD for the development of a Qualified GHG Reduction Strategy, as discussed in **Appendix C**. All information is organized by measure.

SUPPORTIVE MEASURES

Some reduction measures are not expected to result in direct and quantifiable GHG emissions reductions on their own, although they play an essential role in enabling the reported GHG reductions for quantified measures. These measures are known as supportive measures and have no reportable methods, metrics, and sources. For this reason, they are listed immediately below and are not included among the technical information which follows.

- Measure 4.2: Alternative Energy Cost Reduction
- Measure 4.3: Green Industry
- Measure 5.2: Landfill Emissions Reduction
- Measure 6.2: Alternative Sources of Irrigation Water
- Measure 7.1: Promote Municipal Energy Efficiency
- Measure 7.2: Conserve Municipal Water
- Measure 7.3: Reduce Municipal Waste
- Measure 7.4: Supportive Municipal Practices
- Existing Activity 5: Community Transportation Plan
- Existing Activity 9: X-Ray House

GHG METHODS AND ASSUMPTIONS

TECHNICAL DATA FOR QUANTIFIED MEASURES

Measure 1.1	
Policy	Expand active transportation alternatives by providing infrastructure and enhancing connectivity for bicycle and pedestrian access.
2020 MTCO ₂ e Reductions	890
2035 MTCO ₂ e Reductions	870
2020 Assumed Activity Reduction per Participant	Not Applicable
2035 Assumed Activity Reduction per Participant	Not Applicable
2020 Participation Target(s)	Implement regional transportation plans and existing programs
2035 Participation Target(s)	Implement regional transportation plans and existing programs
2020 Community Costs	Minimal (\$0)
2020 Community Savings	High (Over \$500,000)
Reduction Method	To determine VMT reductions from increased access to mass transit, South San Francisco's specific area plans were used to estimate what percentage of new development will be in close proximity to transit. The City/County Association of Governments of San Mateo County (C/CAG) travel demand model was used to determine the expected VMT reductions from these actions during peak periods. These figures were converted to average VMTs using the California Department of Transportation (Caltrans) District 4 Performance Measurement System (PeMS) data. To calculate savings from traffic calming, South San Francisco's specific area plans were used to estimate what percentage of streets and intersections would receive traffic calming treatments. The expanded traffic calming was used as an input in the C/CAG travel demand model to determine VMT reductions during peak periods, which was converted to an average VMT reduction using PeMS data.

APPENDIX D

Measure 1.1	
Reduction Sources	<p>California Air Pollution Control Officers Association (CAPCOA). 2010. Quantifying Greenhouse Gas Mitigation Measures. Sacramento. http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.</p> <p>California Department of Transportation (Caltrans). 2012. Caltrans Performance Measurement System (PeMS). Sacramento. http://pems.dot.ca.gov.</p> <p>City of South San Francisco. 1999. City of South San Francisco General Plan. http://www.ssf.net/index.aspx?NID=360.</p>
Cost Method	There are not expected to be any costs to the community from this policy. The projected savings in VMTs were multiplied by the standard IRS tax reimbursement rate for miles traveled to determine community savings.
Cost Sources	Internal Revenue Service. 2011. IRS Announces 2012 Standard Mileage Rates. Washington, D.C. http://www.irs.gov/uac/IRS-Announces-2012-Standard-Mileage-Rates,-Most-Rates-Are-the-Same-as-in-July .

Measure 1.2	
Policy	Support expansion of public and private transit programs to reduce employee commutes.
2020 MTCO ₂ e Reductions	3,580
2035 MTCO ₂ e Reductions	3,510
2020 Assumed Activity Reduction per Participant	Not Applicable
2035 Assumed Activity Reduction per Participant	Not Applicable
2020 Participation Target(s)	Expansion of TDMs to affect 25–44% of all local employment
2035 Participation Target(s)	Expansion of TDMs to affect 25–44% of all local employment
2020 Community Costs	Minimal (\$0)
2020 Community Savings	High (Over \$500,000)
Reduction Method	Using the South San Francisco Municipal Code and employment data provided by the City, the number of employees eligible for participation in the program was calculated. Figures provided by CAPCOA were used to convert these figures into average VMT reductions.

GHG METHODS AND ASSUMPTIONS

Measure 1.2	
Reduction Sources	California Air Pollution Control Officers Association (CAPCOA). 2010. Quantifying Greenhouse Gas Mitigation Measures. Sacramento. http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf . City of South San Francisco. 2012. City of South San Francisco Municipal Code. http://qcode.us/codes/southsanfrancisco/ .
Cost Method	There are not expected to be any costs to the community from this policy. The projected savings in VMTs were multiplied by the standard IRS tax reimbursement rate for miles traveled to determine community savings.
Cost Sources	Internal Revenue Service. 2011. IRS Announces 2012 Standard Mileage Rates. Washington, D.C. http://www.irs.gov/uac/IRS-Announces-2012-Standard-Mileage-Rates,-Most-Rates-Are-the-Same-as-in-July .

Measure 1.3	
Policy	Integrate higher-density development and mixed-use development near transit facilities and community facilities, and reduce dependence on autos through smart parking practices.
2020 MTCO ₂ e Reductions	2,660
2035 MTCO ₂ e Reductions	2,600
2020 Assumed Activity Reduction per Participant	Not Applicable
2035 Assumed Activity Reduction per Participant	Not Applicable
2020 Participation Target(s)	8.5% of city is transit-oriented, mixed use development, achieving 30 units/acre in the ECR/Chestnut Plan, and a 10% reduction in parking supply for reductions in vehicle miles traveled
2035 Participation Target(s)	8.5% of city is transit-oriented, mixed use development, achieving 30 units/acre in the ECR/Chestnut Plan, and a 10% reduction in parking supply for reductions in vehicle miles traveled
2020 Community Costs	Minimal (\$0)
2020 Community Savings	High (Over \$500,000)

APPENDIX D

Measure 1.3	
Reduction Method	Using South San Francisco's specific area plans, the amount of new commercial, mixed-use, and higher-density development was estimated. Additionally, the amount of below-market-rate housing was determined using the South San Francisco Housing Element. Using the City/County Association of Governments of San Mateo County (C/CAG) travel model, peak-time VMT reductions from these developments were calculated. Caltrans Performance Measurement System (PeMS) data was used to convert these figures to average VMTs.
Reduction Sources	California Air Pollution Control Officers Association (CAPCOA). 2010. Quantifying Greenhouse Gas Mitigation Measures. Sacramento. http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf . California Department of Transportation (Caltrans). 2012. Caltrans Performance Measurement System (PeMS). Sacramento. http://pems.dot.ca.gov . City of South San Francisco. 1999. City of South San Francisco General Plan. http://www.ssf.net/index.aspx?NID=360 . City of South San Francisco. 2009. City of South San Francisco Housing Element. http://ssf.net/index.aspx?NID=360 . City of South San Francisco. n.d. City of South San Francisco Downtown Station Area Specific Plan. http://ssf.net/index.aspx?nid=1365 .
Cost Method	There are not expected to be any costs to the community from this policy. The projected savings in VMTs were multiplied by the standard IRS tax reimbursement rate for miles traveled to determine community savings.
Cost Sources	Internal Revenue Service. 2011. IRS Announces 2012 Standard Mileage Rates. Washington, D.C. http://www.irs.gov/uac/IRS-Announces-2012-Standard-Mileage-Rates,-Most-Rates-Are-the-Same-as-in-July .

