



## **DRAFT Climate Change Mitigation and Adaptation White Paper**

### **A. INTRODUCTION**

Climate change is expected to have significant and widespread impacts on California's environment and economy. Limiting the impacts of climate change requires collaboration and action throughout all sectors of California's economy and governmental agencies. California has taken a proactive stance toward addressing climate change. The State's approach includes strategies that reduce greenhouse gas (GHG) emissions and prepare for climate change impacts through adaptation and resiliency, while also supporting economic prosperity, improving public health and social equity, protecting infrastructure investments, and conserving natural habitat and open space.

Climate change is a global issue, and while California alone cannot halt climate change, the state is joined in its efforts by several states and countries. The United Nations Framework Convention on Climate Change is an international treaty, signed by 196 countries, that sets an overall framework for intergovernmental efforts to address the challenge posed by climate change. At the national level, President Obama released his Presidential Climate Action Plan in June 2013, which describes a strategy to cut GHG emissions, to prepare the United States for impacts of climate change, and to lead international efforts to address global climate change.

Many local and regional governments throughout California, and beyond our international border, are working to create innovative policies, plans, and programs to address climate change. In the San Diego region, local governments, SANDAG, and other regional public agencies are working collaboratively with local non-profits, universities, and businesses to prepare plans and implement programs that complement efforts at the state, federal, and international level.

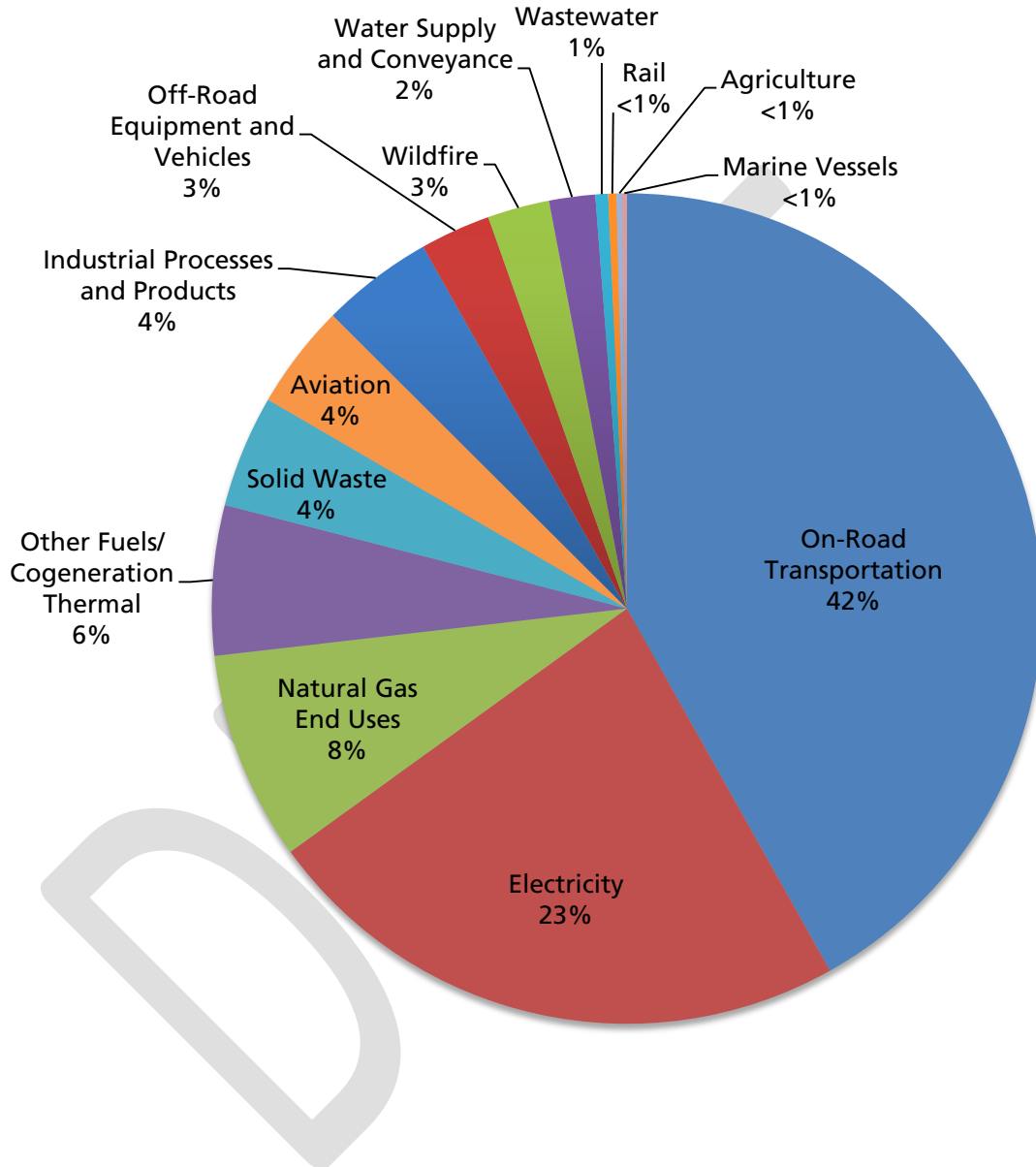
The purpose of the Climate Change Mitigation and Adaptation White Paper is to inform the development of San Diego Forward: The Regional Plan. The paper includes an inventory of regional GHG emissions, recommendations for a regional approach to address climate change, and a summary of current efforts in the San Diego region.

### **Greenhouse Gas Emissions in the San Diego Region**

The 2012 GHG emissions inventory for the San Diego region identifies and quantifies the sources of GHG emissions in the region. In 2012, emissions totaled 32.9 million metric tons of carbon dioxide equivalent (MMTCO<sub>2</sub>e); this represents an 11.5 percent increase compared to 1990 emissions levels (29.5 MMTCO<sub>2</sub>e). Transportation makes up the largest source of GHG emissions in the region, followed by electricity, then natural gas. This inventory was developed using the best available data and following the U.S. Community Protocol for Accounting and Reporting of GHG Emissions. The

California Governor's Office of Planning and Research participated as a steering committee member and technical advisor for the protocol and recommends its use in local government planning efforts.

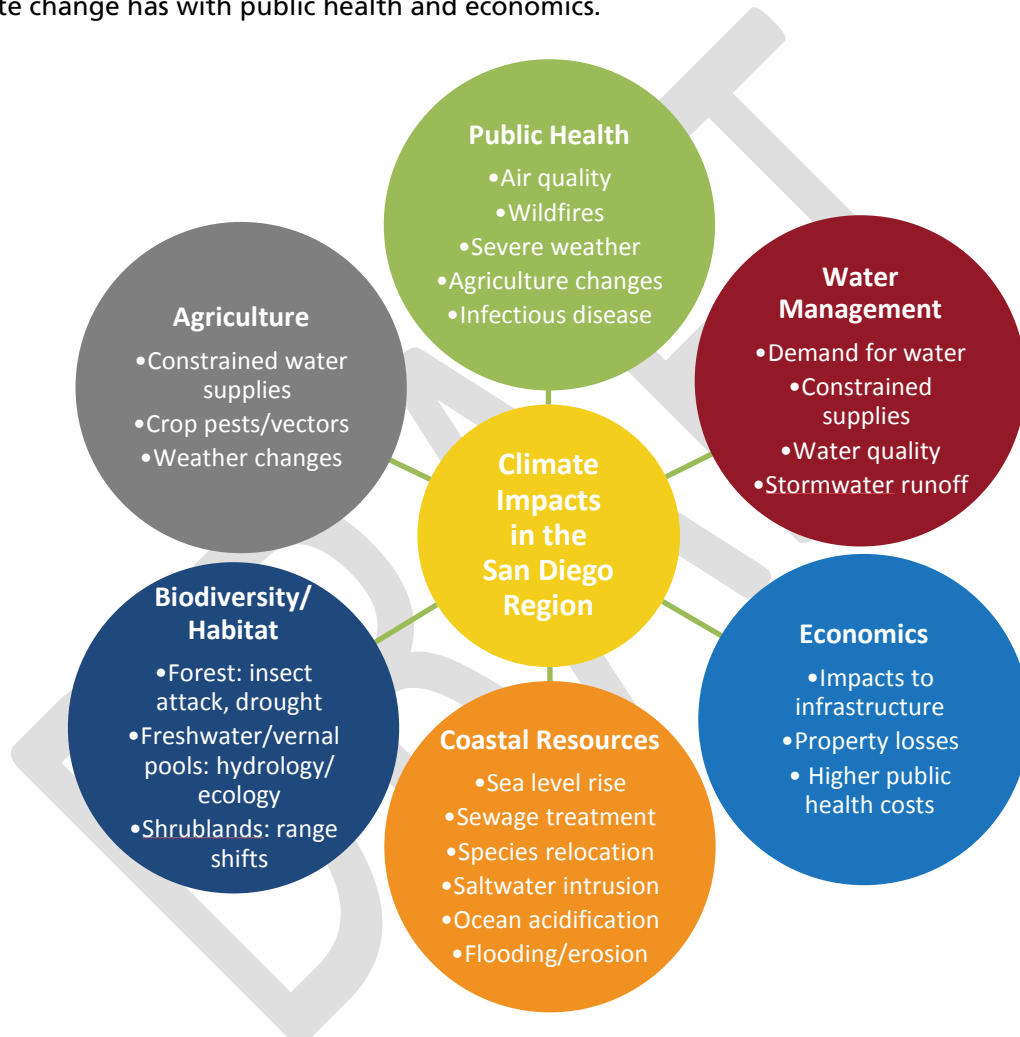
### GHG Emissions Inventory for the San Diego Region 2012<sup>1</sup>



<sup>1</sup> Source: Energy Policy Initiatives Center (EPIC) at University of San Diego, April 2014. GHG emissions in 2012 total 32.9 MMTCO<sub>2</sub>e.

## Climate Change Impacts in the San Diego Region

Even with efforts to reduce GHG emissions, the San Diego region will experience impacts due to climate change, and some of these impacts are already occurring at varying degrees. The potential impacts identified in the SANDAG Climate Action Strategy (2010) are summarized in the diagram below, and include direct impacts from increased temperatures such as sea level rise and associated high surf events, constrained water supplies, wildfires, loss of native plant and animal species, and severe weather, as well as secondary effects on public health and economics. The section on Interrelationships with Other Policy Areas includes additional information on the connections climate change has with public health and economics.



Preparing the region for the effects of climate change requires measures to adapt to these changes and create resilient communities. Adaptation is adjusting in response to climate impacts, while resiliency is the ability to understand potential impacts and take action before, during, and after a particular event. At the state level, California has developed policy guidance for decision makers, planning resources for local and regional governments, and technical tools to assist governments at every level with climate change adaptation and resilience.

