MEETING NOTICE
AND AGENDA

ENERGY WORKING GROUP
The Energy Working Group may take action on any item appearing on this agenda.

Thursday, February 25, 2010
11:30 a.m. to 1:00 p.m.
SANDAG Board Room, 7th Floor
401 B Street, Suite 800
San Diego, CA  92101-4231

Staff Contact: Andrew Martin
(619) 699-7319
ama@sandag.org

AGENDA HIGHLIGHTS

• DRAFT CLIMATE ACTION STRATEGY

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ENERGY WORKING GROUP
Thursday, February 25, 2010

ITEM #  RECOMMENDATION

1. WELCOME AND INTRODUCTIONS

2. SUMMARY OF JANUARY 14, 2010, ENERGY WORKING GROUP MEETING

   APPROVE

   The meeting summary is attached for review and approval.

3. PUBLIC COMMENT

   COMMENT

   Members of the public who would like to address the EWG on a topic not on the agenda should do so at this time. Speakers are limited to three minutes each.

4. DRAFT CLIMATE ACTION STRATEGY (75 MIN)

   RECOMMEND

   The Draft Climate Action Strategy (Draft Strategy) has been revised in response to comments received on the Preliminary Draft. The EWG is asked to review the comments and the proposed changes to the Draft Strategy before making a recommendation. This will be the final opportunity for the EWG to provide input before the Draft Strategy is presented to the Regional Planning Committee and Board of Directors for consideration at their March meetings.

5. SCHEDULING AGENDA ITEMS FOR FUTURE MEETINGS

   DISCUSSION

   EWG members are invited to suggest topics for future meetings. Scheduled topics for the March meeting include an update from San Diego Gas & Electric on the rollout of smart meters in the region and a presentation on a draft of the Climate Change Adaptation White Paper for the 2050 Regional Transportation Plan, currently under development. A discussion of the proposed Carlsbad Energy Center Project is planned for the April meeting. The next EWG meeting is scheduled for March 25, 2010.

6. ADJOURN

+ next to an item indicates an attachment
San Diego Association of Governments

ENERGY WORKING GROUP

February 25, 2010

AGENDA ITEM NO.: 2

Action Requested: APPROVE

SUMMARY OF JANUARY 14, 2010, ENERGY WORKING GROUP MEETING

AGENDA ITEM #1: WELCOME AND INTRODUCTIONS

EWG Chair Carrie Downey, City of Coronado, called the meeting to order at 11:45 a.m.

AGENDA ITEM #2: SUMMARY OF NOVEMBER 19, 2009 MEETING

After making no corrections, the November 19, 2009 meeting summary was unanimously approved following a motion by David Lloyd, North County Economic Development Council, seconded by Greg Newhouse, San Diego Clean Cities Coalition.

AGENDA ITEM #3: PUBLIC COMMENT AND COMMUNICATIONS

Members of the public were invited to address the EWG on any topic not on the agenda. No public comments were received.

AGENDA ITEM #4: PRELIMINARY DRAFT REGIONAL CLIMATE ACTION PLAN

Andrew Martin, SANDAG, introduced the preliminary draft of the Regional Climate Action Plan (RCAP). He stated that one of the main purposes of the plan was to help SANDAG develop a Sustainable Communities Strategy in the next update of its Regional Transportation Plan (RTP). He mentioned that the focus of the plan is on the transportation and energy sectors, as was the case for the Regional Energy Strategy (RES). He also noted that the RCAP will highlight the available measures and actions for SANDAG and local governments as they start to address climate change. He also referenced existing SANDAG plans including the Regional Comprehensive Plan and RTP. The RCAP does not replace those plans, but would be used as a foundation for addressing climate change as those plans are updated. Mr. Martin added that the RCAP will also include impacts of climate change and adaptation strategies for transportation and energy infrastructure. Finally, Mr. Martin stated that the RCAP is not prescriptive, but serves as a guide on available policy measures to address climate change.

Ms. Downey described the outcome of the SANDAG Board Meeting on Friday, January 8, 2010. She announced that a request to shift money from the TransNet measure away from other projects to public transit did not move forward. She noted that the RCAP identifies support for increased funding to expand transit as central to reducing greenhouse gas emissions. Ms. Downey urged the EWG members to bolster support for the RCAP outside of EWG meetings.
Ms. Downey inquired about the timeframe for making comments on the RCAP. Mr. Martin asked for comments to be submitted by January 27, 2010, for consideration in the draft RCAP presented to the Regional Planning Committee at their February 5, 2010, meeting.

Mr. Lloyd suggested including more description of why climate change is a problem specifically including mention of scientific support. Mike Evans, Shell Energy, concurred with Mr. Lloyd, and suggested that the RCAP reference studies that back up statements on climate change and its impacts. He also suggested that the RCAP focus on what is known, namely, increasing levels of CO₂ in the atmosphere.

Ms. Downey referenced a sentence on page 2 of the report that states: “the U.S. is currently the world’s second greatest climate change contributor...” She suggested including in the statement which country is the top contributor to climate change.

Donna Frye, City of San Diego, made a comment relating to the section on page 16 “Design Communities for Walking, Biking, and Public Transit.” She expressed concern that the choice of wording may not be effective because design does not mean that they will be implemented as designed. As an example, she referenced Mission Valley and expressed frustration that the community is not walkable even after the release of numerous studies and reports on the importance and benefits of making communities in San Diego more walkable. She also mentioned the removal of a bus route in the area. Ms. Downey stated that finding a more permanent source of funding is critical to ensure that transit is not lost: one of the options is transit funding through the Quality of Life quarter percent sales tax, to go along with water quality and habitat protection.

Ms. Frye also had a comment related to page 41:” Objective 3b, Use reclaimed water to decrease the amount of GHG emissions attributed to meeting regional water needs.” She requested that the indirect potable reuse of water be mentioned more clearly and identified more strongly as an option. She asked that it be mentioned that the City of San Diego has initiated an indirect potable reuse pilot program.

A member of the public, Don Wood, claimed that growth plans often get ignored and described a large development project before the County of San Diego. The project area, he said, lacks jobs and transit and would increase traffic on Interstate 15. Moreover, he added, SANDAG hasn’t done anything about the proposed project. Mr. Wood inquired if SANDAG, as the transportation funding agency, could add an incentive for member agencies, rewarding communities that are designed in accordance with SANDAG’s growth plans, and penalizing those that do not.

Lesa Heebner, City of Solana Beach, stated that Ms. Downey had done a fabulous job during the SANDAG Board Meeting on January 8, 2010. “Carrots” and “sticks” are needed to change development. Some carrots exist in terms of incentives for smart growth. She stated that she believed that “sticks” are needed in terms of transportation dollars. Though the California Environmental Quality Act (CEQA) could be the “stick” by stopping certain projects, she expressed her disapproval of the CEQA streamlining provisions of Senate Bill 375 (SB 375). Ms. Heebner stated that we will have difficulty reducing transportation-related greenhouse gas emissions without permanent funding for public transit. Referring back to the RCAP, Ms. Heebner suggested that recommendations be made to the SANDAG Board of Directors to redefine terminology such as “smart growth.” She encouraged attendees of the EWG meeting to participate in the SANDAG Board Meetings.
Ms. Heebner suggested adding statistics on smart growth to highlight the benefits of placing transit near homes or workplaces. Other comments she had were that the RCAP needs a table of contents, guidelines should be closer to the beginning, and that the framework section should be moved toward to end of the plan. She asked that the RCAP be used as a reference guide for the Sustainable Communities Strategy in the 2050 RTP, and added that it might be beneficial to use stronger wording in the RCAP.

Mr. Newhouse suggested that on page 3, the sentence “The San Diego region’s emissions result from our reliance on significant quantities of fossil fuel-based electricity, natural gas, and transportation fuels like gasoline and diesel…” be changed to “The San Diego region’s emissions result from our reliance on an inefficient use of significant quantities of fossil fuel-based electricity…” This language, he suggests, avoids the debates remaining about climate change and focuses on something that can be agreed upon more universally.

Mr. Evans referenced a previous discussion related to concerns about terminology not resulting in plans that become realized. He suggested writing up examples - either local or national - of sustainability and successful implementation of smart growth plans. Ms. Downey added that any examples that are known be sent to Mr. Martin. Mr. Lloyd mentioned that the Carlsbad Chamber of Commerce developed a sustainability checklist that covers all aspects of business and home, noting that those materials are available.