GHG METHODS AND ASSUMPTIONS

Measure 2.1	
Policy	Expand the use of alternative fuel vehicles.
2020 MTCO ₂ e Reductions	2,770
2035 MTCO ₂ e Reductions	6,530
2020 Assumed Activity Reduction per Participant	390 gallons of fuel per public EV charging station
2035 Assumed Activity Reduction per Participant	390 gallons of fuel per public EV charging station
2020 Participation Target(s)	80 public EV charging stations, 950 houses with EV chargers, and 90 EV chargers at businesses
2035 Participation Target(s)	150 public EV charging stations, 2,650 houses with EV chargers, and 180 EV chargers at businesses
2020 Community Costs	High (Over \$500,000)
2020 Community Savings	Minimal (\$0)
Reduction Method	Data from the Energy Information Administration was used to determine the annual VMT reduction per charging station and the gallons of fuel saved as a result. Figures from the EPA were used to translate the reduced fuel into electricity. Emissions factors were applied to determine emissions savings from lower fuel use, as well as new emissions from increased electricity use, for each charging station. The net difference was then multiplied by a number of new public charging stations and participation rates for pre-wired new development.
Reduction Sources	US Energy Information Administration, Department of Energy. 2001. Transportation Energy Consumption Surveys. Washington, D.C. http://www.eia.gov/emeu/rtecs/nhts_survey/2001/tablefiles/t0464(2005).pdf . US Environmental Protection Agency, Office of Transportation and Air Quality. 2011. Fact Sheet: New Fuel Economy and Environmental Labels for a New Generation of Vehicles. Washington, D.C. http://www.epa.gov/otaq/carlabel/420f11017.htm .

APPENDIX D

Measure 2.1	
Cost Method	An average cost for each public charging station and pre-wiring of new buildings was determined based on case studies and reports. These figures were multiplied by the number of participants to obtain community costs. Using state projections for electricity and gasoline costs, the cost savings from lower gasoline use and increased electricity costs from charging stations were calculated. The difference between the two was reported as the net savings.
Cost Sources	<p>Association of Bay Area Governments, et al. 2011. Ready, Set, Charge California: A Guide to EV-Ready Communities. http://www.rmi.org/Content/Files/Readysetcharge.pdf.</p> <p>California Energy Commission (CEC). 2010. Transportation Energy Forecasts and Analyses for the 2009 Integrated Energy Policy Report. Sacramento. http://www.energy.ca.gov/2010publications/CEC-600-2010-002/CEC-600-2010-002-SF.PDF.</p> <p>Hagerty, J. R., and Ramsey, M. 2011. "Charging Stations Multiply, But Electric Cars Are Few." Wall Street Journal. http://online.wsj.com/article/SB10001424052970203405504576599060894172004.html.</p>

Measure 2.2	
Policy	Reduce emissions from off-road vehicles and equipment.
2020 MTCO ₂ e Reductions	2,670
2035 MTCO ₂ e Reductions	5,880
2020 Assumed Activity Reduction per Participant	For the trade-in program, 0.02 MTCO ₂ e per lawnmower and 0.01 MTCO ₂ e per leaf blower. A 25% emissions reduction per converted piece of equipment and a 0.1% reduction in emissions per 1% reduction in idling time.
2035 Assumed Activity Reduction per Participant	For the trade-in program, 0.02 MTCO ₂ e per lawnmower and 0.01 MTCO ₂ e per leaf blower. A 25% emissions reduction per converted piece of equipment and a 0.1% reduction in emissions per 1% reduction in idling time.

GHG METHODS AND ASSUMPTIONS

Measure 2.2	
2020 Participation Target(s)	1,670 lawnmowers traded in and 430 leaf blowers traded in. For construction equipment, 40% of equipment converted to alternative fuels and a 25% reduction in construction equipment idling time.
2035 Participation Target(s)	4,190 lawnmowers traded in and 1,080 leaf blowers traded in. For construction equipment, 75% of equipment converted to alternative fuels and a 40% reduction in construction equipment idling time.
2020 Community Costs	Unknown
2020 Community Savings	Unknown
Reduction Method	<p>To determine emissions reductions from lawnmower and leaf blower trade-in, population data and results from the CARB Off-road model were used to determine the number of lawnmowers and leaf blowers in South San Francisco, along with the average annual emissions for each piece of equipment. A participation rate was applied to determine how many pieces of equipment would be removed as a result of the program, which was then multiplied by a per-equipment emissions factor to calculate community GHG reductions.</p> <p>For construction equipment trade-in, EPA figures were used to determine the average reductions of hybrid, natural gas, electrical, and biodiesel construction equipment compared to conventional diesel power. These reductions were combined with a participation rate to determine overall savings.</p> <p>To calculate emissions from reduced idling of construction equipment, EPA figures were used to determine the reduction in emissions per 1% reduction in idling time. This was then multiplied by a target percent reduction in idling time.</p>
Reduction Sources	<p>Nealon, S. 2011. "Hybrid Construction Vehicle Emissions to be Analyzed." UCR Today, University of California at Riverside. http://ucrtoday.ucr.edu/213.</p> <p>US Environmental Protection Agency, National Construction Sector. 2009. Potential for Reducing Greenhouse Gas Emissions in the Construction Sector. Washington, D.C. http://www.epa.gov/sectors/pdf/construction-sector-report.pdf.</p>

APPENDIX D

Measure 2.2	
Cost Method	Due to a number of uncertainties associated with the financial component of this policy, community costs and savings cannot be quantified.
Cost Sources	Not Applicable

Measure 3.1	
Policy	Maximize energy efficiency in the built environment through standards and the plan review process.
2020 MTCO ₂ e Reductions	250
2035 MTCO ₂ e Reductions	1,350
2020 Assumed Activity Reduction per Participant	30 kWh and 60 therms for a single-family home, 40 kWh and 30 therms for a multi-family home, and 2,950 kWh and 470 therms for the average business
2035 Assumed Activity Reduction per Participant	30 kWh and 60 therms for a single-family home, 40 kWh and 30 therms for a multi-family home, and 6,420 kWh and 1,060 therms for the average business
2020 Participation Target(s)	90 new single-family houses, 670 new multi-family houses, and 30 new businesses
2035 Participation Target(s)	280 new single-family houses, 2,190 new multi-family houses, and 130 new businesses
2020 Community Costs	High (Over \$500,000)
2020 Community Savings	Medium-High (\$200,001–500,000)
Reduction Method	Savings from CALGreen base and Tier 1 standards were calculated by determining the average electricity and natural gas use of new houses and businesses, using the Inventory forecast and demographic projections. Standard CALGreen Tier 1 reduction factors were multiplied by an assumed efficiency increase to determine overall per-building electricity and natural gas reductions for commercial buildings, single-family detached houses, townhomes, and multi-family residential units. Lastly, these per-building reductions were combined with a citywide participation rate to determine overall community savings.
Reduction Sources	California Air Pollution Control Officers Association (CAPCOA). 2010. Quantifying Greenhouse Gas Mitigation Measures. Sacramento. http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-