## **B. STRATEGIES TO ADDRESS CLIMATE CHANGE**

Addressing climate change consists of two categories of planning: mitigation, which is reducing GHG emissions, and adaptation, which is preparing communities for impacts of climate change. California has set targets for reducing GHG emissions and strategies to prepare the State for the impacts of climate change. As a metropolitan planning organization (MPO), SANDAG is working with the State and with member agencies, neighboring counties, Mexico, the military, and the tribal nations on climate change.

### **Mitigation - Reducing Greenhouse Gas Emissions**

Several Executive Orders related to climate change have been issued since 2004. All Executive Orders, laws, and regulations are listed on the State's Climate Change Portal<sup>2</sup>. Executive Order S-03-05, which was issued by Governor Schwarzenegger in June 2005, calls for state agencies to work toward reducing GHG emissions as follows: by 2010, reduce GHG emissions to 2000 levels; by 2020, reduce GHG emissions to 1990 levels; and by 2050, reduce GHG emissions to 80 percent below 1990 levels. The goals in Executive Order S-03-05 as well as the other climate change Executive Orders are ambitious and will require efforts from all sectors in California for implementation.

In 2006, Governor Schwarzenegger signed into law Assembly Bill 32 (AB 32), The Global Warming Solutions Act, which legislates the 2020 target in Executive Order S-3-05 and calls for California to reduce GHG emissions back to 1990 levels by the year 2020. AB 32 also directed the California Air Resources Board (CARB) to develop a Scoping Plan that details the strategies for attaining the 2020 target. The Scoping Plan was completed in 2008, and is currently undergoing an update that is scheduled for adoption in 2014. The key reduction measures outlined in the AB 32 Scoping Plan, and currently being implemented, include:

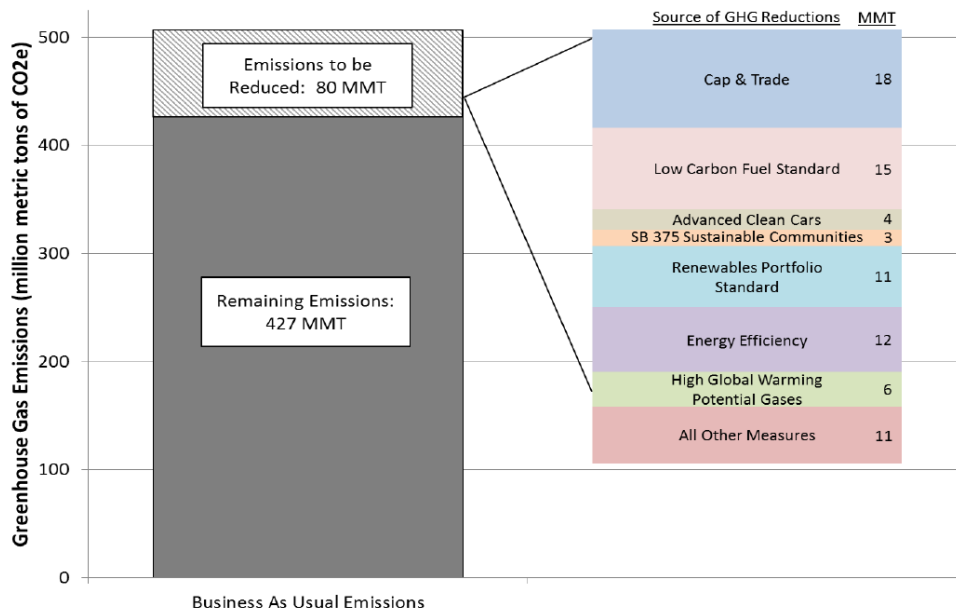
- CARB's GHG Cap-and-Trade Program
- Low Carbon Fuel Standard (LCFS)
- Pavley Clean Car Standards (AB 1493) and Advanced Clean Cars Program
- Transportation-Related GHG Targets and Sustainable Communities Strategies for MPOs (SB 375)
- Renewables Portfolio Standard (RPS)
- Conservation and Energy Efficiency in New and Existing Buildings

The reductions associated with each of these measures and contributions toward the statewide 2020 reduction target are displayed in the chart below. The largest source of GHG reductions is expected to come from the Cap-and-Trade program. The program establishes a declining cap on approximately 85 percent of total statewide GHG emissions. Under the regulations, CARB issues allowances equal to the amount of allowable emissions over a given compliance period, and distributes these to regulated entities. One allowance equals one metric ton of GHGs. Each regulated entity must hold allowances equal to its emissions. Electric generating utilities, electricity importers, and large industrial facilities became subject to the program beginning in 2013, and fuel distributors will be added to the program in 2015. Proceeds from the auctions of allowances under Cap-and-Trade will provide a significant source of new revenue to support GHG reduction measures; activities are currently underway to develop a framework and investment plan for allocating the proceeds.

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<sup>2</sup> California Climate Change Portal website: <http://www.climatechange.ca.gov/>

### Statewide 2020 Greenhouse Gas Emissions and Sources of GHG Reductions<sup>3</sup>



These AB 32 reduction strategies focus on the areas where the State can have the greatest impact; however, the Scoping Plan also describes the critical role that regional and local governments play in implementing these and other measures in order to meet the 2020 GHG reduction target. SB 375 is the only mandated GHG reduction requirement for MPOs, but SANDAG plays a role in reducing GHG emissions in other ways. The following table summarizes the roles that the State, SANDAG, and local governments each play in implementing the key AB 32 reduction strategies and while not exhaustive, provides an overview.

#### Roles in AB 32 Reduction Strategies

State Role	SANDAG Role	Local Government Role
<b>Low Carbon Fuel Standard (LCFS)</b>		
<ul style="list-style-type: none"> <li>• LCFS regulations</li> <li>• Alternative and Renewable Fuel and Vehicle Technology Program (AB 118)</li> </ul>	<ul style="list-style-type: none"> <li>• Provide forum to address barriers to alternative fuel vehicles and infrastructure</li> <li>• Energy Roadmap Program: fleet assessments</li> </ul>	<ul style="list-style-type: none"> <li>• Expand availability of alternative fuels</li> <li>• Integrate alternative fuel vehicles into gov't and contracted fleets</li> </ul>
<b>Pavley Clean Car Standards (AB 1493) and Advanced Clean Cars Program</b>		
<ul style="list-style-type: none"> <li>• Vehicle emissions standards</li> <li>• Clean Vehicle Rebate Project incentives for consumers</li> <li>• Alternative and Renewable Fuel and Vehicle Technology Program (AB 118)</li> </ul>	<ul style="list-style-type: none"> <li>• Regional readiness planning for electric vehicles</li> <li>• Installation of electric vehicle charging at transit facilities</li> <li>• Energy Roadmap Program: fleet assessments</li> </ul>	<ul style="list-style-type: none"> <li>• Streamline permitting for electric vehicle charging stations</li> <li>• Integrate electric vehicles into gov't fleet</li> <li>• Improve traffic flow and efficient driving</li> </ul>

<sup>3</sup> Source: California Air Resources Board, *Annual Report to the Joint Legislative Budget Committee on Assembly Bill 32*, January 2013. Note: The Draft 2013 Scoping Plan Update proposes to update the 2020 limit from 427 to 431 MMTCO<sub>2</sub>e and modifies the GHG reductions associated with these strategies. The new 2020 limit is based on updated global warming potentials of GHGs in the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report.

State Role	SANDAG Role	Local Government Role
<b>Transportation-Related GHG Targets and Sustainable Communities Strategies for MPOs (SB 375)</b>		
<ul style="list-style-type: none"> <li>• Set regional targets for per capita GHG reductions from passenger vehicles</li> <li>• Accept SCSs developed by MPOs</li> </ul>	<ul style="list-style-type: none"> <li>• Develop SCS in accordance with SB 375 reduction targets</li> <li>• Provide VMT data to support local climate action planning</li> <li>• Offer smart growth incentives and resources</li> <li>• Energy Roadmap Program: reducing energy through planning and development</li> </ul>	<ul style="list-style-type: none"> <li>• Implement smart growth principles in targeted areas</li> <li>• Expand active transportation facilities</li> <li>• Implement TDM strategies</li> <li>• Use parking strategies to reduce VMT</li> <li>• Revise zoning, standards, and design guidelines</li> </ul>
<b>Renewable Portfolio Standard (RPS)</b>		
<ul style="list-style-type: none"> <li>• RPS targets for utilities: <ul style="list-style-type: none"> <li>○ 20% by 2010</li> <li>○ 33% by 2020</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Coordinated planning with variety of stakeholders via the Regional Energy Working Group</li> <li>• Regional Energy Strategy Goals and actions</li> </ul>	<ul style="list-style-type: none"> <li>• Identify/remove barriers to large-scale renewables</li> <li>• Support grid modernization</li> </ul>
<b>Conservation and Energy Efficiency in New and Existing Buildings</b>		
<ul style="list-style-type: none"> <li>• Update building energy codes</li> <li>• Comprehensive Energy Efficiency Program for Existing Buildings (AB 758)</li> <li>• Long-Term Energy Efficiency Strategic Plan</li> </ul>	<ul style="list-style-type: none"> <li>• Coordinated planning with variety of stakeholders via the Regional Energy Working Group</li> <li>• Regional Energy Strategy Goals and actions</li> <li>• Energy Roadmap Program: custom management plans, implementation assistance, technical resources</li> </ul>	<ul style="list-style-type: none"> <li>• Retrofit gov't facilities</li> <li>• Green business networks</li> <li>• Staff training</li> <li>• Revise building codes</li> <li>• Perform energy audits</li> <li>• Offer financing programs</li> </ul>

In the San Diego region, all 19 jurisdictions have completed inventories of GHG emissions from government operations and from the community as a whole. In addition, the Border Environment Cooperation Commission (BECC) has worked with the Center for Climate Strategies to complete GHG inventories for all six Mexican border states. Each inventory identifies sources of emissions, and sets a baseline for evaluating potential reductions. More than half of the local jurisdictions, representing over 75 percent of the region’s population, are developing or have adopted a climate action plan (CAP). A CAP typically includes mitigation measures to reduce GHG emissions toward an identified target, and offers streamlining opportunities for future development projects under the California Environmental Quality Act (CEQA). The table below summarizes each jurisdiction’s climate planning efforts. In addition to the efforts of the 18 cities and the County of San Diego, the Port of San Diego, and the San Diego County Water Authority also have developed GHG inventories and CAPs.