Ms. Frye, referred again to page 16, asked for alternative words than “design” communities. Mr. Evans suggested “model communities;” Vice Chair Scott Anders, Energy Policy Initiatives Center, suggested “implement” or “deploy.” Mr. Lloyd recommended “compliance.” Mr. Martin suggested that that kind of language be included under the policy measures, and that current language for guiding principles be maintained. Ms. Downey added that language should be added to encourage cities to require specific funding for smart growth and transit. Ms. Frye requested the word “design” be changed to “create.”

**AGENDA ITEM #5: SCHEDULING AGENDA ITEMS FOR FUTURE MEETINGS**

Mr. Martin announced that the Carlsbad Energy Center Project is a scheduled topic for the April EWG meeting. Mr. Martin also stated that the regularly scheduled meeting is January 28, 2010, and inquired if the group would like to cancel. Mr. Anders made a motion to cancel; Ms. Heebner seconded the motion, and the motion carried with all in favor.

**AGENDA ITEM #6: ADJOURN**

The meeting was adjourned at 12:43 p.m.
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<th>GEOGRAPHICAL AREA/ ORGANIZATION</th>
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<th>NAME</th>
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<td>City of Coronado</td>
<td>Carrie Downey, Chair</td>
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<td>Rebecca Jones</td>
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<td>Donna Frye</td>
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<td>Sherri Lightner</td>
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<td>Sharon Cooney</td>
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<td>Matt Burkhart</td>
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<td>Ahmad Solomon</td>
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<td>San Diego Regional Chamber of Commerce</td>
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<td>Mike Evans</td>
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<td>Mike Nagy</td>
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<td>Regional Economic Development Councils</td>
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<td>David Lloyd</td>
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<td>South County Economic Development Council</td>
<td>Bill Cleverenger</td>
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<td>California Center for Sustainable Energy</td>
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<td>Andrew McAllister</td>
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<td>Irene M. Stillings</td>
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<td>Laura Hunter</td>
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<td>Nicole Capretz</td>
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<td>Energy Policy Initiatives Center</td>
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<td>Scott Anders, Vice Chair</td>
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<td>Dave Weil</td>
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<td>San Diego State University (SDSU)</td>
<td>Dr. Heather Honea</td>
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<td>Michelle White</td>
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<td>Dave Carey</td>
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<td>Sierra Club</td>
<td>Border Power Plants Working Group</td>
<td>Bill Powers</td>
<td>Member</td>
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<td>David Grubb</td>
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<td>Regional Alternative Fuels Groups</td>
<td>San Diego Clean Cities Coalition</td>
<td>Greg Newhouse</td>
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<td>Regional Sustainability Partnership, Clean Transportation Cmt</td>
<td>Derek Turbide</td>
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**OTHER ATTENDEES:**

Shaina Brown, CleanTECH San Diego
Paul O’Neal
Jim McCollum, Solar Turbines
Linda Wagner, City of Chula Vista
Don Wood, C-3/PEPC
Susan Freedman, SANDAG
Andrew Martin, SANDAG
Kim Roeland, SANDAG
Introduction

The Draft Climate Action Strategy (Draft Strategy) serves as a guide on climate change policy for SANDAG. Recognizing that climate change relates to many issues addressed by existing regional and local plans, the Strategy outlines an approach for integrating climate change considerations into existing plans as they are updated. In addition to the on-road transportation sector, the Strategy also focuses on the energy sector and resources for local governments. This report describes key background information and provides an overview of the Draft Strategy. Attachment 1 lists substantive comments received and describes how they are addressed in the Draft Strategy, which is provided as Attachment 2. The Energy Working Group (EWG) will be asked to discuss the Draft Strategy before making a recommendation to the Regional Planning Committee.

The Regional Energy Working Group (EWG) is overseeing development of the Draft Strategy at its monthly meetings. In addition to comments by the EWG, the Draft Strategy reflects the input and suggestions made by members of the Board of Directors, Regional Planning and Transportation Committees, local planning directors on the Regional Planning Technical Working Group, and attendees at the February 11, 2010, public workshop.

Discussion

SANDAG is preparing the Draft Strategy as part of the multiyear partnership with the California Energy Commission and to satisfy a mitigation measure from the 2007 Regional Transportation Plan (RTP) Environmental Impact Report. A major focus is to identify policy measures that could help SANDAG reduce GHG emissions from passenger cars and light-duty trucks as it prepares the 2050 RTP update currently underway. The Draft Strategy also provides a foundation for addressing climate change considerations when the Regional Comprehensive Plan is updated.

Overview of the Draft Climate Action Strategy

The Draft Strategy identifies available policy measures that could help the region address climate change through existing planning processes affecting our transportation system, land use patterns, building stock, and energy infrastructure. The policy measures are not prescriptive and are only intended to help in the consideration of measures to address climate change. The range of potential measures results from a comprehensive review of other agencies and various authorities working on measures to address climate change and published research on reducing GHG emissions. While some may not ultimately prove viable for the San Diego region, they are presented in the
Draft Strategy to provide policymakers with a broad range of options for consideration. In most if not all cases, more detailed study and analysis of the measures would be required prior to implementation.

Energy use related to these areas accounts for about 80 percent of the region’s total GHG emissions. Although climate change is a global problem requiring attention at the state, federal and international levels, many of the solutions and especially the impacts will occur at regional and local levels. And although our region has limited influence on global emissions, we can prepare for the projected impacts and do our part to reduce emissions.

Standards and programs at the state level are expected to achieve the majority of GHG reductions needed in the transportation and energy sectors to achieve the statewide 2020 target under Assembly Bill 32 (Pavley 2006). For example, the California Light-Duty Vehicle Greenhouse Gas Standards and Low Carbon Fuel Standard are expected to account for about 90 percent of the reductions needed from the transportation sector. The remaining transportation-related GHG reductions are expected to come from Metropolitan Planning Organizations (MPOs) like SANDAG through coordinated land use and transportation planning, and related measures, policies and investments to reduce GHG emissions per the requirements of Senate Bill 375. Similarly, state level actions will achieve most of the GHG reductions needed from the energy sector, but regional and local efforts can help California meet its goals for reducing GHG emissions.

As a result, the Draft Strategy examines available policy measures for regional agencies and local governments to reduce GHG emissions in these areas, particularly for passenger cars and light-duty trucks as required in future updates of the RTP. The Draft Strategy also describes how the region may be impacted by the changing climate. Regional and local governments have authority and influence over three essential areas that contribute to climate change and that could be threatened by its impacts:

1. Land use patterns and transportation infrastructure
2. Building construction and energy use
3. Government operations

The Draft Strategy identifies a range of available policy measures SANDAG, local governments, or other regional entities could choose to implement or influence to reduce GHG emissions in these three essential areas. Also addressed are measures and resources to help local governments lead by example and reduce emissions from their operations. In certain cases where authority is lacking at the regional or local level, the plan identifies policy measures for which our region may want to consider pursuing legislative changes or similar actions to enable regional or local action.

Other main components of the draft include an introduction to climate change, guiding principles for climate change action, overview of the climate change policy and regulatory framework in California, summary of the region’s major sources of GHG emissions, and description of the impacts climate change is expected to have on the region.

**Next Steps**

The Board of Directors will be asked to review the comments and the proposed changes to the Draft Strategy at their February 26, 2010, meeting. Afterwards, staff will prepare a final version of
the Climate Action Strategy for presentation to the Regional Planning Committee at its March 5, 2010, meeting for a final recommendation. Final action by the Board of Directors is scheduled for the March 26, 2010, meeting.

Key Staff Contact: Andrew Martin, (619) 699-7319, ama@sandag.org

Attachments: 1. Comments and Responses on the Preliminary Draft Climate Action Strategy  
              2. Draft Climate Action Strategy
This table summarizes the proposed SANDAG staff responses to comments and input received on the Preliminary Draft Climate Action Strategy from the following SANDAG public meetings, as well as other comments provided by elected officials, local government staff, members of the public, or other stakeholders: Regional Energy Working Group, January 14, 2010; Regional Planning Technical Working Group, January 14, 2010 and February 11, 2010; Board of Directors, January 14, 2010; Transportation Committee, February 5, 2010; Regional Planning Committee, February 5, 2010; Public Workshop on the Climate Action Strategy, February 11, 2010.