GHG METHODS AND ASSUMPTIONS

Measure 3.1	
	Report-9-14-Final.pdf.
Cost Method	For CALGreen costs, a standard additional per-square-foot cost for energy efficiency was applied to the projected increase in residential and nonresidential square footage in South San Francisco. The calculated reductions in electricity and natural gas use as a result of the CALGreen Tier 1 standard were multiplied by projected energy costs to determine savings.
Cost Sources	<p>California Energy Commission (CEC). 2012. California Energy Almanac. Utility-wide Weighted Average Retail Electricity Prices. Sacramento. http://energyalmanac.ca.gov/electricity/index.html.</p> <p>City of South San Francisco. 1999. South San Francisco General Plan. http://www.ssf.net/index.aspx?NID=360.</p> <p>Local Governments for Sustainability USA. Climate and Air Pollution Planning Assistant v. 1.3.</p> <p>Pacific Gas & Electric. 2012. Gas Rate Forecast. San Francisco. http://www.pge.com/tariffs/rateinfo.shtml.</p> <p>Zillow.com. 2012. South San Francisco Homes & Real Estate Data. http://www.zillow.com/local-info/CA-South-San-Francisco-homes/r_13929/.</p>

APPENDIX D

Measure 3.2	
Policy	Support retrofits to existing residential structures.
2020 MTCO ₂ e Reductions	1,900
2035 MTCO ₂ e Reductions	6,090
2020 Assumed Activity Reduction per Participant	1,600 kWh and 140 therms for low-income weatherization participants, 500 kWh and 40 therms for basic program participants, and 1,990 kWh and 180 therms for advanced participants in the Energy Upgrade CA/Energy Financing program. 170 kWh for a single-family detached house, 210 kWh for a single-family attached house, and 220 kWh for a multi-family residential unit participating in the appliance upgrade program. 350 kWh and 4 therms per household participating in the Smart Grid Appliance program, and 1,550 kWh and 140 therms per house undergoing a retrofit as part of a sale.
2035 Assumed Activity Reduction per Participant	1,600 kWh and 140 therms for low-income weatherization participants, 500 kWh and 40 therms for basic program participants, and 1,990 kWh and 180 therms for advanced participants in the Energy Upgrade CA/Energy Financing program. 170 kWh for a single-family detached house, 210 kWh for a single-family attached house, and 220 kWh for a multi-family residential unit participating in the appliance upgrade program. 350 kWh and 5 therms per household participating in the Smart Grid Appliance program, and 1,570 kWh and 140 therms per house undergoing a retrofit as part of a sale.
2020 Participation Target(s)	300 participating households in the low-income weatherization program. For the Energy Upgrade CA/Energy Financing program, 1,450 households in the basic program and 720 households in the advanced program. 600 single-family detached houses, 130 single-family attached houses, and 260 multi-family residential units participating in the appliance upgrade program. For the Smart Grid Appliance program, 780 new and existing houses. 40 for-sale homes being upgraded as part of the sale process.

GHG METHODS AND ASSUMPTIONS

Measure 3.2	
2035 Participation Target(s)	450 participating households in the low-income weatherization program. For the Energy Upgrade CA/Energy Financing program, 3,620 households in the basic program and 2,890 households in the advanced program. 4,760 single-family detached houses, 1,020 single-family attached houses, and 2,050 multi-family residential units participating in the appliance upgrade program. For the Smart Grid Appliance program, 3,650 new and existing houses. 140 for-sale homes being upgraded as part of the sale process.
2020 Community Costs	High (Over \$500,000)
2020 Community Savings	High (Over \$500,000)
Reduction Method	<p>For low-income weatherization, energy reduction figures from PG&E case studies were combined with inventory data to determine energy use per house, and then a participation rate was applied to determine overall savings.</p> <p>For Energy Upgrade CA and similar programs, reduction figures from the program were applied to per-residence energy use figures, and then multiplied by participation rates for both basic and advanced retrofits.</p> <p>To determine reductions from home sale energy audits, historical home sale data in South San Francisco was used to determine the yearly percentage of homes in the community that are sold. ABAG figures were used to calculate the average kWh and therm reductions for each home. A participation rate was then applied to determine community reductions.</p>

APPENDIX D

Measure 3.2	
Reduction Sources	<p>Association of Bay Area Governments (ABAG). 2012. Retrofit Bay Area Final Report: ABAG Report to CEC on Energy Upgrade California. Oakland, CA. https://www.pge.com/regulation/EnergyEfficiency2013-2014-Portfolio/Pleadings/LGSEC/2012/EnergyEfficiency2013-2014-Portfolio_Plea_LGSEC_20120803_245608Atch01_245609.pdf.</p> <p>California Air Pollution Control Officers Association (CAPCOA). 2010. Quantifying Greenhouse Gas Mitigation Measures. Sacramento. http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.</p> <p>Energy Upgrade California. 2012. Advanced Upgrade Package. San Mateo County. https://energyupgradeca.org/county/san_mateo/about_advanced.</p> <p>Energy Upgrade California. 2012. Basic Upgrade Package. San Mateo County. https://energyupgradeca.org/county/san_mateo/about_basic.</p> <p>KEMA, Inc. 2010. 2009 California Residential Appliance Saturation Study, Volume 2: Results. CEC-200-2010-004 http://www.energy.ca.gov/appliances/rass/.</p> <p>Zillow.com. 2012. South San Francisco Homes & Real Estate Data. http://www.zillow.com/local-info/CA-South-San-Francisco-homes/r_13929/.</p>
Cost Method	<p>Low-income weatherization is funded by state and federal sources, so there are no community costs. Community savings were determined by multiplying electricity and natural gas savings by projected energy rates.</p> <p>For the cost of other retrofit programs, an ABAG cost-per-retrofit figure was multiplied by a participation rate. To determine savings, electricity and natural gas reductions were multiplied by projected energy rates in 2020 and 2035.</p>

GHG METHODS AND ASSUMPTIONS

Measure 3.2	
Cost Sources	<p>Association of Bay Area Governments (ABAG). 2012. Retrofit Bay Area Final Report: ABAG Report to CEC on Energy Upgrade California. Oakland, CA. https://www.pge.com/regulation/EnergyEfficiency2013-2014-Portfolio/Pleadings/LGSEC/2012/EnergyEfficiency2013-2014-Portfolio_Plea_LGSEC_20120803_245608Atch01_245609.pdf</p> <p>California Energy Commission (CEC). 2012. California Energy Almanac. Utility-wide Weighted Average Retail Electricity Prices. Sacramento. http://energyalmanac.ca.gov/electricity/index.html</p> <p>Pacific Gas & Electric. 2012. Gas Rate Forecast. San Francisco. http://www.pge.com/tariffs/rateinfo.shtml.</p>