### Local Climate Planning Efforts

Jurisdiction	% of 2012 Regional Population	GHG Inventory	Climate Action Plan	
			Adopted (year)	Developing
<b>Chula Vista</b>	7.9	✓	2000, 2008	Update underway
<b>Encinitas</b>	1.9	✓	2011	
<b>Escondido</b>	4.6	✓	2012	
<b>National City</b>	1.9	✓	2011	
<b>San Diego</b>	42.0	✓	2005	Update underway
<b>County of San Diego</b> (unincorporated)	15.8	✓	2012	
<b>Vista</b>	3.0	✓	2012	
<b>Carlsbad</b>	3.4	✓		✓
<b>Del Mar</b>	0.1	✓		✓
<b>La Mesa</b>	1.9	✓		✓
<b>San Marcos</b>	2.7	✓		✓
<b>Santee</b>	1.7	✓		✓
<b>Solana Beach</b>	0.4	✓		✓
<b>Coronado</b>	0.7	✓		
<b>El Cajon</b>	3.2	✓		
<b>Imperial Beach</b>	0.8	✓		
<b>Lemon Grove</b>	0.8	✓		
<b>Oceanside</b>	5.4	✓		
<b>Poway</b>	1.5	✓		

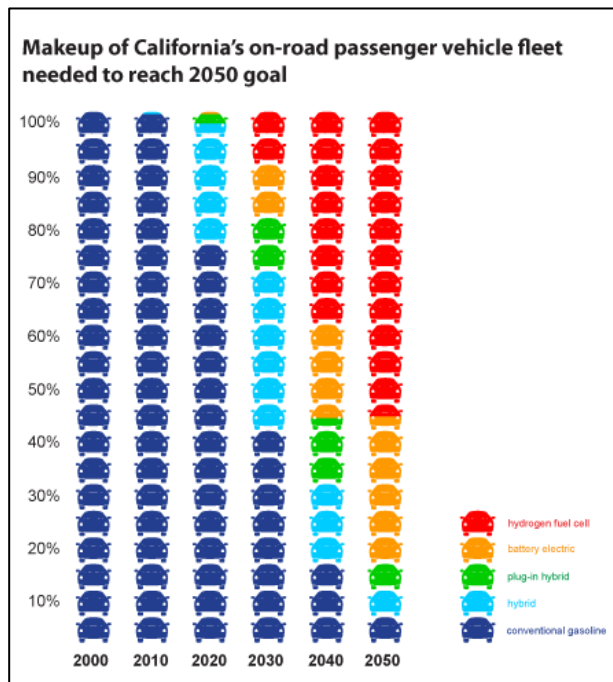
The following sections further describe the State strategy, the current and potential role of SANDAG, and the role of local governments in reducing emissions from the following sectors: transportation, land use, electricity, natural gas end use, water, and solid waste.

#### ***Reducing Emissions from Transportation Sector***

As illustrated in the regional GHG inventory, the transportation sector represents the largest source of GHG emissions (42% in the San Diego region). The AB 32 Scoping Plan outlines three key strategies for reducing emissions from the transportation sector:

- Reduce the miles driven by vehicles
- Increase the efficiency of the vehicles used
- Reduce the carbon content of the fuels used in the vehicles

## California's Strategy for Reducing Emissions from Transportation



The State's three strategies for reducing transportation emissions are supported by three main policies: Senate Bill 375 (SB 375), Advanced Clean Cars program, and Low Carbon Fuel Standard (LCFS).

SB 375 addresses the strategy to reduce vehicle-miles traveled (VMT) by setting targets for MPOs to reduce their region's GHG emissions from passenger vehicles and light-duty trucks. Each MPO must prepare a "Sustainable Communities Strategy" as part of their federally-mandated Regional Transportation Plan to demonstrate how the region would coordinate land use and transportation planning to meet the targets assigned by CARB.

The Advanced Clean Cars program works to increase vehicle efficiency by combining the control of GHG emissions and other air pollution

requirements into a single package of standards. Under the program, by 2025, 1.5 million zero-emission vehicles (ZEVs) will be operating in California and 15 percent of new car sales will be ZEVs. The chart above demonstrates how California's on-road passenger vehicle fleet is planned to change overtime. In order for the State to meet its clean vehicle goals, new fueling infrastructure to power ZEVs and alternative fuel vehicles must be deployed where little to none exists today.

The LCFS calls for a reduction of at least 10 percent in the carbon intensity of California's transportation fuels by 2020. The LCFS program is performance-based and allows fuel providers and regulated parties to choose from a mix of strategies to achieve compliance. Strategies include investing in production of low carbon-intensity (low-CI) fuels, purchasing low-CI fuels for blending, purchasing credits from other regulated parties, and banking credits for use in future years.

### SANDAG Role in Reducing Emissions from Transportation Planning

In accordance with SB 375, SANDAG developed a Sustainable Communities Strategy (SCS) as an element of the 2050 Regional Transportation Plan (RTP). Although the State's estimate is that only three percent of GHG reductions are expected to come from all of the California MPOs' SCSs, SANDAG understands its efforts are an important piece of the overall reduction strategy. The 2050 RTP/SCS describes how the region will meet the per capita GHG reduction targets for passenger vehicle emissions set by CARB. It is important to note that CARB's targets for MPOs are focused only on the reductions that could come from transportation planning for passenger vehicles, not those reductions that can come from technology improvements made by vehicle manufacturers or cleaner fuels. The passenger vehicle GHG targets for SANDAG are a reduction of 7 percent by 2020, and 13 percent by 2035, from a 2005 baseline year.



The five building blocks of the 2050 RTP/SCS, which was adopted by the SANDAG Board of Directors in 2011, are:

1. A land use pattern that accommodates the region's future employment and housing needs while protecting habitat and resource areas
2. A transportation network of public transit, managed lanes and highways, local streets, bikeways and walkways
3. Transportation demand management strategies to reduce traffic during peak periods
4. Transportation system management to maximize efficiency of the transportation network
5. Innovative pricing policies and other measures to reduce VMT

The 2050 RTP/SCS lays out the strategy to reduce passenger vehicle GHG emissions through several SANDAG programs. These programs include iCommute commuter services and planning studies, San Diego Regional Bicycle Plan and early action program implementation, transit planning, *TransNet* Smart Growth Incentive Program and Active Transportation Grant Program, a regional transit-oriented development strategy, and a regional complete streets policy. These programs also help local governments implement their CAPs.

In addition to activities to reduce VMT, the 2050 RTP/SCS addresses SANDAG's role in supporting the State's strategies for efficient vehicles and low-carbon fuels in the region. Since 2012, SANDAG has provided a forum for local governments and other regional stakeholders to address barriers to deploying alternative fuel vehicles and siting necessary fueling stations. In 2014, SANDAG completed a regional readiness plan for plug-in electric vehicles and charging stations<sup>4</sup>. This effort has expanded to planning for all alternative fuels with a regional alternative fuel plan to be completed in 2016. Through the Energy Roadmap Program, SANDAG has partnered with the San Diego Regional Clean Cities Coalition to offer member agencies customized fleet assessments that evaluate alternative fuel vehicle options available, as well as monetary and environmental implications.

#### *Local Government Role in Reducing Emissions from Transportation*

Local governments have the ability to influence transportation-related GHG emissions through land use authority, community investments, and municipal operations. In local CAPs, local governments have identified measures to reduce VMT and promote efficient vehicles and alternative fuel use in government operations and throughout the community. Even though emissions from government operations make up a small percentage of a jurisdiction's overall emissions, the local government can be a leader and help to influence changes in the community by taking steps to reduce internal emissions.

To date, seven jurisdictions in the San Diego region have completed a CAP, while an additional six jurisdictions are in the process of developing one. All of the completed CAPs include one or more measures to reduce VMT in the community. Measures from adopted CAPs in the San Diego region include:

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<sup>4</sup> San Diego Regional Plug-in Electric Vehicle Readiness Plan is available at: [http://www.sandag.org/uploads/publicationid/publicationid\\_1817\\_17061.pdf](http://www.sandag.org/uploads/publicationid/publicationid_1817_17061.pdf)

- Expand and improve the transit network and accessibility
- Promote bicycle use by preparing a bicycle master plan and encourage employers to offer bicycle lockers and other facilities
- Work with employers to promote iCommute services and TDM strategies including telework and alternative work schedule options, the guaranteed ride home program, and incentives for alternative commuters
- Reduce parking requirements in smart growth areas and prioritize parking for high-occupancy vehicles
- Implement improvements to smooth traffic flow, reduce idling, and encourage efficient driving techniques

In addition to the measures to reduce VMT with the community, several local governments include measures to reduce VMT associated with employee commutes. These measures include:

- Offer car sharing and/or bike sharing for employees
- Promote the use of the iCommute Guaranteed Ride Home program
- Offer the use of telework or alternative work schedules
- Offer incentives to employees that use alternative commutes

Beyond VMT reduction measures, local government CAPs also address ways to support the state goals for efficient vehicles and alternative fuels. These measures include:

- Replace vehicles in government fleets and fleets of contractors with alternative fuel and hybrid vehicles
- Streamline permitting for electric vehicle charging stations
- Expand the availability and use of alternative fuel vehicles and fueling infrastructure

### ***Reducing Emissions from Land Use***

Land use decisions impact nearly all sources of GHG emissions. Smart growth development brings people closer to more destinations and supports low-carbon travel choices (public transit, carpooling, walking, and biking). Mixed use, compact developments also result in reduced per capita demand for electricity, heating, and cooling. There are also co-benefits of land use and transportation strategies beyond GHG reductions, including preservation of agricultural land, open space, and habitat; improved water quality from reduced development-related pollutant sources; positive health effects; and the reduction of smog forming pollutants. This section also includes land use strategies to expand tree planting and other urban greening efforts, which have benefits of carbon sequestration, meaning trees uptake and store carbon from the atmosphere as they grow.

#### *California's Strategy for Reducing Emissions from Land Use*

AB 32 and SB 375 emphasize the need for more compact land use patterns to achieve GHG reductions, but recognize that land use planning and urban growth decisions are areas where implementation of the Scoping Plan relies on local governments. Given local land use authority, the State's primary strategy for influencing land use and transportation planning to reduce GHG emissions is to support the MPOs and local jurisdictions' efforts to meet the SB 375 targets. Additionally, the Scoping Plan outlines a strategy to promote sustainable forests by using sustainable management practices and investing in tree-planting.