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<th>THEME OF COMMENT OR DISCUSSION</th>
<th>PROPOSED STAFF RESPONSE</th>
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<tr>
<td>1 Introduction: Revise the Introduction section to focus more on the purpose and scope of the Strategy and less on the causes of climate change; cite scientific studies to provide support statements describing climate change; clarify the intent of available policy measures, including those at the local government level.</td>
<td>The Introduction has been reorganized and revised to focus more on the purpose and scope of the Climate Action Strategy and less on the causes of climate change. The Introduction now begins with the heading, “Overview of the Climate Action Strategy” and a discussion of the purpose and scope of the Strategy. The discussion of climate change has been moved after the overview of the Strategy, given the heading, “Overview of Climate Change,” and revised to include citations supporting descriptions of climate change and its potential impacts. The revised Introduction also includes the following revised description of the intent of the policy measures identified in the Strategy:</td>
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“The policy measures contained in this document are intended to be a list of potential options – “tools in the toolbox” – for consideration as SANDAG updates its Regional Transportation Plan and Regional Comprehensive Plan, and as local governments update their general plans and other community plans. The policy measures are not requirements for SANDAG, local governments, or any other entity. Moreover, it is the discretion of each agency to decide whether and how to best implement the various policy measures listed in this plan. For example, a policy measure at the local government level could be implemented through a local government regulation, incentive, program, public-private collaboration or by a variety of entities such as a local government, private developer, business, nonprofit, quasi-government entity, or even some combination thereof. Many actions at the local government level could also benefit by supportive regional actions from entities like SANDAG.”

“The range of potential measures results form a comprehensive review of other agencies and various authorities working on measures to address climate change and published research on the topic of reducing GHG emissions. While some measures may not ultimately prove viable for the San Diego region, they are presented in the Strategy to provide decision-makers with a broad range of options for considerations. In most, if not all cases, more detailed study and analysis of the measures would be required prior to implementation.”

11
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<th><strong>Evaluation Criteria:</strong> Differentiate among the policy measures using evaluation criteria such as magnitude of GHG reduction and cost.</th>
<th>Staff agrees that climate change policy measures will need to be evaluated on criteria like GHG reductions, costs, and a variety of economic, environmental, and social equity indicators prior to implementation. This type of analysis is currently underway as part of development of the 2050 RTP and will be provided to decision-makers throughout the RTP process.</th>
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<td><strong>Specific Numeric Targets and Goals:</strong> Establish GHG reduction targets for all economic sectors; establish a numeric goal for reduction of vehicle miles traveled.</td>
<td>Staff agrees that targets for reducing GHG emissions and related performance indicators like vehicle miles traveled can play an important role in formulating policies to address climate change. In California, the state has taken the lead role in developing economywide and sector-specific targets for reducing GHG emissions, including the transportation sector. For example, Senate Bill 375 (Steinberg 2008) will lead to the establishment of GHG reduction targets for passenger cars and light-duty trucks and other new requirements on SANDAG in future updates of its Regional Transportation Plan. The state also has identified emissions reductions and regulations and other mechanisms to achieve those reductions for other sectors of the economy, including energy (electricity and natural gas) and a voluntary reduction target for local governments. Rather than establish regional targets that may conflict with or not necessarily complement the State targets, the SANDAG Climate Action Strategy takes the approach of identifying policy measure options that local governments and SANDAG have the opportunity or authority to implement and contribute to state goals and targets for GHG reduction.</td>
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<td><strong>Regional Roles and Responsibilities Associated with Climate Change:</strong> Identify regional climate priorities for GHG reduction and responsibilities for adaptation, regardless of SANDAG and/or local government limitations; Coordinate with County Water Authority to identify common goals between SANDAG and CWA;</td>
<td>Staff agrees that identifying priorities for GHG reduction and responsibilities for adaptation planning are fundamental components of policy to address climate change. The intent of the Strategy is to provide decision-makers with potential options – “tools in the toolbox” – for consideration as SANDAG updates its Regional Transportation Plan and Regional Comprehensive Plan, and as local governments update their general plans and other community plans. Staff also agrees that many agencies are likely to have a role in adaptation planning for the potential impacts of climate change. Decisions on which climate action measures to pursue and the responsible entities are best debated among regional and local officials and the general public during the development of these subsequent public policy documents (and related regulatory mechanisms). As a means to implement the SANDAG Climate Action Strategy and Regional Energy Strategy, Staff could seek a meeting(s) with County Water Authority staff to identify areas for collaboration and coordination on mutual goals related to energy, water supply, and climate change.</td>
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**Carbon Trading:** Describe carbon trading opportunities for the region, for example requiring new development projects to pay a fee per unit of GHG emitted and then using the revenue for projects that reduce GHG emissions.

Staff agrees that information from other agencies, regions, or published research on potential carbon trading opportunities could be helpful to its member agencies and the region and is researching available information for inclusion in the final Strategy. Moreover, Staff believes that detailed discussion of potential carbon trading programs in the San Diego region is outside the purview of the SANDAG Climate Action Strategy. Staff feels that a future update to the Regional Comprehensive Plan, for example, would be a more appropriate time to consider the role of a carbon trading program in the region’s broader climate change-related and other public policy efforts.

**Smart Growth:** Provide evidence supporting statements about the benefits of smart growth, in the San Diego region if available; discuss how SANDAG can further support smart growth, for example through its transportation funding criteria; discuss the relationship among housing type/compact land use and water use; discuss the role among the SANDAG Smart Growth Concept Map and Sustainable Communities Strategy in the 2050 RTP; address the role among protection of sensitive resources and planning for smart growth and compact urban form.

The Smart Growth Land Use and Low-Carbon Transportation section now includes a references to the SANDAG study Trip Generation for Smart Growth: Guidelines for the San Diego Region, which shows that existing smart growth areas in the San Diego region have fewer vehicle trips and miles traveled and a greater number of walking, bicycling and public transit trips than conventional, non-smart growth development due to characteristics like mixture of uses and activities, variety of nearby destinations, transportation infrastructure and urban design conducive to walking and bicycling, and high quality access to public transit. This study is scheduled to be presented for acceptance as an appendix to the SANDAG San Diego Traffic Generators guidance document to the Transportation Committee and Board of Directors in March 2010. In addition, analysis of the GHG reduction potential of various land use and transportation-related measures being performed to facilitate development of the 2050 RTP will show how smart growth and other policy measures could affect GHG emissions in the San Diego region.

The following policy measures have been added under Objective 1a. Create smart growth neighborhoods and communities in which most if not all basic daily needs and public transit service are safely accessible on foot or by bicycle:

- Give strong consideration to existing and planned smart growth areas in the prioritization of transportation projects and related investments and decisions to reduce GHG emissions
- Identify additional ways SANDAG can support the planning and development of smart growth areas through its transportation investments and other funding decisions
- Use the Smart Growth Concept Map as a starting point for the land use component of the Sustainable Communities Strategy
- Integrate sensitive resource area protection activities with efforts to promote compact smart growth development patterns and reduce transportation-related GHG emissions
| **Affordable Housing, Regional Housing Needs Assessment, and Senate Bill 375:** Discuss the relationship among affordable housing, the Regional Housing Needs Assessment (RHNA) process, and reducing transportation-related GHG emissions; Clarify statements in the Strategy addressing local government requirements under Senate Bill 375. | The discussion of smart growth and compact urban form also has been updated to note that smart growth leads to lower water consumption and related household and infrastructure costs than conventional development patterns, and would contribute to the goal to reduce water-related energy use and GHG emissions identified in the Clean Energy and Efficient Buildings section of the Strategy. The Strategy has been updated to include more discussion on the relationship among habitat protection, smart growth planning, and transportation strategies to reduce GHG emissions. The Smart Growth and Land Use section and related discussions of Senate Bill 375 describe the role of planning for affordable housing, the Regional Housing Needs Assessment (RHNA) process, and reducing transportation-related GHG emissions. The Strategy has been revised to clarify that coordination of local land use planning, including the identification of sites for affordable housing with regional transportation planning is essential to the successful implementation of Senate Bill 375. The Strategy includes the following discussion on the topic of integrating planning for affordable housing with planning for land use, transportation, and GHG reductions:

“The affordability of housing and transportation and access to employment play a critical role in determining where people live, how much they travel, and, therefore, directly affect transportation-related GHG emissions. Integrating social equity considerations like affordability, displacement, gentrification, and jobs-housing fit (providing affordable housing that matches well with wage levels of nearby jobs) in smart growth development can lower VMT and contribute to GHG reductions by allowing groups with moderate and lower incomes to live affordably in areas closer to their jobs with improved access to services and affordable travel options like public transit. Failure to consider social equity factors may lead to exclusion, limited employment opportunities, dispersed development, and therefore higher VMT.” |
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<tr>
<th><strong>California Standards for Low-Carbon Fuels and More Fuel Efficient Vehicles:</strong></th>
<th>The Strategy has been revised to make clear that standards and programs at the State level are expected to achieve the majority of the GHG reductions needed in the transportation sector to achieve the statewide 2020 target under Assembly Bill 32. The California Light-Duty Vehicle Greenhouse Gas Standards and the Low Carbon Fuel Standard are expected to account for about 90 percent of the reductions needed from the transportation sector. Additional transportation-related GHG reductions will need to come from actions at the regional and local levels. The remaining approximately 10 percent of needed transportation-related GHG reductions are expected to come from Metropolitan Planning Organizations like SANDAG through coordinated land use and transportation planning, and related measures, policies, and investments to reduce GHG emissions per the requirements of Senate Bill 375.</th>
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<tr>
<td>Provide greater detail on the significant GHG reductions that are expected to result from State efforts to increase the use of low-carbon, alternative fuels and improve the fuel efficiency of passenger cars and light-duty trucks; Discuss strategies at the local and regional level to support a transition to alternative fuel vehicles.</td>
<td>Goal 3. Promote the Use of Low-Carbon, Alternative Fuels, of the Smart Growth Land Use and Low-Carbon Transportation section identifies available policy measures the region could take to facilitate the transition of the passenger vehicle fleet to alternative fuels through measures like support for the installation of infrastructure such as electric car charging points.</td>
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<tr>
<td><strong>Transportation Policy Measures:</strong> The Strategy identified some policy measures that may not be viable for the San Diego region, including the conversion of existing general purpose lanes to toll facilities or high occupancy toll (HOT) facilities or reduction of the maximum speed limit to 55 miles per hour.</td>
<td>The range of potential measures results from a comprehensive review of other agencies, regions, and various authorities working on measures to address climate change and published research on reducing GHG emissions. While some measures may not ultimately prove viable for the San Diego region, they are presented in the Strategy to provide decision-makers with a broad range of options for consideration. In most, if not all cases, more detailed study and analysis of the measures would be required prior to making a decision regarding their implementation. Moreover, pricing policies are an option for managing the use of transportation facilities, particularly when there is limited capacity, such as during rush hours. Conversion of existing HOV facilities to high occupancy toll (HOT) lanes, or general purpose facilities to toll facilities, are ways in which pricing could be used to manage demand. In the San Diego region, development of new HOT lanes and new toll lanes – rather than the conversion of existing facilities – has been the adopted approach to pricing.</td>
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| **Transportation:** Add new policy measure to address adaptation as improvements to coastal infrastructure are made | Objective 4b. Protect transportation infrastructure from sea level rise and associated higher storm surges, of the Smart Growth Land Use and Low-Carbon Transportation section has been updated with the following new policy measure:  
  * Address adaptation issues in the design of new projects and when improvements are made to existing infrastructure. |
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<tr>
<th><strong>Land Use and Transportation:</strong> Address reducing “cold starts” as another GHG reduction measure in the land use and transportation section.</th>
<th>Staff agrees that policy measures intended to reduce the number of “cold starts” (i.e., total vehicle trips) are one approach to reduce GHG emissions and miles of vehicle travel. The Strategy identifies available policy measures that would reduce the number of cold starts by promoting smart growth development and transportation alternatives such as public transit, walking, bicycling, and ridesharing.</th>
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<tr>
<td><strong>Land Use and Transportation:</strong> Revise a “Guiding Principle” from “Design” walkable communities to “Build” walkable communities.</td>
<td>The Climate Action Strategy Guiding Principle to, “Design Communities for Walking, Bicycling, and Public Transit” has been revised to read “Build Communities for Walking, Biking, and Public Transit.”</td>
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<tr>
<td><strong>Parking:</strong> Comprehensive parking reform is fundamental to reducing transportation-related GHG emissions. The Climate Action Strategy should describe the need to develop detailed and feasible strategies to price both parking and driving.</td>
<td>Staff agrees that policy measures related to parking and pricing of driving are two of the many options available to address transportation-related GHG emissions. The list of policy measures identified in the Strategy includes changes to current parking requirements, parking management and multiple available pricing strategies. Staff is researching other agencies, regions, and published literature on the relationship among parking policies, travel behavior, and GHG emissions and proposes to include a brief summary in the final Strategy.</td>
</tr>
<tr>
<td><strong>Transportation Policy Measures:</strong> include a policy measure to reduce GHG emissions by using concrete surfaces instead of asphalt for transportation improvements.</td>
<td>Staff is further researching the issue raised by this topic and proposes to include a brief discussion on the relationship among pavement type, vehicle fuel efficiency, and GHG emissions in the final Strategy.</td>
</tr>
<tr>
<td><strong>Trees and Landscaping:</strong> Reference information about the ability of different tree and landscaping species and materials to sequester greenhouse gases.</td>
<td>Staff agrees that this information would be helpful to local governments and is researching available information for inclusion in the final Strategy.</td>
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</table>
| **Energy and Water:** Under Objective 3b. Use reclaimed water to decrease the amount of GHG emissions attributed to meeting regional water needs, list indirect potable reuse (IPR) projects as a policy measure to reduce embedded energy use and indirect GHG emissions from water use. Also describe the City of San Diego IPR project. | The discussion under Objective 3b. has been revised to include a description of the City of San Diego’s IPR project and include the following policy measure:  
- Support projects to meet water demand by treating and reusing processed reclaimed water to potable water standards, such as the City of San Diego IPR project (SANDAG and local governments) |
<p>| <strong>Energy and Water:</strong> Provide information on the energy and GHG emissions impacts of available water supply options. | The discussion under Goal 3. Reduce Water-related Energy Use and GHG Emissions, has been revised to include the embedded energy of various options for meeting future water demand. The more energy intensive water supply options will generally result in higher GHG emissions than the less energy intensive water supply options. |
| <strong>Energy and Water:</strong> Differentiate between the energy intensity of providing drinking water through indirect potable reuse and reclamation. | As of this writing staff has not been able to locate a further breakdown of the energy intensity of recycled water by the categories of indirect potable reuse and reclamation. Staff will continue to research this information for inclusion in the final Strategy (if it is available). |</p>
<table>
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<tr>
<th><strong>Energy and Buildings:</strong> Make clearer the magnitude of the utility’s role, state’s role and local/regional government role in achieving GHG reductions from the energy sector.</th>
<th>The opening narrative for this section has been revised to clarify the large role that the utility, and state agencies undertake in energy efficiency and renewables, followed by ways that local governments can leverage these efforts to further reduce GHG emissions.</th>
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<tr>
<td><strong>Energy and Buildings:</strong> Provide greater emphasis to policy measures related to energy and buildings with greater GHG reduction potential, e.g. signify that greater GHG reductions come from retrofitting existing building more than reach codes for new construction.</td>
<td>Buildings and Energy section has been revised to describe the scale of GHG benefits from targeting energy reductions in existing and new construction. Figures showing the region’s electricity and natural gas consumption by end use sector have been included. Also, staff acknowledged that the Regional Energy Strategy top priority is development of a regional building retrofit program.</td>
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<tr>
<td><strong>Green Buildings:</strong> Describe new state green building standards.</td>
<td>The Clean Energy and Efficient Buildings section, under Goal 1, has been revised to include discussion of the new California Green Building Standards.</td>
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<tr>
<td><strong>Energy Dependence and National Security:</strong> Research energy independence and national security implications of climate change and whether they need to be addressed in this Strategy.</td>
<td>The discussion under The Smart Growth Land Use and Low-Carbon Transportation section, Goal 3. Promote Use of Low-Carbon Alternative Fuels, has been revised to include the connection among alternative fuels, high efficiency vehicles and energy independence. The promotion of low carbon, alternative fuels provides the added benefit of reducing regional reliance on imported petroleum. The federal Energy Independence and Security Act of 2007 identified increased vehicle efficiency and increased supply of alternative fuels as two measures to enhance national energy security and reduce the nation’s reliance on petroleum imports. By coordinating a regional alternative transportation infrastructure effort and supporting local alternative fuel developers, SANDAG and local governments can help the San Diego region become more energy independent.</td>
</tr>
<tr>
<td><strong>Review of the Strategy:</strong> Include the military in review of the draft Strategy.</td>
<td>Representatives of the military have been included in the process of soliciting input and comments on the Strategy; they are included on distribution lists at the working group level and for Board of Directors meetings. In addition, SANDAG coordinates with military entities on transportation demand management programs such as the Regional Vanpool Program.</td>
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<tr>
<td><strong>Local Government Resources:</strong> Incorporate relevant information from the General Plan Guidelines currently being updated by the Governor’s Office of Planning and Research (OPR).</td>
<td>The update to the OPR General Plan Guidelines is not complete nor is a draft version available as of this writing. However, the Strategy identifies policy measures available to local governments for their consideration if and when they prepare updates to their General Plans.</td>
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<tr>
<td>Local Government:</td>
<td>In addition to local governments, identify actions SANDAG can take to reduce GHG emissions from its operations.</td>
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<td></td>
<td>Staff proposes that the Local Government Operations section be revised to the read “SANDAG and Local Government Operations.” In addition, a new objective could be added such as Objective 1b. “SANDAG assess energy use of its own operations”</td>
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<td></td>
<td>Potential policy measures to address SANDAG operations could include:</td>
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<td></td>
<td>• Establish a cross-department team to address climate change mitigation and adaptation</td>
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<td></td>
<td>• Regularly update a countywide inventory of municipal and communitywide GHG emissions</td>
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<td></td>
<td>• Perform an energy assessment of SANDAG operations</td>
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<td></td>
<td>• Based on the assessment, identify opportunities to reduce inefficient use of electricity, natural gas and petroleum in SANDAG operations</td>
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SAN DIEGO ASSOCIATION OF GOVERNMENTS