Measure 3.3	
Policy	Encourage energy efficiency retrofits to the existing nonresidential building stock that reduce operating costs and increase industry competitiveness.
2020 MTCO ₂ e Reductions	9,470
2035 MTCO ₂ e Reductions	22,190
2020 Assumed Activity Reduction per Participant	For the appliance upgrade program, 6,570 kWh and 220 therms per participating business. For the Smart Grid Appliance program, 7,420 kWh and 60 therms for existing businesses, and 5,300 kWh and 40 therms for new businesses. For retrocommissioning, 8,230 kWh and 410 therms per average participating business. A 6% improvement in efficiency for new boilers for the boiler upgrade program. 24,120 kWh and 30 therms for participants in the structural retrofit program, and 56,170 kWh and 3,360 therms for participants in the deep retrofit program.
2035 Assumed Activity Reduction per Participant	For the appliance upgrade program, 6,570 kWh and 220 therms per participating business. For the Smart Grid Appliance program, 7,420 kWh and 60 therms for existing businesses, and 11,520 kWh and 100 therms for new businesses. For retrocommissioning, 8,230 kWh and 410 therms per average participating business. A 6% improvement in efficiency for new boilers for the boiler upgrade program. 24,120 kWh and 30 therms for participants in the structural retrofit program, and

APPENDIX D

Measure 3.3	
	56,170 kWh and 3,360 therms for participants in the deep retrofit program.
2020 Participation Target(s)	360 participating businesses for the appliance upgrade program, 50 existing businesses and 10 new businesses participating in the Smart Grid Appliance program, 3 million participating nonresidential square feet for the retrocommissioning program, and 50% of boilers participating in the high-efficiency boiler upgrade program. 470 participating businesses in the structural retrofit program and 90 participating businesses in the deep retrofit program.
2035 Participation Target(s)	830 participating businesses for the appliance upgrade program, 190 existing businesses and 60 new businesses participating in the Smart Grid Appliance program, 9 million participating nonresidential square feet for the retrocommissioning program, and 100% of boilers participating in the high-efficiency boiler upgrade program. 950 participating businesses in the structural retrofit program and 240 participating businesses in the deep retrofit program.
2020 Community Costs	High (Over \$500,000)
2020 Community Savings	High (Over \$500,000)
Reduction Method	<p>For nonresidential appliances, inventory and case study data was used to determine how much nonresidential natural gas and electricity are used for various purposes. Additional case studies were used to calculate the potential savings from appliance upgrades for each energy use. These potential savings were multiplied by an average implementation rate, as most businesses only upgrade some appliances, to determine per-business savings. Lastly, this was multiplied by a participation rate to calculate community-wide reductions.</p> <p>For smart grid appliances, inventory and demographic data was used to determine the energy use of new and existing businesses. These factors were combined with smart grid reduction factors to determine per-business savings. Lastly, these savings were multiplied by a participation rate to calculate the community-wide reduction.</p> <p>To calculate the reductions from retrocommissioning, inventory data and the South San Francisco General Plan were used to calculate the average business size.</p>

GHG METHODS AND ASSUMPTIONS

Measure 3.3	
	<p>Case studies were used to determine the per-square-foot reduction in energy use as a result of retrocommissioning. These figures were combined with a participation rate to determine the number of participating businesses and overall community reductions.</p> <p>For reductions from boilers inventory and case study data was used to determine the amount of natural gas consumed by boilers. Additional case studies were used to calculate the average life cycle of a boiler, current boiler efficiency, and projected efficiency of new boilers. Lastly, the change in efficiency and average life cycle were used to determine the total decrease in natural gas as a result of boiler upgrades. For retrofits, a number of case studies, scientific research papers, and surveys were used to identify the amount of energy used by different activities in a commercial setting and what degree of savings could be achieved through retrofits. These savings were then multiplied by a participation rate to determine the community savings.</p>
Reduction Sources	<p>Brown, Rich, Sam Borgeson, Jon Koomey, and Peter Biermayer. 2008. U.S. Building-Sector Energy Efficiency Potential. Ernest Orlando Lawrence Berkeley National Laboratory, University of California. http://enduse.lbl.gov/info/LBNL-1096E.pdf.</p> <p>California Air Pollution Control Officers Association (CAPCOA). 2010. Quantifying Greenhouse Gas Mitigation Measures. Sacramento. http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.</p> <p>Itron, Inc. 2007. California Commercial End-use Survey - Results Page. http://capabilities.itron.com/CeusWeb/Chart.aspx.</p> <p>Pacific Northwest National Laboratory. 2011. Advanced Energy Retrofit Guide: Practical Ways to Improve Energy Performance - Office Buildings. Building Technologies Program, Energy Efficiency and Renewable Energy, US Department of Energy. http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20761.pdf.</p>

APPENDIX D

Measure 3.3	
Cost Method	<p>To calculate the cost from the appliance upgrade and Smart Grid Appliance programs, standard new appliance costs were multiplied by the number of participating businesses. Costs from retrocommissioning were determined by reviewing case studies of similar projects in California. Costs of the boiler replacement program cannot be accurately determined at this time. The projected kWh and therm savings from each program were multiplied by estimated future energy costs to determine community savings. Costs and savings from commercial and structural retrofits are based on recent academic and government studies.</p>
Cost Sources	<p>Brown, Rich, Sam Borgeson, Jon Koomey, and Peter Biermayer. 2008. U.S. Building-Sector Energy Efficiency Potential. Ernest Orlando Lawrence Berkeley National Laboratory, University of California.</p> <p>California Air Pollution Control Officers Association (CAPCOA). 2010. Quantifying Greenhouse Gas Mitigation Measures. Sacramento. http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.</p> <p>California Department of General Services. n.d. Retro-Commissioning Fact Sheet. Sacramento. http://www.documents.dgs.ca.gov/green/eeproj/retrocommfactsheet.doc.</p> <p>California Energy Commission. 2012. California Energy Almanac, Utility-wide Weighted Average Retail Electricity Prices. Sacramento. http://energyalmanac.ca.gov/electricity/index.html.</p> <p>Pacific Gas & Electric. 2012. Gas Rate Forecast. San Francisco. http://www.pge.com/tariffs/rateinfo.shtml.</p> <p>Pacific Northwest National Laboratory. 2011. Advanced Energy Retrofit Guide: Practical Ways to Improve Energy Performance. Richland, WA. http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-20761.pdf.</p>