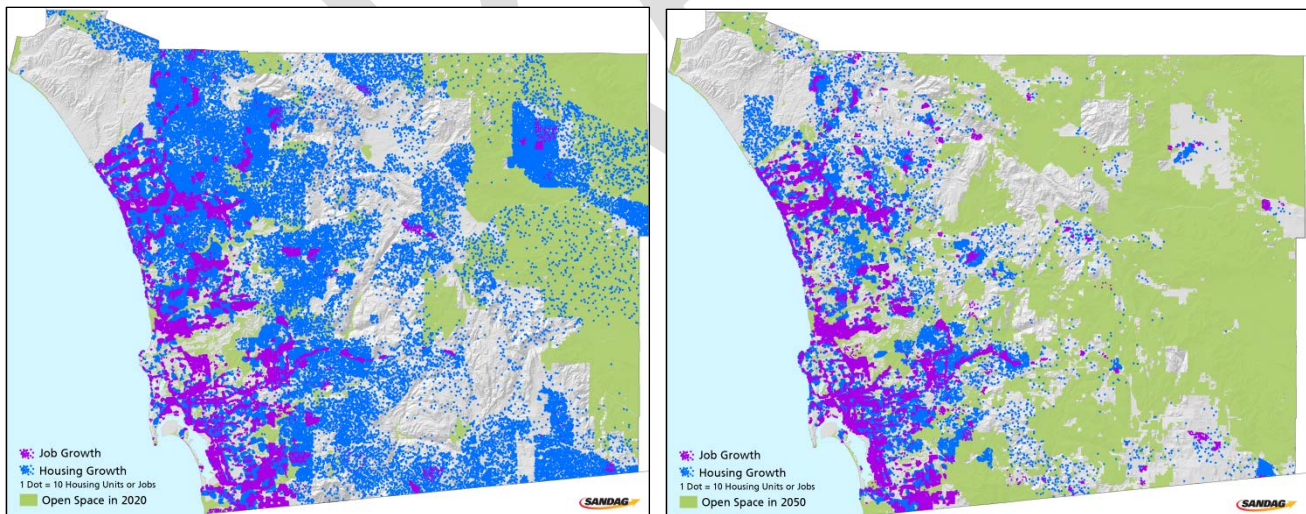
### *SANDAG Role in Reducing Emissions from Land Use*

The SANDAG Regional Comprehensive Plan (RCP), adopted in 2004, is based on principles of smart growth and sustainability, which focuses on better urban design, walkability, and compact growth near transit. A key goal of RCP implementation is to provide incentives and assistance to local member agencies with land use authority to encourage smart growth development in areas on the Smart Growth Concept Map. Through the Smart Growth Tool Box, the *TransNet* Smart Growth Incentive Program, the *TransNet* Active Transportation Grant Program, and transportation investments included in regional transportation plans, SANDAG provides planning and financing tools to local jurisdictions. Grant funding criteria addresses several project elements, including sustainability, which encourages energy conservation and sustainable landscaping in project design. Additionally, through the Energy Roadmap Program, SANDAG provides resources to reduce energy use through planning and development.

### *Local Government Role in Reducing Emissions from Land Use*

Local governments have the authority to decide how and where land is developed to accommodate population growth. The figures below show the region's projected housing and job growth based upon local general plans in 1999 (left) and 2013 (right). Over 14 years, local plans have been updated to concentrate growth within the urbanized areas of the region, closer to existing and planned transportation infrastructure, while increasing land area dedicated to open space and habitat preservation. These land use changes implement the vision and goals set in the RCP, adopted by SANDAG in 2004, collectively moving the region toward more compact development, more open space preservation, and reduced GHG emissions.

**Comparison of Housing and Job Growth Projected in 1999 vs. 2013<sup>5</sup>**



<sup>5</sup> Projected housing and job growth in 1999 (left) and 2013 (right) based upon the SANDAG Series 9 and 13 Regional Growth Forecasts.

In local CAPs, several jurisdictions have highlighted land use-related strategies to reduce GHG emissions, many of which overlap with strategies to reduce VMT described in the previous section. Examples of strategies from adopted CAPs include:

- Implement smart growth design principles in targeted areas, such as transit stations, mixed use areas, and near retail and employment centers
- Revise zoning designations, development standards, and design guidelines to promote sustainable and smart growth land use patterns
- Develop and offer incentives, such as reduced parking requirements or expedited permit processing, for mixed use, transit-oriented, and affordable housing projects in designated SANDAG Smart Growth Opportunity Areas
- Preserve and increase the amount of urban forest and tree planting

### ***Reducing Emissions from Electricity***

Electricity use is responsible for 23 percent of the San Diego region's GHG emissions. Even prior to climate change policy, California has long been a leader in improving building energy efficiency and promoting the use of renewable energy sources. California's per capita energy consumption is among the lowest in the country and has remained relatively constant since 1974;<sup>6</sup> this has been achieved through building codes and appliance standards, incentive programs, design and installation training, and public outreach. In 1996, the State began incentivizing customer-side renewable energy technologies, and in 2002, established the first Renewable Portfolio Standard (RPS) for the investor-owned utilities (IOUs)<sup>7</sup>. In order to achieve energy and climate goals, Californians at all levels will need to play a part. The key strategies to reduce GHG emissions from electricity are consistent with the State's loading order, and include:

- Conservation and energy efficiency in new and existing buildings
- Low carbon distributed generation
- Large scale renewable energy sources

### ***California's Strategy for Reducing Emissions from Electricity***

The State's strategy to reduce electricity-related GHG emissions involves the coordination of several State agencies including the California Public Utilities Commission (CPUC), the California Energy Commission (CEC), and CARB. To improve energy efficiency, the AB 32 Scoping Plan calls for maximizing building and appliance standards, pursuing new technologies and policy mechanisms, and continuing investments from electricity providers in energy efficiency programs.

In 2008, the CPUC led the development of the California Long-Term Energy Efficiency Strategic Plan (LTEESP) to achieve maximum energy efficiency savings across all sectors, including local government. Updated in 2011, LTEESP identifies four "Big Bold Energy Efficiency Strategies" to help meet AB 32 GHG reduction targets:

1. All new residential construction in California will be zero net energy (ZNE) by 2020

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<sup>6</sup> California Energy Commission, Comprehensive Energy Efficiency Program for Existing Buildings: <http://energy.ca.gov/ab758/>

<sup>7</sup> California IOUs are San Diego Gas & Electric (SDG&E), Pacific Gas & Electric (PG&E), Southern California Electric (SCE) and Southern California Gas (SCG).

2. All new commercial construction in California will be ZNE by 2030
3. Heating, ventilation, and air conditioning (HVAC) will be transformed to ensure that its energy performance is optimal for California's climate
4. All eligible low-income customers will be given the opportunity to participate in the low income energy efficiency program by 2020

The State's IOUs, regulated by the CPUC, implement energy efficiency programs that target both residential and non-residential sectors in support of LTEESP. Additional programs that support the LTEESP include AB 758 (Skinner, 2009) and the State's Building Energy Efficiency Standards<sup>8</sup>. AB 758 requires the CEC to develop and implement a comprehensive efficiency plan for all existing residential and commercial buildings. The Building Energy Efficiency Standards are updated on a roughly three-year cycle and become more stringent and closer to ZNE buildings with each revision. Additional funding to support energy efficiency came in 2012 when voters approved the California Clean Energy Jobs Act (Proposition 39). Proposition 39 money will be used to support energy efficiency and clean energy projects in California's K-12 public schools and community colleges pursuant to SB 73 (Skinner, 2013).

California's renewable energy activities have targeted both small-scale, distributed generation as well as larger, utility-scale renewable generation. Expansion of small-scale distributed generation, including rooftop solar photovoltaic (PV), fuel cells, gas turbines, and advanced energy storage, has been primarily driven by incentive programs. Programs include California Solar Initiative, New Solar Homes Partnership, and Self-Generation Incentive Program. Governor Brown has set a goal for 12,000 megawatts<sup>9</sup> (MW) of distributed renewable generation by 2020; so far, 4,400 MW<sup>10</sup> has come online. The Renewable Portfolio Standard (RPS) is another key measure for achieving the AB 32 target; it required California utilities to serve 20 percent of their customers' electricity needs with large-scale, clean renewable energy by 2010, which has been achieved, and 33 percent by 2020.

#### *SANDAG Role in Reducing Emissions from Electricity*

While state agencies have significant authority over electricity programs, SANDAG focuses on opportunities that SANDAG and its member agencies could take advantage of to influence electricity savings and GHG reductions in the region. SANDAG does this through coordinated planning with a variety of stakeholders through the Regional Energy Working Group and providing resources to member agencies through a Local Government Partnership (LGP) with San Diego Gas & Electric (SDG&E). The SANDAG Regional Energy Strategy (RES) outlines several goals that support the State's efforts to reduce electricity-related GHG emissions while considering other factors such as cost effectiveness and impacts to the power grid. Three of the six Priority Early Actions from the RES are related to electricity:

- Pursue a comprehensive building retrofit program to improve efficiency and install renewable energy systems
- Create financing programs to pay for projects and improvements that save energy

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<sup>8</sup> Title 24, Part 1, Chapter 10 and Part 6, and affected provisions in Part 11 (Cal. Green Building Standards Code)

<sup>9</sup> A megawatt is equal to 1,000 kilowatts or one million watts. One megawatt is enough electrical capacity to power about 1,000 average homes in California.

<sup>10</sup> California Air Resources Board, *Proposed First Update to the Climate Change Scoping Plan: Building on the Framework*, February 2014.

- Utilize the SANDAG-SDG&E LGP to help local governments identify opportunities and implement energy savings at government facilities and throughout their communities

The SANDAG LGP, the Energy Roadmap Program, is one component of SDG&E's portfolio of energy efficiency programs. Through the Energy Roadmap Program, SANDAG offers custom energy management plans for member agencies that do not have an LGP. Nearly all member agencies have a completed Roadmap, and several are working on implementation. To support cities with implementation of the energy conservation measures identified through the Roadmap program, SANDAG has an energy engineering firm under contract to offer assistance to cities with energy efficiency project specifications, procurement, and applications for rebates, incentives, and financing. SANDAG serves as a resource for local governments that do not have energy or climate change staff.

#### *Local Government Role in Reducing Emissions from Electricity*

The State's LTEESP describes goals for local governments to be leaders in energy efficiency by leveraging their authorities and opportunities to lead by example and influence their communities. These goals have been supported by investment in LGPs from utility energy efficiency programs. In the San Diego region, the following agencies have an LGP with SDG&E: cities of San Diego and Chula Vista, County of San Diego, Port of San Diego, and SANDAG (offering services to non-LGP member agencies). Through their LGPs, public agencies retrofit their facilities, facilitate green business networks, train government staff on energy concepts and building code updates, develop electricity components of CAPs, and participate in regional collaborative programs.