CLIMATE ACTION STRATEGY

DRAFT

February 2010
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Overview of the Climate Action Strategy

While climate change is undoubtedly a global problem requiring attention at the state, federal, and international levels, many of the solutions and especially the impacts will occur at the regional and local levels. While our region cannot influence global emissions, we can prepare for the projected impacts and do our part to reduce emissions.

The SANDAG Climate Action Strategy (Strategy) serves as a guide to help policymakers address climate change as they make decisions to meet the needs of our growing population, maintain and enhance our quality of life, and promote economic stability. It does so in the context of the significant action on climate change happening in California.

The State of California is taking a strong approach to address climate change, and has jurisdiction over important sources of GHG emissions like vehicle fuel efficiency and power plants. In addition, the federal government has recently become more involved in climate change, and as of this writing, legislation to reduce GHG emissions is pending before Congress. Nevertheless, there are roles for local and regional governments. SANDAG, local governments, and other regional entities have authority and influence over three essential areas that contribute to climate change:

1. Land use patterns, transportation infrastructure and related public investments
2. Building construction and energy use
3. Government operations

As a result, the Strategy focuses on these areas where regional and local agencies have the authority or opportunity to influence emissions and make our region more resilient to the changing climate. The opportunity and ability to reduce the three largest sources of GHG emissions in our region are in the following areas:

- On-road transportation (i.e., passenger vehicles, light-, medium- and heavy-duty trucks, and motorcycles),
- Electricity generation, and
- Natural gas end uses (e.g., space heating, cooking, etc.).

When combined, these three sources account for about 80 percent of emissions in the San Diego region, with on-road transportation alone responsible for about 46 percent of the total. Just as important, our transportation and energy infrastructure systems also are threatened by climate change impacts.

Successfully responding to climate change will require us to mitigate our GHG emissions and adapt to the changes it will bring. Reducing our emissions will require a foundation of improved land use and transportation planning, and changes in the amounts and types of energy we use. A major purpose of the Strategy is to identify land use and transportation policy measures that could reduce GHG emissions and help SANDAG meet or exceed its Senate Bill 375 (SB 375) (Steinberg, 2008) targets for reducing GHG emissions from passenger cars and light-duty trucks.

The Strategy identifies goals, objectives, and policy measures in the areas of transportation, land use, buildings, and energy use. Also addressed are measures and resources to help local governments reduce emissions from their operations and in their communities. While a small fraction of our total climate change contribution, reducing GHG emissions from local government operations can save taxpayer dollars and set an example for the greater community.
The policy measures contained in this document are intended to be a list of potential options – “tools in the toolbox” – for consideration as SANDAG updates its Regional Transportation Plan and Regional Comprehensive Plan, and as local governments update their general plans and other community plans. The policy measures are not requirements for SANDAG, local governments, or any other entity. Moreover, it is the discretion of each agency to decide whether and how to best implement the various policy measures listed in this plan. For example, a policy measure at the local government level could be implemented through a local government regulation, incentive, program, public-private collaboration or by a variety of entities such as a local government, private developer, business, non-profit, quasi-government entity, or even some combination thereof. Many actions at the local government level could also benefit by supportive regional actions from entities like SANDAG.

The range of potential measures results from a comprehensive review of other agencies and various authorities working on measures to address climate change and published research on the topic of reducing GHG emissions. While some measures may not ultimately prove viable for the San Diego region, they are presented in the Strategy to provide decision-makers with a broad range of options for considerations. In most, if not all cases, more detailed study and analysis of the measures would be required prior to implementation.

Decisions on which climate action measures to pursue are best debated among regional and local officials and the general public during the development of these subsequent public policy documents (and related regulatory mechanisms).

**Climate Change and SANDAG Regional Planning**

The SANDAG Regional Comprehensive Plan (RCP) provides the long-term strategic planning framework for our region to address the many issues affecting our quality of life and move us toward a more sustainable future. The RCP, which was adopted in 2004, does not include a discussion of climate change and its effects on the region. However, our contributions to climate change and its impacts to our region are not considered in the RCP. At the time the RCP was prepared, climate change was not a significant public policy issue at the regional and state levels. When the issue of climate change is integrated within the broader RCP framework, it is expected that this is important because some certain regional strategies for promoting our quality of life may contribute to climate change and aspects of our quality of life are threatened by climate change. For example, different success in reducing our GHG emissions will require consideration of how investments in areas like transportation infrastructure investment strategies may affect our GHG emissions in the region to varying degrees, as well as how the changing climate might impact those investments. In addition, some investments called for in the RCP, such as investments in low lying coastal areas, may face threats from climate change.

The quality of life experienced by future generations in the San Diego region is influenced by the decisions we make today. Indeed, realizing the RCP vision for the region will never be realized without effective climate action. Fortunately, many strategies discussed in the RCP provide a foundation for addressing climate change: smart growth land use planning and compact urban form, providing transportation alternatives like walking, bicycling, ridesharing, and public transit, and reducing energy consumption all contribute to lower GHG emissions and a healthier climate. In addition, the types of changes required to address climate change reinforce the RCP principles of smart growth and sustainability.

**Regional Comprehensive Plan Vision**

“To preserve and enhance the San Diego region’s unique features - its vibrant and culturally diverse communities, its beaches, deserts, mountains, lagoons, bluffs, and canyons, and its international setting - and promote sustainability, economic prosperity, and an outstanding quality of life for everyone.”
In many cases responding to climate change will provide benefits in other areas related to our quality of life such as job creation, social equity, public health, biodiversity and air quality protection, and financial savings, and many of the available measures to reduce GHG emissions also help promote sound energy policy and reduce our dependence on volatile energy sources and supplies. However, the interdependent nature of these issues means that climate action also could also have unintended adverse impacts on other important quality of life indicators. For example, the interaction among climate action and issues like job creation and implementation costs will require careful examination in light of the high unemployment, budget cuts and other issues characterizing our current economic situation-economic factors. In any event, integrating climate action planning into the broader planning framework of the RCP and other local and regional planning processes will allow us to make climate change related decisions based on evaluation and understanding of the potential affects on a comprehensive set of quality of life indicators important to the region.

Taking climate change action requires building on the foundation of smart growth and sustainability established in the RCP and integrating important considerations like greenhouse gas (GHG) emissions and climate impacts into existing planning processes at the regional and local level. This Climate Action Strategy provides a basis for addressing climate change in the context of regional and local decision making affecting our transportation system, land use patterns, building stock, and energy infrastructure. While climate action is most directly focused on reducing our emissions and preparing for its impacts, success will ultimately be determined by our ability to do so in ways that also create jobs, improve social equity, and protect our environment – in short, promote sustainability.

**Overview of Climate Change**

Climate change is happening now and its impacts are readily apparent, with temperatures increasing, Arctic sea ice disappearing, glaciers melting at historic rates, and sea levels rising beyond climate scientists’ worst-case estimates. Recently it was reported that January 2000 to December 2009 was the warmest decade on record. Recent atmospheric measurements of carbon dioxide and methane (two important greenhouse gases) exceed the natural range over the last 650,000 years. The predicted rate of temperature change by 2050 as a result of these greenhouse gas levels is 10-50 times faster than the temperature changes that occurred when the ice ages receded.