GHG METHODS AND ASSUMPTIONS

Measure 3.4	
Policy	Address heat island issues and expand the urban forest.
2020 MTCO ₂ e Reductions	60
2035 MTCO ₂ e Reductions	140
2020 Assumed Activity Reduction per Participant	120 kWh per existing house, 2,360 kWh per existing business, 120 kWh per new house, and 1,960 kWh per new business. Additionally, 30,580 kWh community-wide due to a decrease in the urban heat island effect.
2035 Assumed Activity Reduction per Participant	120 kWh per existing house, 2,360 kWh per existing business, 120 kWh per new house, and 3,670 kWh per new business. Additionally, 72,480 kWh community-wide due to a decrease in the urban heat island effect.
2020 Participation Target(s)	810 existing houses, 50 existing businesses, 570 new houses, and 20 new businesses
2035 Participation Target(s)	2,010 existing houses, 120 existing businesses, 880 new houses, and 30 new businesses
2020 Community Costs	Unknown
2020 Community Savings	Low-Mid (\$25,001–100,000)
Reduction Method	<p>To determine the reductions from cool roofs, inventory and case study data was used to determine the average amount of electricity used for cooling on residences and businesses. A reduction rate for cool roofs based on case studies was multiplied by the average cooling electricity use to determine per-participant savings. This was then multiplied by a participation rate.</p> <p>To calculate the impacts on cool roofs to the overall urban heat island effect, the South San Francisco General Plan and Zoning Code were used to estimate the amount of community roof area that would be converted to a cool surface. This area was combined with the change in solar reflective index as a result of cool roofs to determine the citywide increase in albedo. Scientific constants were used to convert the change in albedo to a decrease in temperature, and a decrease in kWh as a result of a lower cooling demand.</p>

APPENDIX D

Measure 3.4	
Reduction Sources	City of South San Francisco. 1999. City of South San Francisco General Plan. http://www.ssf.net/index.aspx?NID=360 . Sacramento Municipal Utility District. 2012. Cool Roofs. Sacramento. https://www.smud.org/en/residential/save-energy/rebates-incentives-financing/cool-roofs.htm .
Cost Method	Community costs for this measure cannot be accurately determined. Cost savings were determined by multiplying the estimated electricity savings by the projected electricity rates in 2020 and 2035.
Cost Sources	California Energy Commission (CEC). 2012. California Energy Almanac. Utility-wide Weighted Average Retail Electricity Prices. Sacramento. http://energyalmanac.ca.gov/electricity/index.html Pacific Gas & Electric. 2012. Gas Rate Forecast. San Francisco. http://www.pge.com/tariffs/rateinfo.shtml .

Measure 3.5	
Policy	Promote energy information sharing and educate the community about energy-efficient behaviors and construction.
2020 MTCO ₂ e Reductions	130
2035 MTCO ₂ e Reductions	330
2020 Assumed Activity Reduction per Participant	100 kWh and 10 therms per participating house for the behavioral energy reduction efforts
2035 Assumed Activity Reduction per Participant	100 kWh and 10 therms per participating house for the behavioral energy reduction efforts
2020 Participation Target(s)	2,010 houses engaging in behavioral-based energy reduction efforts
2035 Participation Target(s)	5,030 houses engaging in behavioral-based energy reduction efforts
2020 Community Costs	High (Over \$500,000)
2020 Community Savings	Medium-High (\$200,001–500,000)
Reduction Method	Savings from educational efforts were calculated by reviewing case studies of environmental education programs and determining average per-home reductions, which were then multiplied by a participation rate to arrive at community-wide savings.

GHG METHODS AND ASSUMPTIONS

Measure 3.5	
Reduction Sources	Davis, Matt. n.d. Behavior and Energy Savings: Evidence from a Series of Experimental Interventions. Environmental Defense Fund. http://blogs.edf.org/energyexchange/files/2011/05/BehaviorAndEnergySavings.pdf .
Cost Method	Costs cannot be accurately calculated for environmental education due to uncertainties. The projected kWh and therm savings for each program were multiplied by estimated future energy costs to determine community savings.
Cost Sources	Association of Bay Area Governments (ABAG). 2012. Retrofit Bay Area Final Report: ABAG Report to CEC on Energy Upgrade California. Oakland, CA. https://www.pge.com/regulation/EnergyEfficiency2013-2014-Portfolio/Pleadings/LGSEC/2012/EnergyEfficiency2013-2014-Portfolio_Plea_LGSEC_20120803_245608Atch01_245609.pdf . California Energy Commission (CEC). 2012. California Energy Almanac. Utility-wide Weighted Average Retail Electricity Prices. Sacramento. http://energyalmanac.ca.gov/electricity/index.html Pacific Gas & Electric. 2012. Gas Rate Forecast. San Francisco. http://www.pge.com/tariffs/rateinfo.shtml .

Measure 4.1	
Policy	Promote installation of alternative energy facilities.
2020 MTCO ₂ e Reductions	5,100
2035 MTCO ₂ e Reductions	11,760
2020 Assumed Activity Reduction per Participant	180 kWh per square foot of nonresidential roof space converted to solar panels, 5,190 kWh per house with a solar panel array, and 90 therms per participating house with a solar hot water heating system
2035 Assumed Activity Reduction per Participant	180 kWh per square foot of nonresidential roof space converted to solar panels, 5,190 kWh per house with a solar panel array, and 90 therms per participating house with a solar hot water heating system

APPENDIX D

Measure 4.1	
2020 Participation Target(s)	80,440 square feet of nonresidential roof space converted to solar panels, 1,010 existing houses and 380 new houses with solar panel arrays, 38% of electricity demand for new large-scale nonresidential development supplied by on-site renewables, and 1,050 houses with solar hot water systems
2035 Participation Target(s)	215,700 square feet of nonresidential roof space converted to solar panels, 2,010 existing houses and 880 new houses with solar panel arrays, 45% of electricity demand for new large-scale nonresidential development supplied by on-site renewables, and 2,410 houses with solar hot water systems
2020 Community Costs	Unknown
2020 Community Savings	High (Over \$500,000)
Reduction Method	Using data from the inventory and South San Francisco General Plan, the amount of nonresidential roof space was calculated and projected forward to 2020 and 2035. Information from the National Renewable Energy Laboratory was used to determine the average annual kWh per square foot of solar panel in the San Francisco Bay region. These factors were combined with a participation rate to determine community reduction in kWh.
Reduction Sources	<p>City of South San Francisco. 1999. City of South San Francisco General Plan. http://www.ssf.net/index.aspx?NID=360.</p> <p>City of South San Francisco. 2010. South San Francisco Zoning Ordinance. http://qcode.us/codes/southsanfrancisco.</p> <p>Gil, C. E., and D. S. Parker. 2009. Geographic Variation in Potential of Residential Solar Hot Water System Performance in the United States. Florida Solar Energy Center. http://www.fsec.ucf.edu/en/publications/pdf/FSEC-CR-1817-09.pdf.</p> <p>Renewable Resource Data Center, National Renewable Energy Laboratory. 2009. PWATTS Solar Calculator for San Francisco, CA. Golden, CO. http://rredc.nrel.gov/solar/calculators/PWATTS/version1/US/California/San_Francisco.html.</p>

GHG METHODS AND ASSUMPTIONS

Measure 4.1	
Cost Method	Costs of installing the panels cannot be accurately determined due to a number of uncertainties. Cost savings were determined by multiplying the projected kWh generated by the panels by the expected cost of electricity.
Cost Sources	California Energy Commission (CEC). 2012. California Energy Almanac. Utility-wide Weighted Average Retail Electricity Prices. Sacramento. http://energyalmanac.ca.gov/electricity/index.html .