Local CAPs recognize the role that energy efficiency and renewable energy play in reaching GHG reduction goals. Examples of strategies from CAPs to reduce electricity-related emissions include:

- Revise building codes to require new and renovated buildings to increase their energy efficiency and meet statewide green building standards
- Encourage solar PV on new homes and commercial buildings
- Perform energy audits of existing buildings by utilizing key trigger points such as time of sale
- Offer financing programs to help offset upfront cost of energy retrofit and renewable energy projects
- Support modernization of the power grid to provide more real-time information to consumers
- Establish requirements for energy efficiency and renewable energy at municipal facilities
- Promote SDG&E rebate and incentive programs for all customers
- Identify and remove barriers to large-scale renewable energy production

#### ***Reducing Emissions from Natural Gas End Use***

Natural gas end uses account for 8 percent of GHG emissions in the San Diego region, the third largest source after transportation and electricity. These emissions primarily come from natural gas combustion for hot water, space heating, cooling, cooking, and other uses in residential and commercial buildings. GHG emissions associated with power generation from natural gas power plants are accounted for in the electricity sector data.

### *California's Strategy for Reducing Emissions from Natural Gas End Use*

In the AB 32 Scoping Plan, the State sets a target for reducing natural gas use by 800 million therms from business as usual through energy efficiency. Several of the strategies described above for improving electricity efficiency in buildings also apply to natural gas savings. One key source of natural gas emissions is heating hot water. Solar hot water heating is one technology that has been identified to implement the State's targets for ZNE buildings. Solar hot water heating systems offset the use of natural gas, and typically reduce the need for conventional water heating by about two-thirds. The Solar Hot Water and Efficiency Act of 2007 authorized a ten year, \$250-million incentive program with a goal of 200,000 systems installed by 2017.

Combined heat and power (CHP), or cogeneration, is another state priority for reducing GHG emissions and using natural gas as efficiently as possible. CHP systems, which generate on-site electricity and heat in a single system, are typically used in industrial, commercial, and institutional applications where both electricity and steam are required. Governor Brown set a goal for 6,500 MW of additional CHP capacity by 2030, which builds upon the Scoping Plan's goal of 4,000 MW of new CHP by 2020.

### *SANDAG Role in Reducing Emissions from Natural Gas End Use*

The RES has a goal related to efficiency of natural gas power plants; however, the goal does not currently address natural gas end uses. In the 2014 technical update of the RES, one of the recommendations is to broaden the natural gas goal to address end-user energy efficiency and other pertinent issues. Through the Energy Roadmap Program, SANDAG works with local governments to identify strategies to reduce natural gas use in their own facilities and in the community.

### *Local Government Role in Reducing Emissions from Natural Gas End Use*

For reducing emissions from natural gas end-uses, strategies are similar to those described above for electricity efficiency. Measures from local CAPs include:

- Revise building codes to require new and renovated buildings to increase their energy efficiency and meet statewide green building standards
- Perform energy audits of existing buildings by utilizing key trigger points such as time of sale
- Offer financing programs to help offset upfront cost of energy retrofit and renewable energy projects
- Promote SDG&E rebate and incentive programs for all customers
- Support increased use of solar hot water heating in residential, pool, and commercial uses

### ***Reducing Emissions from Water Sector***

Emissions generated from water use are primarily accounted for in the electricity and natural gas sectors of the GHG inventory resulting from electricity used for transport, distribution, treatment, and pumping of water; and natural gas used for heating water. Two percent of the region's overall emissions come from emissions associated with the conveyance of water from outside sources to the San Diego region. Because of the close relationship between energy and water, strategies that save water generally save energy as well. This is especially true for the San Diego region since most of the region's water is imported from either the Colorado River or from northern California via the

State Water Project; both sources require large amounts of energy to transport the water across long distances.

### *California's Strategy for Reducing Emissions from Water Sector*

The State's overall goal is to promote efficient use of water and use cleaner energy sources to move and treat water. The AB 32 Scoping Plan recognizes that water conservation is critical to making the State's water supply more reliable and drought resistant. California's 2009 Water Conservation Act (Senate Bill x7-7) sets a goal to reduce per capita water use by 20 percent by 2020. The state has also set goals for increasing recycled water and stormwater usage, which have been supported by over \$1.15 billion in infrastructure grant and loan programs. Additional investments from the State have supported regional collaborative efforts to develop water management plans, diversify regional water portfolios, and increase self-reliance. The state also recognizes that efforts to conserve water are critical for both reducing GHG emissions and building resilience to impacts of climate change, such as high temperatures and severe drought.

### *SANDAG Role in Reducing Emissions from Water Sector*

The San Diego County Water Authority (SDCWA) is the agency responsible for ensuring reliable supplies of water to the San Diego region. SANDAG coordinates with SDCWA to ensure consistency among the various regional planning efforts. Through the Energy Roadmap Program, SANDAG also provides resources to local governments on the water-energy nexus and ways to save water and energy. The RES has a goal to reduce water-related energy use, and the SDCWA has participated in discussions on the topic at Regional Energy Working Group meetings.

### *Local Government Role in Reducing Emissions from Water Sector*

Local governments can leverage their authority and encourage residents and businesses to conserve water by adopting building codes with increased water efficiency, coordinating with the local water district and/or SDCWA on programs and incentives available to residents and businesses, and demonstrating leadership by saving water in government facilities. Some cities already require residents to update water fixtures to low-flow models at point-of-sale. Other measures to reduce water-related GHG emissions in local CAPs include:

- Promote use of low-flow fixtures, dual flush toilets, and water efficient appliances
- Encourage water rate structures that support water conservation
- Promote water conserving landscaping such as turf lawn conversion and drought tolerant plants
- Coordinate with local water districts on outreach programs and use of rain barrels and gray water systems
- Expand reclaimed water use in landscaping

### **Reducing Emissions from Solid Waste**

Solid waste contributes 4 percent to the San Diego region's total GHG emissions, which comes from methane emissions at landfills and wastewater treatment. The state has a goal (set by Assembly Bill 341 in 2011) for diverting 75 percent of waste from landfills (through recycling, composting, or source reduction) by the year 2020 and capturing methane from landfills to further reduce GHG emissions. The role that SANDAG plays in waste management is limited, as it is not responsible for any landfills in the region. In keeping with state waste reduction goals, SANDAG has established internal measures to significantly lessen the amount of paper printed for internal and external meetings and works with the



building owner to implement a comprehensive recycling program. Local governments can adopt codes and standards that increase construction waste diversion, recycling, green waste programs, and composting. Many local governments have contracted waste services for their jurisdiction and can work with the waste service provider on strategies to reduce GHG emissions.

## **Adaptation - Preparing for Impacts of Climate Change**

Even with the mitigation measures described in the previous sections, the current levels of GHGs in the atmosphere have already resulted in changes to the climate and will continue to do so. California has recognized the need to prepare communities for the effects of climate change by identifying ways to adapt and make communities resilient to climate impacts. The State has taken a leadership role in providing guidance for identifying vulnerabilities and addressing the major impacts of climate change at the state, regional, and local level. The sections below describe California's climate adaptation planning efforts, the role that SANDAG plays in preparing for climate change, and the ways local governments are considering adaptation in their climate action planning efforts.

### **California Climate Adaptation Planning**

In 2008, Governor Schwarzenegger issued Executive Order S-13-08 which directed the California Natural Resources Agency, in coordination with other state agencies, to complete the first California Sea Level Rise Assessment Report, develop a state Climate Adaptation Strategy, and coordinate with the Governor's Office of Planning and Research (OPR) to provide land use planning guidance related to sea level rise and other climate change impacts. The 2009 California Climate Adaptation Strategy was the result of a coordinated effort among several state agencies and used the best available science to describe the impacts, risks, and strategies for climate adaptation in the following sectors:

- Ocean and Coastal Resources
- Public Health
- Biodiversity and Habitat
- Water Management
- Agriculture
- Forestry
- Transportation and Energy Infrastructure

In December 2013, the Natural Resources Agency released an update to the 2009 strategy called *Safeguarding California: Reducing Climate Risk*. After the public review process, the Safeguarding California Plan is expected to be adopted in 2014. In addition to the Natural Resources Agency, other State agencies have prepared guidance documents for considering climate change adaptation in planning and decision making at the local and regional level. The following sections describe the best practices identified by the State for climate adaptation with regards to ocean and coastal resources, extreme heat, wildfire, biodiversity/habitat, and water management.

#### *Ocean and Coastal Resources*

In March 2013, the Coastal and Ocean Working Group of the California Climate Action Team released guidance and policy recommendations for incorporating sea level rise (SLR) projections into planning and decision making for projects. The guidance is based on the findings of the June 2012

National Research Council (NRC) report: *Sea-Level Rise for the Coasts of California, Oregon, and Washington*, which include the following ranges over three time horizons for areas south of Cape Mendocino:

- 2000-2030: 4 to 30 cm (0.13 to 0.98 ft.)
- 2000-2050: 12 to 61 cm (0.39 to 2.0 ft.)
- 2000-2100: 42 to 167 cm (1.38 to 5.48 ft.)

In coordination with the other state adaptation strategies, the California Coastal Commission (CCC) released *Draft Sea-Level Rise Policy Guidance* in October 2013 that recommends steps for addressing SLR in CCC planning and regulatory actions. The Policy Guidance describes the best available science on SLR and provides step-by-step guidance on how to address SLR in new and updated Local Coastal Programs and Coastal Development Permits, which are the fundamental land use planning and regulatory governing mechanisms in the coastal zone.

### *Extreme Heat*

The *State of California Extreme Heat Adaptation Interim Guidance Document* provides projections for increased temperatures and extreme heat events in California. Most of the research on climate change and extreme heat for California has come from the Scripps Institute of Oceanography at University of California, San Diego. Projections include annual temperature increases of up to 5 degrees by 2030 and up to 10 degrees by the end of the century. The historic average for urban regions across the state is 4 extreme heat days per year. The report indicates that San Diego is expected to be impacted more severely than other cities with 76 extreme heat days in 2050 and 129 extreme heat days in 2099. These heat events will have considerable health risks to the population. In order to prepare and safeguard the community for extreme heat events, the report offers the following recommendations:

- Incorporate cooling strategies for indoor and outdoor environments into building design, including porous materials and green infrastructure
- Consider potential heat health risks posed by climate change in state and local hazard mitigation plans, improve heat alerts, improve community resiliency (ability to withstand climate impacts), particularly in vulnerable communities, and protect the energy grid
- Increase preparedness of the health care system and protect workers at risk of extreme heat

### *Wildfire*

Southern California already experiences wildfire, and changes to the frequency and severity will depend on factors including shifts in vegetation, Santa Ana wind behavior, temperature increases, and decreased moisture due to longer periods of drought<sup>11</sup>. The *CA Climate Adaptation Strategy* recommends firefighting agencies include climate change impact information in fire program planning. Enhanced wildfire risk from climate change will likely increase public health and safety risks, property damage, fire suppression and emergency response costs, and impacts to water quality and vegetation/habitat.