Our changing climate is the result of greenhouse gases produced by the fossil fuel energy we burn to power our society. We are largely dependent on fossil fuels to generate electricity, drive our vehicles, transport goods, heat and cool our homes, produce and deliver food, convey and treat water, and provide power to our businesses and industries. When too many GHG emissions are released into the air, they act like a blanket, trapping heat in the atmosphere and altering weather patterns throughout the world. A shift in global temperature threatens the favorable ecological conditions in which human beings have thrived for thousands of years, such as ample water supplies, increasing food production, and constant sea levels.

Climate change is expected to affect the San Diego region. Over the next several decades, if no action is taken to reduce or minimize climate change and its impacts, we face the prospect of water shortages, rising sea levels along our coast, more frequent and intense wildfires, longer and more severe heat waves, loss of native plants and animals, worsening air quality, and difficulty meeting peak energy needs. Many citizens currently lack the resources to respond to these impacts and the resulting economic losses. A report cited in the 2009 California Climate Adaptation Strategy estimates that the cost of no action in California would be on the order of “tens of billions of dollars in direct costs” and would “expose trillions of dollars of assets to collateral risk.”

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1 Available at: [http://www.nasa.gov/home/hqnews/2010/jan/HQ_10-017_Warmest_temps.html](http://www.nasa.gov/home/hqnews/2010/jan/HQ_10-017_Warmest_temps.html).
4 Available at: [http://www.climatechange.ca.gov/adaptation/index.html](http://www.climatechange.ca.gov/adaptation/index.html)
SANDAG Transportation and Land Use Planning Integration

As the regional planning consolidated agency for transportation, SANDAG serves as the forum for regional decision-making among the 18 cities and county government. SANDAG builds consensus, makes strategic plans, obtains and allocates resources, plans, engineers, and builds public transportation, and provides information on a broad range of topics pertinent to the region's quality of life. In its federal and state roles, SANDAG funds the region's transportation network and develops the Regional Transportation Plan to implement a long-range vision for transportation in the region. SANDAG provides the regional framework to connect our land use to our transportation systems through the Regional Comprehensive Plan. Integrated land use and transportation planning is a core element of successfully reducing greenhouse gas emissions. The climate action strategy can serve as a foundation for addressing climate change when these plans, summarized below, are updated.

SANDAG Regional Comprehensive Plan

Adopted in 2004, the RCP serves as the foundation for integrating land use, transportation, infrastructure needs, and public investment strategies in the San Diego region. The RCP defines a vision and provides a framework to connect local and regional policy decisions that support our shared vision of the future. It balances regional population, housing, and employment growth with habitat preservation, agriculture, open space, energy, and other infrastructure needs in a way that moves us toward a sustainable future with more choices and opportunities for all residents.

The SANDAG Board of Directors adopted the goals and policy direction of the RCP as the strategic planning framework for our region, in conjunction with other plans and strategies. To implement these goals, the RCP calls for the application of principles of “smart growth” and “sustainability.” Smart growth in the San Diego region means developing the region in a way that creates livable communities by connecting land use and transportation and improving the quality of travel by focusing on better urban design and walkability. The principles of sustainability are based on achieving goals and objectives in three broad areas: a prosperous economy, a healthy environment, and social equity. These “three Es” together provide the foundation for achieving sustainable and livable communities in the San Diego region.

2030 San Diego Regional Transportation Plan

The Regional Transportation Plan (RTP), most recently updated in 2007, serves as the primary transportation element of the RCP, and helps position the region to achieve smarter, more sustainable growth that meets the transportation needs of the growing population and changing region. The RCP calls upon SANDAG to update the RTP and related programming documents in a way that both maximizes opportunities for local governments to implement smart growth and ensures that the design and implementation of regional transportation facilities support local smart growth. The adopted RTP calls for more than $42 billion for transportation investments through 2030. The types of transportation investments identified in the RTP and their relationship with local smart growth will greatly influence the transportation choices people make to reach jobs and services, including driving alone, walking, bicycling, taking public transit, vanpooling, and carpooling. Transportation-related GHG emissions are in large part determined by the sum of individual travel choices, as well as other important factors like vehicle fuel efficiency. Work on development of the 2050 RTP, scheduled for adoption in 2011, is now underway.
While our region needs to reduce its share of global GHG emissions, the speed and severity of the impacts to the San Diego region will ultimately be determined by the outcome of worldwide efforts to reduce the amount of emissions in the atmosphere to a safe level. If global emissions stopped tomorrow, some level of further warming and related impacts are inevitable as a result of the emissions already in the atmosphere. The current climate we are experiencing now is the result of much lower levels of GHG emissions that occurred several decades ago. Several decades from now, future generations will experience the higher levels of GHG concentrations occurring today.

Global emissions are unlikely to cease anytime soon, and the outcome of international efforts to reduce emissions remains uncertain. Worldwide emissions have been increasing year-after-year, and the rate of annual increase has been going up. The longer the trend of greater emissions and temperature increases continues, the greater the risk of triggering “tipping elements” that can rapidly bring about abrupt changes. Tipping elements refer to thresholds where temperature increases cause a chain reaction of mutually reinforcing physical processes that lead to accelerating and possible irreversible climate change.5

While per-capita emissions in the San Diego region are on average lower than the nation as whole, they are among the highest in the world. The United States is currently the world’s second greatest climate change contributor, and historically has been one of the largest contributors to GHG emissions. Climate science tells us that all nations must find ways to decrease their emissions by 50 to 95 percent below today’s levels by the middle of the century, with high-emitting developed nations like ours needing to make the steepest cuts. This process has started in many countries. For example, China recently unveiled its goal to reduce the amount of greenhouse gases emitted per unit GDP by 40-45% by 2020, relative to 2005 levels.6

The San Diego region’s emissions result from our reliance on fossil fuel-based electricity, natural gas, and transportation fuels like gasoline and diesel to support the region’s existing three million residents, one million housing units, and one and a half million jobs. Improving energy efficiency and other actions and advances will help reduce the amount of fossil fuels used to support our region’s population, thereby lowering GHG emissions.

Long-term population and economic growth will complicate efforts to reduce GHG emissions. According to the SANDAG regional growth forecast, the San Diego region is expected to grow by almost one million people (32 percent), add four hundred thousand housing units (26 percent), and add nearly half a million jobs (32 percent) by 2030. Historically, growth in population, the economy, energy use, and GHG emissions have gone hand-in-hand. And these past trends are expected to continue unless deliberate, systematic changes are made in the areas of public policy, private sector decisions, and individual behavior.

How the Strategy is Organized

Where appropriate, the policy measures included in the Strategy are divided into two main categories of authority or influence: (1) SANDAG and (2) local governments. Regional and local coordination will be essential to the success of many of the policy measures identified in this strategy. In certain cases where authority is lacking at the regional or local level, the Strategy identifies policy measures for which our region may want to consider pursuing legislation or similar actions to enable regional or local action. The policy measures for local governments are not prescriptive and only intended as guidance to help them in their consideration of measures to address climate change through planning and permitting processes, local ordinances, outreach and education efforts, and their government operations.

6 Available at: http://www.chinafaqs.org/policy-actions.
Considerations for evaluating policy measures include: (1) their effectiveness in helping to achieve contribution to short-term (2020) and longer-term (2035 and 2050) goals for GHG emission reduction and (2) their costs, not just to government budgets and the economy, but also social and environmental costs important critical to our quality of life. Toward this end, SANDAG is overseeing the preparation of a study estimating the GHG reductions and costs of several transportation and energy-related policy measures. The study, which is expected to be completed in spring 2010, will serve as a resource to help policy-makers evaluate GHG reduction measures during development of the RTP.

### Mitigation and Adaptation

Mitigation is defined as actions to reduce greenhouse gas emissions, while adaptation refers to actions to avoid, withstand, or take advantage of climate change effects impacts.

Mitigation alone will not prevent climate change from having serious impacts on the San Diego region. The current concentration of greenhouse gasses in our atmosphere - without considering continued and accelerated pace of emissions - will continue to change the climate during for the next 30 to 40 years. Adaptation to the changes that have already been set in motion is essential to maintain the region’s economy, ecosystems, and human health.

While adaptation and mitigation measures can be complementary and overlapping, they also can also conflict. For example, increased air conditioning use may be beneficial to adapting to extreme heat events, but would be unfavorable for mitigation efforts to reduce energy usage during peak demand periods. Because of this, an integrated approach that coordinates efforts to manage impending climate risks (adaptation) while avoiding climate extremes through
SANDAG Climate Action Strategy Guiding Principles

**GENERAL**

**TAKE IMMEDIATE ACTION**
Climate change is a serious global challenge to public health, the environment, and the economy requiring all levels of government, including SANDAG and its member agencies, to engage in immediate and sustained actions to reduce greenhouse gas emissions and prepare for the impacts of a changing climate.