Measure 5.1	
Policy	Develop a waste reduction strategy to increase recycling and reuse of materials to achieve a 75% diversion of landfilled waste by 2020.
2020 MTCO ₂ e Reductions	6,720
2035 MTCO ₂ e Reductions	10,950
2020 Assumed Activity Reduction per Participant	650 pounds of compostables per household and 5,110 pounds of compostables per business. For increased recycling, the amount of waste thrown away should be reduced to 1,570 pounds per resident or 3,120 pounds per employee annually.
2035 Assumed Activity Reduction per Participant	650 pounds of compostables per household and 7,380 pounds of compostables per business. For increased recycling, the amount of waste thrown away should be reduced to 990 pounds per resident or 1,960 pounds per employee annually.
2020 Participation Target(s)	21,520 households and 2,290 businesses participating in the composting program. All community residents and employees participating in the increased recycling efforts.
2035 Participation Target(s)	26,890 households and 2,490 businesses participating in the composting program. All community residents and employees participating in the increased recycling efforts.
2020 Community Costs	Minimal (\$0)
2020 Community Savings	Minimal (\$0)

APPENDIX D

Measure 5.1	
Reduction Method	<p>For composting, statewide figures were used to determine the total tonnage of compostable materials from residential and nonresidential sources. A compliance rate was applied to determine how much of these compostables would actually be composted if a program was established, and then an emissions factor was applied to calculate GHG savings.</p> <p>For improved recycling, daily pounds of waste produced per South San Francisco resident was calculated using inventory data and projected out to 2020 and 2035. Once a target was adopted, the difference between the target and the projected per-capita waste was determined and multiplied by an emissions factor to obtain a GHG reduction.</p>
Reduction Sources	<p>California Air Resources Board (CARB). 2011. Method for Estimating Greenhouse Gas Emission Reductions from Compost from Commercial Organic Waste. Sacramento. http://www.arb.ca.gov/cc/protocols/localgov/pubs/compost_method.pdf.</p> <p>California Integrated Waste Management Board. 2009. California 2008 Statewide Waste Characterization Study. Sacramento. http://www.calrecycle.ca.gov/Publications/Documents/General/2009023.pdf.</p>
Cost Method	There are no community costs or savings directly associated with waste minimization.
Cost Sources	Not Applicable

Measure 6.1	
Policy	Reduce water demand.
2020 MTCO ₂ e Reductions	250
2035 MTCO ₂ e Reductions	530
2020 Assumed Activity Reduction per Participant	20 gallons per person per day and 10 kWh per person
2035 Assumed Activity Reduction per Participant	40 gallons per person per day and 30 kWh per person
2020 Participation Target(s)	1,030 megagallons (MG) annually and 1,346,020 kWh saved
2035 Participation Target(s)	2,370 megagallons (MG) annually and 3,096,000 kWh saved

GHG METHODS AND ASSUMPTIONS

Measure 6.1	
2020 Community Costs	Minimal (\$0)
2020 Community Savings	High (Over \$500,000)
Reduction Method	Baseline inventory figures were used to calculate the gallons of water per capita per day (GPCD) for South San Francisco. A target reduction rate was then used to determine the target reduction in GPCD. Inventory figures were used to calculate emissions factors for potable water and wastewater, which were multiplied by the target reduction in GPCD. Lastly, a compliance rate was applied to determine the overall emissions reduction.
Reduction Sources	Heaney, J. P., et al. (1998). Nature of Residential Water Use and Effectiveness of Conservation Programs. http://bcn.boulder.co.us/basin/local/heaney.html .
Cost Method	There are no costs to the community associated with this policy. To determine community savings, the average water rate for South San Francisco was calculated and converted into a cost per gallon. This was then multiplied by the reduction in gallons.
Cost Sources	California Water Company. 2012. South San Francisco Rates and Tariffs. http://www.calwater.com/rates/rates_tariffs/index.php Westborough Water District. 2012. Services and Billing Information. http://www.westboroughwater.com/services.htm#q1 .

Existing Activity 1	
Policy	Aircraft Noise Insulation Program (ANIP)
2020 MTCO ₂ e Reductions	540
2035 MTCO ₂ e Reductions	520
2020 Assumed Activity Reduction per Participant	1,390 kWh and 140 therms for a full retrofit, and 700 kWh and 70 therms for a partial retrofit
2035 Assumed Activity Reduction per Participant	1,390 kWh and 140 therms for a full retrofit and 700 kWh and 70 therms for a partial retrofit
2020 Participation Target(s)	290 homes participating in the full retrofit and 460 homes participating in the partial retrofit
2035 Participation Target(s)	290 homes participating in the full retrofit and 460 homes participating in the partial retrofit

APPENDIX D

Existing Activity 1	
2020 Community Costs	Minimal (\$0)
2020 Community Savings	Medium-High (\$200,001–500,000)
Reduction Method	Using details provided by the City about the ANIP program, PG&E case studies of residential retrofits in the Bay Area, and inventory data, the electricity and natural gas savings from an ANIP upgrade were determined for each participating house. This was then multiplied by the number of participating residences to determine community savings.
Reduction Sources	Association of Bay area Governments (ABAG). 2012. Retrofit Bay Area Final Report: ABAG Report to CEC on Energy Upgrade California. Oakland, CA. https://www.pge.com/regulation/EnergyEfficiency2013-2014-Portfolio/Pleadings/LGSEC/2012/EnergyEfficiency2013-2014-Portfolio_Plea_LGSEC_20120803_245608Atch01_245609.pdf . City of South San Francisco. 2012. South San Francisco Aircraft Noise Insulation Program. http://www.ssf.net/index.aspx?NID=249 .
Cost Method	There are no community costs associated with this policy, as it is being funded by the San Francisco International Airport and the Federal Aviation Administration. To determine savings, the reductions in electricity and natural gas use were multiplied by projected energy rates and summed.
Cost Sources	California Energy Commission (CEC). 2012. California Energy Almanac. Utility-wide Weighted Average Retail Electricity Prices. Sacramento. http://energyalmanac.ca.gov/electricity/index.html . Gas Rate Forecast. 2012. Pacific Gas & Electric. San Francisco, CA. http://www.pge.com/tariffs/rateinfo.shtml . City of South San Francisco. 2012. Aircraft Noise Insulation Program (ANIP). http://www.ssf.net/index.aspx?NID=249 .