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<sup>11</sup> California Emergency Management Agency and Natural Resources Agency, *California Adaptation Planning Guide: Understanding Regional Characteristics*, July 2012.

### *Biodiversity/Habitat*

Impacts of climate change such as SLR, loss of wetlands, wildfire, warmer temperatures, and drought can dramatically alter terrestrial and freshwater aquatic habitats and the species that depend on them. The *CA Adaptation Planning Guide* identifies strategies for addressing climate impacts on biodiversity and habitat and recommends local agencies work with their communities to:

- Identify and protect locations where native species may shift or lose habitat
- Collaborate with agencies managing public lands to identify, develop, or maintain corridors and linkages between undeveloped areas
- Use purchase of development rights or conservation easements to protect vulnerable habitats

### *Water Management*

Climate impacts on water management include altered timing and amount of precipitation as well as increased temperatures that influence the availability of water supply. The *CA Adaptation Planning Guide* describes strategies for limiting community exposure to threats such as flooding or landslides as well as measures to reduce local water use in response to water supply limits from reduced snowpack, reduced precipitation, or drought. The guide recommends that local jurisdictions update general plan safety elements and local hazard mitigation plans to reduce potential losses of life and property from flooding and landslide risk. Strategies to conserve water work as both mitigation and adaptation strategies and include implementing a recycled water program, using pricing to reduce consumption demand, and restoring natural groundwater supplies for water storage.

### ***SANDAG Role in Adaptation Planning***

The 2050 RTP/SCS recognizes that the region is and will continue to be affected by the impacts of climate change. Specifically, the SCS chapter identifies the following actions to support implementation:

- To the extent possible, address climate adaptation issues in the design of new projects, and when improvements are made to existing infrastructure
- Evaluate the feasibility of developing preliminary maps that identify transportation infrastructure that could be vulnerable to environmental changes to climate change, including precipitation, heat, and sea level rise

Recognizing that climate impacts extend beyond jurisdictional and international boundaries, the 2009 and 2010 binational seminars, supported by the Committee on Binational Regional Opportunities (COBRO) focused on climate change and opportunities for crossborder collaboration. The seminars resulted in recommendations on ways to continue collaborative work on climate change by agreeing on priority actions and sharing information on local and regional efforts.

### *Considering Climate Change Impacts on Transportation Infrastructure*

SANDAG has begun to consider impacts of climate change as projects are designed, built, and maintained, recognizing the importance of protecting infrastructure investments. In order to inform the North Coast Corridor Program, SANDAG and Caltrans commissioned a *San Diego Region Coastal Sea Level Rise Analysis Report*. The Report describes future scenarios for SLR along the region's coastline based on the latest and most relevant scientific reports and guidance, offers design water

level guidance for local projects, an adaptive management strategy, and general conclusions and recommendations.

In February 2013, Caltrans released a guide for MPOs and RTPAs in *Addressing Climate Change Adaptation in Regional Transportation Plans*. The guide describes the need for considering long-term impacts of climate change on transportation infrastructure projects, which typically have long service life, as well as condition and vulnerability of existing facilities. The guide identifies impacts to transportation infrastructure of SLR, increase in intense precipitation events, and higher temperatures and extreme heat events. The SLR impacts include coastal erosion, coastal and inland tidal zone road flooding, bridge scour, and railway flooding. Impacts from intense precipitation events comprise railway and roadway flooding, landslides, and bridge scour. Impacts from higher temperatures and extreme heat include highway asphalt rutting, asphalt and rail buckling, concrete deterioration, limits on periods of construction activity, increased thermal expansion of bridges, vegetation/biodiversity changes, and increase in wildfires and mudslides. Caltrans recommends that MPOs identify locations of roadway, bridges, and railway vulnerable to these impacts and address the vulnerabilities in transportation plans, design, and operations/maintenance.

#### *Shoreline Preservation*

Recognizing the need for regional coordination to address beach erosion issues along the coastline, SANDAG facilitates collaboration on beach building and maintenance through the shoreline management program. The Shoreline Preservation Working Group helps to inform SANDAG on issues related to the implementation of the Shoreline Preservation Strategy and beach replenishment opportunities. The CCC Draft Sea Level Rise Policy Guidance identifies beach replenishment and nourishment as an adaptation strategy for addressing impacts of SLR on shorelines.

#### *Habitat Conservation*

The *TransNet* Environmental Mitigation Program (EMP) funds habitat-related environmental mitigation activities required to implement projects from the RTP including purchasing, conserving, and restoring native habitats as offsets to disturbances caused by transportation projects. The EMP is also helping to fund research and regional coordination on ways to build resiliency among species and habitats. The San Diego Management and Monitoring Program recently completed a *Management Strategic Plan (MSP) for Conserved Lands in Western San Diego County*, providing a comprehensive approach for management of multiple plant and animal species. A component of the MSP addresses regional threat and stressor management, including fire, invasive species, urban edge, habitat fragmentation, human use of preserves, nitrogen deposition, and cumulative stressors. Many of these threats and stressors are either directly or indirectly related to climate change and the MSP offers goals and objectives for building resiliency to these effects of climate change.

#### **Local Government Role in Adaptation Planning**

Local governments play a key role in assessing vulnerabilities to climate change in their communities and identifying and implementing strategies to prepare communities for these impacts. While most CAPs are focused on strategies to reduce GHG emissions, some local governments are recognizing that preparing for inevitable impacts of climate change is equally important. Strategies included in CAPs related to adaptation include:

- Reduce urban heat island impacts through cool paving, shade trees, green/cool roofs, and reflective materials

- Decrease water use through low impact development, water recycling, landscape ordinances, and education for residents
- Prevent stormwater pollution through landscape and construction site water waste reductions and designing stormwater structures to accommodate future precipitation regimes
- Prepare for wildfires through outreach and education to residents, updating emergency response plans and hazard mitigation plans to consider climate change, encourage fire retardant materials and plants, and improve development standards to reduce fire risk at the urban/wildland interface
- Prepare the public for extreme heat events through air quality and extreme heat notifications, targeting vulnerable communities, and offering cool zones for residents
- Use existing species conservation planning processes to protect biodiversity and habitats that are threatened by climate change
- Update environmental review procedures to consider sea level rise in coastal developments

In addition to individual CAP measures, local governments have worked collaboratively to address impacts of climate change. Specifically, the local governments that border the San Diego Bay worked together to complete the *Sea Level Rise Adaptation Strategy for San Diego Bay* in January 2012. The steering committee for the study included representatives from the five cities around the bay (Chula Vista, Coronado, Imperial Beach, National City, and San Diego), as well as the Port of San Diego and the San Diego County Regional Airport Authority. The strategy includes a vulnerability assessment and list of comprehensive strategies to assess the vulnerabilities.

### **Interrelationships to Other Policy Areas**

Climate change is related to several other policy areas of the Regional Plan, and these interrelationships offer co-benefits where strategies to address climate change also benefit other policy goals, however, there are some areas where strategies to address climate change could conflict with other policy goals. The following sections describe how climate change is interrelated to economics, public health, and social equity considerations.

#### ***Economics and Climate Change***

Taking steps to mitigate climate change can assist with many of the other objectives in The Regional Plan, and can result in substantial economic benefits. For example, changes in land use regulations, zoning, and transportation infrastructure intended to reduce transportation GHG emissions can create denser, mixed-use, multi-modal communities that can serve the growing populations of younger professionals, singles, and seniors. These changes can also lead to better health outcomes, and to easier access to schools, jobs, and recreation, increasing economic opportunities for those with limited resources. Efforts to improve energy and water efficiency can have substantial positive benefits to the San Diego economy, by saving money and stimulating job creation in the energy contractor and engineering fields since the improvements must be installed and maintained by a local workforce. Benefits to job growth also come from the “Cleantech” sector, which produces products and services related to renewable energy, energy efficiency, clean transportation, and smart grid. In the San Diego region roughly 8,000 jobs, with an average wage of over \$87,000, are in the “Cleantech” sector<sup>12</sup>.

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<sup>12</sup> SANDAG, *Traded Industry Clusters in the San Diego Region*, July 2012

Assessing and preparing for vulnerabilities of drought and severe weather now can have substantial economic benefits in the future. Climate change has the potential to present substantial costs to the San Diego region, from severe impacts of SLR and increased storm activity on the region’s oceanfront, to the impact on energy-needs, agricultural disruption, and public health. There is considerable uncertainty as to the timing and severity of these impacts, and to our ability to avoid or mitigate them, and/or adapt to them should they occur to any substantial degree. Technological and engineering solutions of varying cost and effectiveness could mitigate many of the effects, but it is likely that behavioral changes may be required as well.

**Public Health, Social Equity, and Climate Change**

Public health, social equity, and climate change are policy areas that are closely connected. Goals and objectives for creating a healthy community and improving quality of life for all residents closely align with those for addressing climate change. Many of the key strategies for reducing GHG emissions can also improve health and have the potential to increase quality of life for all people regardless of age, race, color, national origin, income, or physical agility. These strategies and co-benefits are summarized in the following table.

**GHG Reduction Strategies and Potential Co-Benefits**

Strategy to Reduce GHG Emissions	Potential Health/Social Equity Co-Benefits <sup>13</sup>
Reduce vehicle miles traveled	<ul style="list-style-type: none"> <li>• Reduce air pollution</li> <li>• Increase physical activity</li> <li>• Reduce chronic disease (such as asthma and heart disease)</li> <li>• Improve mental health</li> <li>• Improve access to low-cost alternative transportation options</li> </ul>
Increase fuel efficiency and use of cleaner fuels in vehicles	<ul style="list-style-type: none"> <li>• Reduce air pollution</li> </ul>
Reduce emissions through land use changes such as more compact growth	<ul style="list-style-type: none"> <li>• Increase physical activity</li> <li>• Reduce chronic disease</li> <li>• Increase local access to essential services (affordable housing, jobs, amenities)</li> <li>• Enhance safety for biking and walking with reduced vehicle speeds and reduced collisions</li> </ul>
Reduce residential building energy and water use	<ul style="list-style-type: none"> <li>• Reduce household energy costs (especially beneficial for low-income households)</li> <li>• Promote healthy homes</li> <li>• Create local green jobs</li> <li>• Promote cooler communities through shade trees and cool pavements</li> </ul>
Urban greening	<ul style="list-style-type: none"> <li>• Reduce temperature and urban heat island health effects</li> <li>• Reduce air pollution</li> <li>• Reduce noise</li> <li>• Enhance safety</li> </ul>

<sup>13</sup> California Department of Public Health, *Integrating Public Health into Climate Action Planning*, February 2012

While there are many co-benefits among strategies that reduce GHG emissions, improve public health, and address social equity, there are some important considerations that must be made in order to avoid negative impacts on public health and social equity:

- Use of zero-emission or fuel efficient vehicles reduces GHG emissions, but has no change on sedentary lifestyles that contribute to chronic disease and does not address the needs of the populations that do not drive or cannot afford to own and operate a vehicle
- Increasing density must be coupled with addressing green space and tree canopy needs in order to avoid the unintended consequence of increasing urban heat island effects, as well as increased housing costs and gentrification of existing communities
- Implementation of building efficiency standards must also consider adequate ventilation and other components of healthy housing
- Increasing renewable energy sources for electricity must also consider impacts to electricity costs, particularly on low-income residents

Impacts to public health from climate change include increased heat-related illnesses; increased asthma, allergies, and other cardiovascular and respiratory diseases due to poor air quality; disruption in food and water supply due to drought and severe weather; and population displacement due to wildfire or sea level rise. Impacts from climate change will not affect all communities in the same way; in particular, the health impacts of climate change may disproportionately affect vulnerable populations including: children, the elderly, people with chronic illness, low-income, and those unable to afford food or fuels for cooling and transportation. Working to create healthy communities builds a foundation for resiliency to climate impacts that benefits all segments of the population, including vulnerable populations.