**PREPARE FOR THE IMPACTS OF A CHANGING CLIMATE**
The region will be prepared for projected impacts of climate change to San Diego, including increased threats to public health, higher sea level, warmer average temperature, more frequent and longer heat waves, increased peak demand for electricity, more vulnerable water supply, more frequent wildfires, and loss of native plant and animal species.

**LEAD BY EXAMPLE**
SANDAG and its member agencies lead by example and increase public awareness of climate change: our actions to reduce GHG emissions from internal operations and prepare for the impacts of climate change encourage residents and the private sector to follow our lead.

**ENSURE SOCIAL EQUITY AND ENVIRONMENTAL JUSTICE**
Climate protection policies and actions promote the principles of opportunity, inclusion, and equal access for disadvantaged populations and ensure fair treatment and meaningful involvement for all people regardless of race, ethnicity, gender, income, national origin or geography.

**LAND USE AND TRANSPORTATION**

**BUILD DESIGN COMMUNITIES FOR WALKING, BIKING, AND PUBLIC TRANSIT**
Regional transportation planning is integrated with improved land use planning and community design to significantly lower demand for vehicle travel by making walking, biking, and public transportation practical choices for everyday travel.

**MINIMIZE GHGS RELEASED WHEN VEHICLES ARE USED**
Programs to reduce demand for single occupancy vehicle trips, such as carpools, vanpools, and telecommuting, and promote efficient travel conditions are an emphasis in regional transportation planning.

**FUND THE REGIONAL TRANSIT NETWORK**
Increasing and securing funding for public transportation planning and operations is recognized as critical to the success of the region’s efforts to reduce GHG emissions.

**PRICE TRANSPORTATION MODES TO REFLECT THEIR CLIMATE IMPACTS**
Transportation pricing signals lead to travel behavior that supports regional GHG emissions reductions.

**INCREASE USE OF ALTERNATIVE FUELS AND VEHICLES**
Infrastructure and policy promote the transition away from petroleum to vehicles and fuels with lower greenhouse gas emissions on a full fuel cycle basis.

**REDUCE EMISSIONS FROM THE INTERREGIONAL AND BINATIONAL MOVEMENT OF PEOPLE AND GOODS**
Infrastructure, policy, and technology are deployed as necessary to significantly lower GHG emissions associated with the interregional movement of people and goods.

**ENERGY AND BUILDINGS**

**IMPLEMENT THE STATE’S PREFERRED LOADING ORDER**
Following the state’s preferred loading order, new energy resources come first from energy efficiency, demand response, renewable energy, and distributed generation, all before new transmission and natural gas generation are sought.

**PURSUE ENERGY REDUCTIONS IN EXISTING RESIDENTIAL AND COMMERCIAL BUILDINGS**
Net energy usage and costs from the region’s existing building stock are significantly reduced through targeted policies, programs and financing options to promote energy efficiency and clean distributed generation.

**PROMOTE STATE POLICY FOR ZERO NET ENERGY RESIDENTIAL AND COMMERCIAL BUILDINGS**
Consistent with the policy direction of state agencies like CPUC, aggressive strategies, including regulations and incentives, are employed to achieve zero net energy usage in new residential and commercial buildings.
FRAMEWORK FOR CLIMATE ACTION

California has responded to the challenge of climate change in many ways. These state efforts are driving climate change action at the regional and local level. In developing regional and local responses, it is important and helpful to understand and differentiate among international, state, regional, and local authorities, responsibilities, and opportunities. Key efforts are described below.

International Efforts

United Nations Framework Convention on Climate Change

The United Nations Framework Convention on Climate Change (UNFCCC) is an international treaty that sets an overall framework for intergovernmental efforts to address the challenge posed by climate change. The UNFCCC entered into force in March 1994, with ratification by 192 countries (both the United States and Mexico signed the Convention in 1992).

Kyoto Protocol

Linked to the UNFCCC, the Kyoto Protocol sets binding targets for 37 industrialized countries and the European community for reducing GHG emissions. Mexico signed the Kyoto Protocol in 1998 and enacted the legislation in 2005. The United States signed the Protocol in 1998, but it has not been ratified or enforced. The Kyoto Protocol expires in 2012, and negotiations to develop a new protocol are ongoing as of this writing.

State Efforts

California Global Warming Solutions Act of 2006 (Assembly Bill 32)

The California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32, Chapter 488, Statutes of 2006) establishes the 1990 emissions level as the statewide limit for 2020, which is an approximately 15 percent reduction from the baseline 2006 level. AB 32 calls for regulatory and market mechanisms to achieve the GHG emissions reduction target. Many of the State’s policies and programs are now significantly shaped, at least in part, by the requirements and spirit of AB 32.

Climate Change Scoping Plan

The California Air Resources Board (CARB) Climate Change Scoping Plan (Scoping Plan) report outlines the main strategies for meeting the AB 32 GHG reduction target, which include a range of actions including direct regulations, alternative compliance mechanisms, monetary and non-monetary incentives, voluntary actions, market-based mechanisms like a cap-and-trade system, and a cost of implementation fee to fund the program. CARB and other state agencies must adopt these reduction measures by the start of 2011, and already a number of “early action” measures required by the Scoping Plan have been adopted, such as the Low Carbon Fuel Standard (LCFS). In addition, the Scoping Plan emphasizes the need to better connect land use and transportation planning to help the state achieve its GHG emissions reduction target for 2020.

Governor’s Executive Order S-13-08

Governor’s Executive Order (EO) S-13-08 recognizes that mitigation efforts in California may slow but will not stop all long-term climate impacts, and that adaptation and building resiliency to climate changes are needed. EO S-13-08 directs the California Resources Agency to develop a state Climate Adaptation Strategy through coordination with local, regional, state, and federal public and private entities. It also emphasizes the need for statewide consistency in planning for sea level rise, and requires the National Academy of Sciences (NAS) to complete the first California Sea Level Rise Assessment Report.
Senate Bill 375

As described in the introduction, Senate Bill (SB) 375 (Statutes of 2008) requires metropolitan planning organizations (MPOs) like SANDAG to create a Sustainable Communities Strategy (SCS) that integrates the transportation network with development patterns in a way that achieves GHG emissions reduction targets from passenger cars and light-duty trucks while meeting housing needs and other regional planning objectives. The SCS must demonstrate how changes to land use patterns, transportation infrastructure investments, funding allocations, policies, or any other measures will achieve the targets to be established through the SB 375 process in the next update of the RTP. While local government land use planning and coordination with regional transportation planning will be critical to the ultimate success of the SCS, local governments are not subject to GHG reduction requirements under SB 375. Moreover, local governments retain their land use planning authority under this legislation.

Governor’s Executive Order S-3-05

Governor’s Executive Order S-3-05 establishes a long-term climate goal for the state of reducing emissions an additional 80 percent below the 1990 level by 2050 (an approximately 95 percent reduction from the baseline 2006 level). Although not required by statute, the 2050 target is based on the scientifically-supported level of emissions reduction required for climate stabilization and used as the long-term driver for state policy development.

California’s Preferred Loading Order

The California Public Utilities Commission (CPUC) and California Energy Commission adopted a preferred loading order to meet goals for satisfying the state’s growing demand for electricity while reducing GHG emissions. The preferred loading order places top priority on first increasing energy efficiency and demand response, then with new generation from renewable and distributed generation resources, and finally with clean fossil-fueled generation and infrastructure improvements. This is described further in the SANDAG Regional Energy Strategy (RES).

The California Preferred Loading Order

1. Increase energy efficiency.
2. Increase demand response – temporary reduction or shift in energy use during peak hours.
3. Meet generation needs with renewable and distributed generation resources.
4. Meet new generation needs with clean fossil-fueled generation and infrastructure improvements.