GHG METHODS AND ASSUMPTIONS

Existing Activity 2	
Policy	Recycle waste from construction and demolition projects.
2020 MTCO ₂ e Reductions	50
2035 MTCO ₂ e Reductions	50
2020 Assumed Activity Reduction per Participant	Not Applicable
2035 Assumed Activity Reduction per Participant	Not Applicable
2020 Participation Target(s)	9,310 additional tons of C&D waste being recycled
2035 Participation Target(s)	10,380 additional tons of C&D waste being recycled
2020 Community Costs	Unknown
2020 Community Savings	Unknown
Reduction Method	Statewide waste composition data was used to determine the existing recycling rate of inert and non-inert C&D material. Using South San Francisco's C&D recycling ordinance, a compliance rate, and inventory data, the 2020 and 2035 amount of C&D waste was calculated, both with and without the ordinance in place. An emissions factor was applied to the difference to determine the overall savings as a result of the C&D ordinance.
Reduction Sources	<p>California Air Resources Board (CARB). 2010. Local Government Operations Protocol, Version 1.1. Sacramento. http://www.arb.ca.gov/cc/protocols/localgov/pubs/lgo_protocol_v1_1_2010-05-03.pdf.</p> <p>California Department of Resources Recycling and Recovery (CalRecycle). 2004. Statewide Waste Characterization Study. Sacramento. http://www.calrecycle.ca.gov/publications/Detail.aspx?PublicationID=1097.</p> <p>California Department of Resources Recycling and Recovery (CalRecycle). 2006. Targeted Statewide Waste Characterization Study: Detailed Characterization of Construction and Demolition Waste. Sacramento. http://www.calrecycle.ca.gov/Publications/Documents/Disposal/34106007.pdf.</p> <p>San Mateo County RecycleWorks. n.d. Understanding C&D Recycling Requirements. Redwood City, CA. http://www.recycleworks.org/pdf/CD_office_guide_pg_</p>

APPENDIX D

Existing Activity 2	
	4_5.pdf.
Cost Method	There are no community costs or savings directly associated with this policy. Indirect costs and savings cannot be accurately quantified.
Cost Sources	Not Applicable

Existing Activity 3	
Policy	Participate in the California Solar Initiative (CSI).
2020 MTCO ₂ e Reductions	890
2035 MTCO ₂ e Reductions	810
2020 Assumed Activity Reduction per Participant	An average of 64,100 kWh per installation
2035 Assumed Activity Reduction per Participant	An average of 64,100 kWh per installation
2020 Participation Target(s)	70 solar panel arrays installed to date under the CSI program
2035 Participation Target(s)	70 solar panel arrays installed to date under the CSI program
2020 Community Costs	Minimal (\$0)
2020 Community Savings	Medium-High (\$200,001–500,000)
Reduction Method	The most recent (as of 10/15/12) participation data for South San Francisco was downloaded, and cancelled projects were removed. Using this data, the overall kW per solar installation and the number of installations annually was determined. Data from the National Renewable Energy Laboratory was used to determine the average annual kWh per kW in the San Francisco Bay region. The to-date kW figures were converted to kWh to calculate the total reduction.
Reduction Sources	California Energy Commission and California Public Utilities Commission. 2012. Current (10/15/12) Working Data Set. 2012. California Solar Statistics. Sacramento. http://www.californiasolarstatistics.ca.gov/current_data_files/ . Renewable Resource Data Center, National Renewable Energy Laboratory. 2009. PWATTS Solar Calculator for San Francisco, CA. Golden, CO. http://rredc.nrel.gov/solar/calculators/PWATTS/version1/US/California/San_Francisco.html .

GHG METHODS AND ASSUMPTIONS

Existing Activity 3	
Cost Method	Due to uncertainties about the cost of installation and the size of the rebates, the cost of this program cannot be accurately calculated. To determine savings, the annual kWh generated by the solar panels installed due to the CSI program was multiplied by the projected cost of energy. City savings represent the reduction in electricity costs from the panels installed by the City of South San Francisco. Community savings represent the costs from installations on private property.
Cost Sources	California Energy Commission (CEC). 2012. California Energy Almanac. Utility-wide Weighted Average Retail Electricity Prices. Sacramento. http://energyalmanac.ca.gov/electricity/index.html . Pacific Gas & Electric. 2012. Gas Rate Forecast. San Francisco. http://www.pge.com/tariffs/rateinfo.shtml .

Existing Activity 4	
Policy	Retrofit municipal facilities for energy efficiency.
2020 MTCO ₂ e Reductions	330
2035 MTCO ₂ e Reductions	310
2020 Assumed Activity Reduction per Participant	On average, 69,050 kWh for electricity efficiency projects and 3,980 therms for natural gas efficiency projects
2035 Assumed Activity Reduction per Participant	On average, 69,050 kWh for electricity efficiency projects and 3,980 therms for natural gas efficiency projects
2020 Participation Target(s)	Not Applicable
2035 Participation Target(s)	Not Applicable
2020 Community Costs	Minimal (\$0)
2020 Community Savings	Minimal (\$0)
Reduction Method	The San Mateo County Energy Watch program provided data detailing all municipal energy efficiency programs in South San Francisco and the reduction in electricity or natural gas that each program had achieved. These reductions were summed to determine overall savings.
Reduction Sources	San Mateo County Energy Watch. 2012.
Cost Method	The San Mateo County Energy Watch data included cost savings, which are used here. Costs to the City cannot be accurately determined.

APPENDIX D

Existing Activity 4

Cost Sources	San Mateo County Energy Watch. 2012.
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Existing Activity 6

Policy	SSFUSD-Chevron partnership
2020 MTCO ₂ e Reductions	460
2035 MTCO ₂ e Reductions	420
2020 Assumed Activity Reduction per Participant	Not Applicable
2035 Assumed Activity Reduction per Participant	Not Applicable
2020 Participation Target(s)	Not Applicable
2035 Participation Target(s)	Not Applicable
2020 Community Costs	Minimal (\$0)
2020 Community Savings	Minimal (\$0)
Reduction Method	The annual kWh output of the South San Francisco Unified School District's solar arrays was determined using data from the district and solar constants specific to the San Francisco Bay region from the National Renewable Energy Laboratory.
Reduction Sources	Renewable Resource Data Center, National Renewable Energy Laboratory. 2009. PVWATTS Solar Calculator for San Francisco, CA. Golden, CO. http://rredc.nrel.gov/solar/calculators/PVWATTS/version1/US/California/San_Francisco.html .
Cost Method	Not Applicable
Cost Sources	Not Applicable

Existing Activity 7

Policy	Implement the City's Transportation Demand Management Program.
2020 MTCO ₂ e Reductions	4,210
2035 MTCO ₂ e Reductions	4,070
2020 Assumed Activity Reduction per Participant	Not Applicable
2035 Assumed Activity Reduction per Participant	Not Applicable

GHG METHODS AND ASSUMPTIONS

Existing Activity 7	
2020 Participation Target(s)	Not Applicable
2035 Participation Target(s)	Not Applicable
2020 Community Costs	Minimal (\$0)
2020 Community Savings	High (Over \$500,000)
Reduction Method	Using the South San Francisco Municipal Code and employment data provided by the City, the number of employees eligible for participation in the program was calculated. Figures provided by CAPCOA were used to convert these figures into average VMT reductions. Additionally, case studies were used to estimate the expected ridership of work shuttles and the average length of each trip. These figures were then converted into average daily VMT reductions.
Reduction Sources	California Air Pollution Control Officers Association (CAPCOA). 2010. Quantifying Greenhouse Gas Mitigation Measures. Sacramento. http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf . City of South San Francisco. 2012. City of South San Francisco Municipal Code. http://qcode.us/codes/southsanfrancisco/ . Genentech. Inc. 2006. Genentech South San Francisco Transportation Demand Management Plan. South San Francisco, CA.
Cost Method	There are not expected to be any costs to the community from this policy. The projected savings in VMTs were multiplied by the standard IRS tax reimbursement rate for miles traveled to determine community savings.
Cost Sources	Internal Revenue Service. 2011. IRS Announces 2012 Standard Mileage Rates. Washington, D.C. http://www.irs.gov/uac/IRS-Announces-2012-Standard-Mileage-Rates,-Most-Rates-Are-the-Same-as-in-July .