Auction proceeds from CARB's Cap-and-Trade program will help to benefit disadvantaged communities. Senate Bill 535 requires that CARB identify disadvantaged communities based on geographic, socioeconomic, public health, and environmental hazard criteria, and that at least 25 percent of auction proceeds be allocated to projects that benefit these communities. Additionally, at least 10 percent of the proceeds must be allocated to projects located in the disadvantaged communities.

## **Recommendations**

Based on the State's strategy and the roles that SANDAG and local governments have in addressing climate change, there are opportunities for regional collaboration on strategies to coordinate on a consistent approach to climate change in the San Diego region. The following recommendations describe ways that SANDAG can work together with member agencies and other stakeholders to reduce GHG emissions, prepare for climate impacts, and increase education and awareness.

### ***Reducing GHG Emissions***

- Ensure that efforts to reduce VMT at the regional and local level are done in a coordinated manner and that the SCS and local CAPs are complementary
- Make jurisdictional VMT data accessible to local governments and assist in identifying VMT reduction strategies for local CAPs that are consistent with the SCS and leverage other SANDAG plans and programs

- Integrate regional planning for plug-in electric vehicles and alternative fuels into local CAPs
- Continue to provide planning resources to support local governments efforts to implement smart growth and technical support for demonstrating associated GHG emission reductions
- Continue and expand the Energy Roadmap Program to offer resources to local governments on ways to save energy in government operations and in the community
- Coordinate with SDCWA to provide resources for local governments on the water-energy nexus and strategies to save water and energy that implement CAPs
- Collaborate on education, outreach, and consistent messaging on ways residents and businesses can help reduce GHG emissions

### ***Preparing for Climate Impacts***

- Use the Caltrans guide, *Addressing Climate Change Adaptation in Regional Transportation Plans*, to identify locations of infrastructure vulnerable to climate impacts and address the vulnerabilities in transportation plans, design, and operations/maintenance
- Replicate the process that was used to create the Sea Level Rise Adaptation Strategy for the San Diego Bay for other areas of adaptation and resiliency, such as sea level rise along the shoreline, wildfires in inland areas, and water conservation
- Partner with other regional entities such as the SDCWA, bordering counties, Mexico, military, and tribal nations on adaptation and resiliency, and agree on priority aspects of climate change collaboration, including mitigation, adaptation, and education strategies
- Integrate climate change considerations into existing planning processes, such as habitat planning, emergency response, hazard mitigation, and public health planning
- Collaborate on education and outreach for the general public on impacts of climate change in communities and on ways to prepare for impacts

## **C. ADDRESSING CLIMATE CHANGE IN THE SAN DIEGO REGION**

There are many efforts underway in the San Diego region that are planning and implementing strategies to address climate change. This section further describes the ways SANDAG and local governments are addressing climate change in the San Diego region, both individually and collaboratively. In addition to the plans and programs described below, there are numerous private and non-profit organizations that are taking action on climate change.

### **SANDAG Plans and Programs**

#### *2050 Regional Transportation Plan/Sustainable Communities Strategy (2011)*

The 2050 RTP/SCS demonstrates how development patterns and the transportation network, policies, and programs can work together to achieve the GHG emission targets for cars and light trucks established by CARB. The SCS also contains additional energy and climate actions that go beyond the transportation emission reductions required by SB 375.

#### *Regional Energy Strategy (2009, 2014 Technical Update)*

The RES establishes goals for the San Diego region to be more energy efficient, to increase use of renewable energy sources, and to enhance the region's energy infrastructure so that we are able to meet growing energy demand. The San Diego region has a history of developing an energy strategy



going back to 1979, with updates occurring through the 1980s, 1990s, and in 2003. The 2009 RES was developed in response to increasing scientific and policy focus on global climate change and in light of the significant policy changes and implementation programs affecting the electricity, natural gas, and transportation sectors. In order to inform the San Diego Forward: The Regional Plan, SANDAG undertook a technical update of the RES, which demonstrates progress since 2009 toward RES goals, identifies data and monitoring methods for each goal, and provides recommendations for continued progress.

#### *Climate Action Strategy (2010)*

The Climate Action Strategy is a guide for SANDAG on climate change policy. The Strategy identifies a range of potential policy measures – “tools in the toolbox” – for consideration as SANDAG updates long-term planning documents like the Regional Transportation Plan and Regional Comprehensive Plan, and as local jurisdictions update their General Plans and other community plans. The Strategy helped SANDAG identify land use, transportation, and related policy measures and investments that could reduce greenhouse gases from passenger cars and light-duty trucks as part of the development of a Sustainable Communities Strategy for the 2050 RTP/SCS in compliance with Senate Bill 375. Potential policy measures also are identified for buildings and energy use, protecting transportation and energy infrastructure from climate impacts, and to help SANDAG and local jurisdictions reduce greenhouse gases from their operations.

#### *Riding to 2050, the San Diego Regional Bicycle Plan (2010) and Bike Early Action Program*

The San Diego Regional Bicycle Plan is a strategy for making the bicycle a more useful form of transportation for everyday travel. The Plan describes the regional bicycle network as a component of the multimodal regional transportation system included in the RTP/SCS as well as the programs that are necessary to support the network. Implementation of the plan is key to achieving the GHG reduction goals of the SCS and supporting improved public health through active transportation.

When the SANDAG Board of Directors adopted the 2050 RTP/SCS, it committed to developing an early action program for projects included in the Regional Bicycle Plan. In September 2013, the Board approved the Regional Bike Plan Early Action Program with the overall goal to implement Bike Plan Network High Priority Projects within 10 years, and execute programs to support the network investments.

#### *Transportation Demand Management Program, iCommute Commuter Services*

Transportation Demand Management (TDM) refers to programs and strategies that manage and reduce traffic congestion by encouraging the use of transportation alternatives. SANDAG coordinates a number of programs that are increasing the number of commuters who carpool, vanpool, take transit, bike, walk, and telework. These activities are facilitated through the iCommute program. The goal of iCommute is to manage and reduce traffic congestion, as well as reduce GHG emissions and other environmental pollutants that result from commuters driving alone each day. Managing the demand for our roadways is a cost-effective method for improving the daily commute while also improving the quality of life across the region.

SANDAG works closely with Caltrans, the Metropolitan Transit System, North County Transit District, and all 19 jurisdictions within the region. Programs and services provided by iCommute include free, online ridematching, a vanpool subsidy program, transit solutions, bicycle encouragement

programs, the Guaranteed Ride Home program, SchoolPool, and support for teleworking. Public outreach increases awareness about the variety of transportation choices through events such as Bike to Work Day, Rideshare Week, Dump the Pump, and through direct outreach to employers, community groups, schools, and agencies.

#### *San Diego Region Intelligent Transportation Systems (ITS) Strategic Plan (2011)*

The San Diego Region ITS Strategic Plan defines a ten-year vision for the effective use of technology to support intelligent transportation operations and management goals, and identifies key strategies that the region can implement to address critical technical and institutional needs. The purpose of the Plan is to provide policy guidance and a common vision for ITS applications to improve mobility, safety, efficiency, and reliability. One guiding principle of the plan is to prioritize funding for projects that help the region achieve GHG reduction targets and preserve natural resources.

#### *Regional Alternative Fuel Planning*

One of the six priority early actions identified in the Regional Energy Strategy and actions included in the SCS are to support planning for electric vehicle charging and alternative fueling infrastructure. Strong regional support for alternative fuels can communicate to the market that the San Diego region is committed to, and seeks to attract, investment in alternative fuel vehicles and infrastructure.

Infrastructure needs were identified in a 2009 assessment of how to accelerate deployment of alternative fuel vehicles in and around San Diego entitled the Regional Alternative Fuels, Vehicles and Infrastructure Report. The report recommended public – private partnerships and collaborative approaches to infrastructure planning and increasing alternative fuels in fleets. Its findings were incorporated into the regional energy and climate strategies, and informed actions for implementation identified in the 2050 RTP/SCS. In 2014, SANDAG began a regional planning effort to address infrastructure needs for alternative fuels, expanding on the electric vehicle planning described next.

#### *Regional Plug-in Electric Vehicle Planning*

The San Diego region is at the forefront of plug-in electric vehicle (PEV) deployment, and the region's early PEV experiences identified barriers to widespread PEV adoption. In order to address these barriers, the California Energy Commission awarded SANDAG a grant to form the San Diego Regional Electric Vehicle Infrastructure Working Group (REVI) and develop a Regional PEV readiness plan. REVI held its kick-off meeting in March 2012, and members include representatives from local governments, regional agencies, EV charging manufacturers, local colleges and universities, workforce training programs, and non-profits. The San Diego Regional PEV Readiness Plan was accepted by the SANDAG Board of Directors on January 24, 2014. Efforts begun by REVI will be continued through another grant from the CEC for SANDAG to develop a regional readiness plan for all alternative fuels.

#### *Energy Roadmap Program*

The Energy Roadmap Program is a collaboration between SANDAG and San Diego Gas & Electric that began in 2010. It is funded primarily by California utility customers under the auspices of the California Public Utilities Commission, while SANDAG funds the transportation components.

The Energy Roadmap Program provides free energy assessments and energy management plans, or “energy roadmaps,” to SANDAG member agencies. Each energy roadmap provides a framework for a local government to reduce energy use in municipal operations and in the community, and can result in economic savings and environmental benefits. The Energy Roadmap Program also offers cities support towards achieving the energy savings identified within their Roadmaps. Implementation activities include:

- Project analysis and selection
- Project feasibility studies
- Development of product/technology specifications
- Support for contractor procurement
- Completion and submittal of financing requirements
- Planning support for plan, policy, and regulatory needs
- Assistance with community outreach events
- Identify available staff training opportunities

#### *SANDAG Green Operations Manual (2014)*

The SANDAG Green Operations Manual, completed in March 2014, examines programs and projects that the agency oversees or influences, office space, and internal operations, as well as actions that employees can take to reduce GHG emissions and help implement the 2050 RTP/SCS. Development of the manual was made possible through the SANDAG Local Government Partnership with SDG&E. GHG reductions can come from energy efficiency measures, renewable energy options, alternative fuel use, petroleum reduction practices, and active transportation efforts.

#### *TransNet Smart Growth Incentive Program and Active Transportation Grant Program*

The *TransNet* Smart Growth Incentive Program (SGIP) funds transportation-related infrastructure improvements and planning efforts that support smart growth development. The SGIP awards two percent of the annual *TransNet* revenues (\$9.6 million in 2013) to local governments through a competitive grant program to support projects that will help better coordinate transportation and land use in the San Diego region.

The goal of the Active Transportation Grant Program is to encourage local jurisdictions to plan and build facilities that promote multiple travel choices for residents and connectivity to transit, schools, retail centers, parks, work, and other community gathering places. The grant program provides both capital funding for projects and non-capital funding for plans, bicycle parking, education, encouragement, and awareness programs that support pedestrian and bicycle infrastructure.

## **Local Government Plans and Programs**

### *Local Government Partnerships*

SDG&E, along with the other IOUs in California, have included local government partnerships (LGPs) as part of their energy efficiency portfolios since 2006. The IOUs have formed LGPs with local governments, regional governments, and public agencies. They also offer institutional partnerships to colleges, universities, and other institutions. The LGP proposals are submitted by SDG&E to the CPUC as part of its overall portfolio of energy efficiency programs. SANDAG, the City and County of

San Diego, the City of Chula Vista, and the San Diego Unified Port District (Port) currently have LGPs with SDG&E. The city and county LGPs with SDG&E were established in 2006, while the SANDAG and Port programs began in 2010. Since then the LGPs have provided municipal and community energy-saving programs. The existing LGP programs are to be extended through 2015.

#### *South Bay Energy Action Collaborative*

Since 2013, SANDAG has partnered with the City of Chula Vista to offer an additional method for Energy Roadmap implementation to the South Bay Cities of Coronado, Imperial Beach, and National City. Chula Vista is leading this pilot program, called the South Bay Energy Action Collaborative (SoBEAC). SoBEAC offers a “peer to peer” or “neighboring city to neighboring city” approach to Roadmap implementation. SoBEAC objectives are focused on three categories: municipal energy management, building and development processes, and community outreach. SANDAG plans to share and expand successful components of SoBEAC efforts with all Roadmap cities.

### **Collaborative Regional Efforts**

#### *San Diego Regional Climate Collaborative*

The San Diego Regional Climate Collaborative (Climate Collaborative) is a multi-agency initiative to create a web-based outreach tool<sup>14</sup> for increasing local, state, and national awareness of this region’s many energy and climate activities. The Climate Collaborative has been established as part of the CPUC-funded LGPs among SDG&E and the Cities of Chula Vista and San Diego, County of San Diego, Port of San Diego, University of San Diego, and SANDAG. Additional Climate Collaborative members include the San Diego Foundation, San Diego County Regional Airport Authority, and cities of Oceanside and Encinitas. The Web portal describes the State policies driving action at the local level, and serves as a clearinghouse of adopted regional policies, plans, and actions demonstrating what the San Diego region is doing to reduce energy use and address climate change. The Climate Collaborative includes links to public agency GHG inventories, adopted CAPs, Energy Roadmaps, and other local and regional sustainability efforts.

#### *San Diego Regional Energy Partnership*

SANDAG coordinates with other SDG&E LGPs, including the Cities of San Diego and Chula Vista, County of San Diego, and San Diego Unified Port District on regional energy efficiency programs through the San Diego Regional Energy Partnership. This partnership includes the continuation and expansion of the San Diego Regional Climate Collaborative, the Regional Energy Mapping Project, and other Energy Upgrade California or similarly related efforts.

#### *Sea Level Rise Adaptation Strategy for the San Diego Bay (2012)*

The Adaptation Strategy was prepared by ICLEI Local Governments for Sustainability through a collaborative, regional stakeholder process that included most of the public agencies and private sector representatives with a major interest in the future of San Diego Bay. Over the course of multiple workshops, stakeholders and technical advisors developed common assumptions and consensus-based recommendations that should form the basis of the region’s climate adaptation planning going forward. The Adaptation Strategy is a living document that can be implemented by local agencies and re-evaluated as new information becomes available in the coming years.

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<sup>14</sup> San Diego Regional Climate Collaborative website: [www.sdclimatecollaborative.org](http://www.sdclimatecollaborative.org)

### *Climate Understanding and Resilience in the River Valley (CURRV) – Tijuana River National Estuarine Research Reserve*

The overarching goal for CURRV is to begin a regionally committed process of adapting to climate change within the context of other environmental and socioeconomic changes. In order to achieve this goal, the Tijuana River National Estuarine Research Reserve (TRNERR) is collaborating with a diverse stakeholder group from San Diego and Baja California, Mexico, to conduct a vulnerability assessment that informs the development of an Adaptation Strategy addressing the impacts of climate change, specifically sea level rise and river flooding.

### *The San Diego Foundation Climate Initiative*

The San Diego Foundation educates and supports all of the region's communities in addressing climate change through research, strategic investments, and collaborations with community leaders and policymakers. The Foundation participates in several regional projects including the San Diego Regional Climate Collaborative and Climate Education Partners. The Foundation also helps to fund research to build a scientific foundation for effective public policy, reports include:

- Focus 2050 Study for the San Diego Region (2008)
- Local Government Greenhouse Gas Emissions Inventories (2009-2011)
- Regional Public Opinion Research on Climate Change (2010)
- Sea Level Rise Adaptation Strategy for the San Diego Bay (2012)
- Climate Action Planning Progress in the San Diego Region (2013)

### *Energy Policy Initiatives Center at University of San Diego*

The Energy Policy Initiatives Center (EPIC) is a non-profit academic and research center of the University of San Diego's School of Law that studies energy policy issues affecting the San Diego region and California. EPIC has developed several reports and tools to aid local governments in their climate planning efforts, including an Excel-based climate planning tool that allows local governments to calculate GHG emissions in their jurisdiction and evaluate the GHG reduction potential of various mitigation measures. EPIC completed the 2008 regional GHG emissions inventory for the 2050 RTP/SCS and completed the updated 2012 GHG emissions inventory for San Diego Forward: The Regional Plan.

### *Climate Education Partners*

Climate Education Partners is a project funded by the National Science Foundation to develop climate change education strategies. Climate Education Partners is a collaboration of partners that bring together expertise in climate science, social psychology, law, policy, and communications from the University of San Diego, EPIC, California State University San Marcos, Scripps Institution of Oceanography, The San Diego Foundation, and The Steve Alexander Group. The project has conducted public opinion surveys as well as interviews with influential people in the San Diego region in order to understand their views of climate science and the impacts of climate change. With funding for an additional five years, Climate Education Partners are working to develop education materials and implement educational programs.

## **Additional References**

Presidential Climate Action Plan (2013)

<http://www.whitehouse.gov/sites/default/files/image/president27sclimateactionplan.pdf>

Executive Order – Preparing the United States for the Impacts of Climate Change (2013)

<http://www.whitehouse.gov/the-press-office/2013/11/01/executive-order-preparing-united-states-impacts-climate-change>

Executive Order S-03-05 <http://gov.ca.gov/news.php?id=1861>

Assembly Bill 32 – Global Warming Solutions Act (2006) <http://www.arb.ca.gov/cc/ab32/ab32.htm>

- 2008 Scoping Plan [http://www.arb.ca.gov/cc/scopingplan/document/adopted\\_scoping\\_plan.pdf](http://www.arb.ca.gov/cc/scopingplan/document/adopted_scoping_plan.pdf)
- 2013 Scoping Plan Update <http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm>
- Cap and Trade <http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm>

Senate Bill 375 – Sustainable Communities and Climate Protection Act (2008)

<http://www.arb.ca.gov/cc/sb375/sb375.htm>

Senate Bill 97 – CEQA Amendments for GHG Analysis (2007) <http://ceres.ca.gov/ceqa/guidelines/>

Executive Order B-16-12 – Zero Emission Vehicles (ZEV) <http://gov.ca.gov/news.php?id=17472>

- ZEV Action Plan <http://www.documents.dgs.ca.gov/ofa/fars/zevactionplan02-13.pdf>
- ZEV Community Readiness Guidebook [http://opr.ca.gov/docs/ZEV\\_Guidebook.pdf](http://opr.ca.gov/docs/ZEV_Guidebook.pdf)

Assembly Bill 758 – Comprehensive Energy Efficiency Program for Existing Buildings (2008)

<http://www.energy.ca.gov/ab758/>

California Long Term Energy Efficiency Strategic Plan (2008, 2011)

<http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/eesp/>

Executive Order S-13-08 – Climate Adaptation Strategy <http://gov.ca.gov/news.php?id=11036>

- California Climate Adaptation Strategy (2009, 2013)  
<http://www.climatechange.ca.gov/adaptation/strategy/index.html>
- California Adaptation Planning Guide  
[http://resources.ca.gov/climate\\_adaptation/local\\_government/adaptation\\_policy\\_guide.html](http://resources.ca.gov/climate_adaptation/local_government/adaptation_policy_guide.html)
- Sea Level Rise Guidance Document (2013)  
[http://www.opc.ca.gov/webmaster/ftp/pdf/docs/2013\\_SLR\\_Guidance\\_Update\\_FINAL1.pdf](http://www.opc.ca.gov/webmaster/ftp/pdf/docs/2013_SLR_Guidance_Update_FINAL1.pdf)

Pacific Coast Action Plan on Climate and Energy (2013) <http://gov.ca.gov/news.php?id=18284>

California Coastal Commission Draft Sea Level Rise Policy Guidance (2013)

<http://www.coastal.ca.gov/climate/SLRguidance.html>

Governor’s Office of Planning and Research Environmental Goals and Planning Report: “California’s Climate Future” (2013) [http://opr.ca.gov/s\\_egpr.php](http://opr.ca.gov/s_egpr.php)