Existing Activity 8	
Policy	Expansion of multi-family development.
2020 MTCO _{2e} Reductions	3,610
2035 MTCO _{2e} Reductions	6,840
2020 Assumed Activity Reduction per Participant	Not Applicable
2035 Assumed Activity Reduction per	Not Applicable

APPENDIX D

Existing Activity 8	
Participant	
2020 Participation Target(s)	440 new single-family homes and 3,350 new multi-family homes
2035 Participation Target(s)	840 new single-family homes and 6,470 new multi-family homes
2020 Community Costs	Minimal (\$0)
2020 Community Savings	High (Over \$500,000)
Reduction Method	PG&E data was used to determine the difference in energy use between single-family and multi-family houses in South San Francisco, and Census data was used to identify the current breakdown between housing types in the community. These figures were projected forward to 2020 to calculate residential energy use if the current housing balance remained unchanged. South San Francisco's post-2005 residential development trends were used to estimate the change in housing type breakdown for new development, projected forward to 2020 and 2035. Energy use under this new development scenario was estimated, and the difference between the two was attributed to the General Plan as a reduction measure.
Reduction Sources	City of South San Francisco. 1999. City of South San Francisco General Plan. http://www.ssf.net/index.aspx?NID=360 . Pacific Gas and Electric Company. 2011. South San Francisco City Residential Energy Overview v1.3. San Francisco, CA.
Cost Method	Because this is an existing component of the City's General Plan, costs cannot be accurately determined. Savings were calculated by multiplying the expected energy savings by projected energy rates.
Cost Sources	California Energy Commission. 2012. California Energy Almanac. Utility-wide Weighted Average Retail Electricity Prices. Sacramento. http://energyalmanac.ca.gov/electricity/index.html . Pacific Gas & Electric. 2012. Gas Rate Forecast. San Francisco. http://www.pge.com/tariffs/rateinfo.shtml .

GHG METHODS AND ASSUMPTIONS

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APPENDIX E
DEVELOPMENT REVIEW
CHECKLIST

DEVELOPMENT REVIEW CHECKLIST

APPENDIX - E: DEVELOPMENT REVIEW CHECKLIST

This appendix presents the items that City staff will monitor to track implementation of the Climate Action Plan. On a project-by-project basis, City staff will monitor these criteria using a separate development checklist that identifies departmental responsibility and project-level measures. The following tables identify the illustrative criteria necessary for tracking project-level contributions to the Climate Action Plan target. Yet the separate development checklist will clearly identify applicable measures by project type, providing a streamlined process for applicants and City staff using a simple checklist format. By maintaining the development checklist as a separate, stand-alone implementation item of the Climate Action Plan, the City will have flexibility to modify the checklist over time and adapt to the information that applicants can easily provide.

PROJECT INFORMATION FOR ADDITIONS, ALTERATIONS, AND TENANT IMPROVEMENTS

This list includes project-level criteria from the Climate Action Plan relevant to additions, alterations, and tenant improvements. City staff will use a separate development checklist to monitor project compliance with these key actions.

Climate Action Plan Measures for Additions, Alterations, and Tenant Improvements
Does the project provide bicycle facilities, bicycle lanes, or other facilities?
Will the project provide a bike share program for employees or residents?
Will there be a commute shuttle or public transit stop within 500 feet?
Is the project subject to a Transportation Demand Management (TDM) program?
Will the project provide incentives for commuters?
Is the project subject to a traffic impact fee?
How will the net number of parking spaces change on-site?
Is the project located within a specific plan area, station area, or Priority Development Area?
Will this project provide any alternative-fuel stations?
Will the project have any pre-wiring or conduits to accommodate renewable energy facilities or electric vehicle charging stations in the future?
Will project construction activities implement best management practices, such as the BAAQMD's recommended construction mitigations identified in the BAAQMD CEQA Guidelines?
Is the building more than 30 years old?
Will certification of the building be sought under LEED or another green building criteria?
Will the project be built to CALGreen Tier 1 energy efficiency standards?

APPENDIX E

Climate Action Plan Measures for Additions, Alterations, and Tenant Improvements
Does the project include any energy-efficient improvements (e.g., double-paned windows, increased insulation, weatherization)?
Does the project include any upgrades of appliances to more energy efficient models?
Will mechanical equipment (e.g., HVAC equipment, boilers, water heaters) be upgraded to more energy efficient models?
Will roofs or surface paving be replaced with high-reflectivity ("cool") surfaces?
How will the net number of trees change on-site?
Will any renewable energy system be installed as part of this project?
Is the project a new conversion of unconditioned space 5,000 square feet or more?
Is there a plan for construction and demolition waste recycling?
Will there be composting on-site?
Will any water fixtures be replaced with more efficient fixtures?
Will there be any effort to educate occupants and tenants about water conservation?
Does the project incorporate low-impact development (LID) practices?
Will any xeriscaping be installed?
Will captured rainwater or graywater be used for irrigation?

PROJECT INFORMATION FOR NEW DEVELOPMENT

This list includes criteria from the Climate Action Plan that are applicable to new development. These measures should be included in the project design as feasible.

Climate Action Plan Measures for New Development
Does the project include bicycle facilities (e.g., bicycle lanes, parking, lockers)?
Will the project support bike sharing/rental programs?
Will there be a commute shuttle or public transit stop on-site or within 500 feet?
Is the project within ¼ mile of a Caltrain or BART stop?
Will the project include high-density housing and a diverse range of housing?
Will the project provide traffic calming treatments?
Is the project paying a traffic impact fee to fund bicycle and pedestrian improvements?

DEVELOPMENT REVIEW CHECKLIST

Climate Action Plan Measures for New Development
Will the project provide shared or reduced parking?
Will the project provide designated parking spaces for electric vehicles, carpool vehicles, or other low-emissions vehicles?
Will the project have any ground-level commercial space?
Does the project include any alternative-fuel stations?
Will the project have any pre-wiring or conduit construction to easily add electric vehicle charging stations or alternative energy facilities at a later date?
If this project is replacing an existing building, is the building being replaced more than 30 years old?
Will certification of the building be sought under LEED or other green building criteria?
Will the project include any high-reflectivity ("cool") roof or surface paving?
Will there be a net increase in the number of mature trees on-site once the project is completed?
Will any renewable energy system be installed as part of this project?
Is the project a new nonresidential conditioned space of 5,000 square feet or more?
Will this project use renewable energy generated off-site?
Will there be composting collection on-site?
Will any water fixtures exceed CALGreen standards?
Will the project incorporate low-impact development (LID) practices?
Will any xeriscaping be installed?
Will captured rainwater or graywater be used for irrigation?

APPENDIX E

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