California Attorney General Guidance on Climate Change, CEQA, and General Plan Updates

The California Attorney General’s office has encouraged local governments to take a programmatic approach to climate change, particularly through general plan updates and accompanying California Environmental Quality Act (CEQA) documents. Guidance addressing CEQA, climate change, and general planning is emerging in pending CEQA Guidelines amendments, comments on General Plan Updates and Regional Transportation Plans, and ensuing settlements by the Attorney General’s Office.
The Attorney General’s office suggests that if feasible, a city or county’s General Plan update should evaluate at least one alternative that would ensure that the community contributes to a lower-carbon future. Such an alternative might include one or more of the following options:

- Higher density development that focuses growth within existing urban areas;
- Policies and programs to facilitate and increase biking, walking, and public transportation and reduce vehicle miles traveled;
- The creation of “complete neighborhoods” where local services, schools, and parks are within walking distance of residences;
- Incentives for mixed-use development;
- In rural communities, creation of regional service centers to reduce vehicle miles traveled;
- Energy efficiency and renewable energy financing (see, e.g., AB 811);
- Policies for preservation of agricultural and forested land serving as carbon sinks;
- Requirements and ordinances that mandate energy and water conservation and green building practices; and
- Requirements for carbon and nitrogen-efficient agricultural practices.

The selection of measures is subject to the discretion of each local government. (http://ag.ca.gov/globalwarming/pdf/CEQA_GP_FAQs.pdf).

Regional Greenhouse Gas Emissions Reduction Targets and Goals

While achieving the near-term goal of reducing statewide GHG emissions to the 1990 level by the year 2020 is ambitious but likely achievable with available policy measures and technology options, however, the long-term goal of reducing statewide GHG emissions to 80 percent below the 1990 level by the year 2050 will require fundamental changes in policy, technology, and behavior.

Although the state does not set economy-wide reduction targets for specific geographic regions of the state, projections showing the theoretical emissions reductions necessary to reach the 2020 and 2050 targets illustrate the magnitude of change the region needs to make during the next four decades (Figure II-1).

**Figure II-1: Theoretical Greenhouse Gas Emissions Reduction Targets for the San Diego Region**

![Graph showing theoretical greenhouse gas emissions reduction targets for the San Diego Region.](image)

Source: Energy Policy Initiatives Center, University of San Diego, 2008.

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7 Although SB 375 will lead to the establishment of regional GHG emission reduction targets; however, the SB 375 target is limited to for passenger cars and light-duty trucks.
By 2030, the region must have met and gone below the 1990 level and be well on its way to doing its share for achieving the 2050 GHG reduction level. It should be noted that deep cuts in GHG emissions required for climate stabilization also must also occur during a period of projected growth in population and economic output.

**SANDAG Energy and Climate Change Planning**

Under a partnership with the California Energy Commission, SANDAG prepared the 2009 Regional Energy Strategy and a Regional Alternative Fuels, Vehicles, and Infrastructure Report. This Climate Action Strategy is also being prepared as part of this partnership. Where applicable, this strategy incorporates the energy policy guidance of the RES and recommendations from the Alternative Fuels report, which are summarized below.

**Regional Energy Strategy**

Approved in December 2009, the updated Regional Energy Strategy (RES) provides information, goals and policy measures for a comprehensive set of energy issues. With its intent to save energy and promote the use of clean and renewable energy sources, the many of the measures identified in the following areas would also reduce GHG emission: (1) Energy Efficiency and Conservation, (2) Renewable Energy, (3) Distributed Generation, (4) Energy and Water, (5) Peak Demand, (6) The Smart Grid, (7) Natural Gas Power Plants, (8) Transportation Fuels, (9) Land Use and Transportation Planning, (10) Border Energy, (11) Clean Energy Economy.

Although there is overlap between the energy policy guidance provided in the RES and the types of policy measures that would reduce GHG emissions addressed in the Climate Action Strategy, energy and climate change are not synonymous issues. As a result, SANDAG is preparing this Strategy to accompany the RES to provide regional policy guidance on climate change and energy issues, respectively.

In light of significant state control over certain energy policy areas like electricity and natural gas, the RES focuses on the multiple opportunities and authorities that SANDAG and its member agencies could take advantage of to address energy issues and achieve both local and regional goals related to energy and climate change. This includes opportunities for SANDAG to address energy considerations through RCP implementation and the next RTP update, as well as options for local governments through mechanisms like the General Plan and participation in the SANDAG Energy Roadmap program. The RES identifies six core strategies that, if implemented, would go a long way toward helping the region meet its energy and climate change mitigation goals. The following strategies are ones that SANDAG and local governments could play an integral role in implementing.

1. Pursue a comprehensive building retrofit program to improve efficiency and install renewable energy systems;
2. Create financing programs to pay for projects and improvements that save energy;
3. Utilize the SANDAG-SDG&E Local Government Partnership funding award to help local government identify opportunities and implement energy savings at government facilities and throughout their communities;
4. Support land use and transportation planning strategies that reduce energy use and GHG emissions;
5. Support planning of electric charging and alternative fueling infrastructure; and
6. Support use of existing unused reclaimed water to decrease the amount of energy needed to meet the water needs of the San Diego region.
Regional Alternative Fuels, Vehicles, and Infrastructure Report

SANDAG developed a regional assessment of alternative transportation fuels, vehicles, and infrastructure that identifies and recommends regional and local government actions to increase the use of alternative fuels and vehicles in the fleets of local governments and their franchisees. While primarily focused on opportunities for local government fleets, the report also provides analysis, tools, and recommendations to facilitate a regional rollout of alternative fuels, vehicles, and infrastructure to the general public.

The report concludes with four sets of recommendations to help local government fleets and the region as a whole increase the use of alternative fuels and vehicles and develop the supportive infrastructure. The SANDAG Board of Directors accepted the final report in September 2009.

Climate Change and SANDAG Borders Planning and Coordination

The SANDAG Borders Planning program addresses planning issues from three perspectives: the binational perspective with relation to our international border with the Republic of Mexico; the interregional perspective regarding issues with our Orange, Riverside, and Imperial County neighbors; and collaboration with tribal governments within San Diego County.

Climate change mitigation and adaptation planning is increasingly receiving attention in at least one of these perspectives: binational and crossborder collaboration with Baja California, Mexico. In the 2009, the topic of the annual SANDAG binational event was “Challenges and Opportunities for Crossborder Climate Change Collaboration.” Stakeholders attending from both sides of the international border received several presentations and participated in discussions on both climate change mitigation and adaptation planning. The 2009 binational event led to development of the following recommendations later approved by the SANDAG Board of Directors:

1. Recognize the importance of encouraging all levels of agencies and stakeholders in our San Diego - Baja California region to mutually agree on priority aspects of climate change collaboration, including mitigation, adaptation, and education strategies.
2. Encourage the inclusion of strategies for collaboration and sharing information on regional climate change action plans in San Diego and Baja California.
3. The Fiscal Year FY 2010 binational event should follow up on topics related to climate change planning.
4. In Fiscal Year FY 2010, produce a progress report on development and actions taken in climate change planning as a result of the 2009 seminar recommendations.
THE SAN DIEGO REGION’S CONTRIBUTION TO CLIMATE CHANGE

Existing Greenhouse Gas Emissions in the San Diego Region

Energy use is the largest source of our GHG emissions. Table III-1 shows emissions in the four principal categories established by the United Nations Intergovernmental Panel on Climate Change (IPCC). As it shows, 91 percent of all GHG emissions in the region are related to the production and consumption of energy.

<table>
<thead>
<tr>
<th>Intergovernmental Panel on Climate Change Category</th>
<th>Percentage of Total Greenhouse Gas Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>91%</td>
</tr>
<tr>
<td>Industrial (non-fuel)</td>
<td>5%</td>
</tr>
<tr>
<td>Waste</td>
<td>2%</td>
</tr>
<tr>
<td>Agriculture, Forestry, Land Use</td>
<td>2%</td>
</tr>
</tbody>
</table>

Source: Energy Policy Initiatives Center, University of San Diego, 2008.

Existing Greenhouse Gas Emissions by End-Use Category

Although many activities consume energy, most of the region’s energy consumption and related GHG emissions are caused by three categories of energy consumption: the movement of people and goods in the on-road transportation sector, electricity generation that provides power to homes and businesses, and natural gas for end uses like space heating and cooking (Figure III-1).

Figure III-1: Summary of Existing Greenhouse Gas Emissions by End-Use Category

Source: Energy Policy Initiatives Center, University of San Diego, 2008.

On-Road Transportation

The largest emissions category is on-road transportation, which accounts for nearly half (46 percent) of GHG emissions in the San Diego region. Moreover, energy consumed by passenger cars and light-duty vehicles (e.g., pick-up trucks, sport utility vehicles), primarily gasoline for personal automobile transportation, accounts for about 89 percent of on-road transportation emissions, and about 41 percent of total emissions in the region.
The high level of GHG emissions from on-road transportation is due to the region’s near total dependence on petroleum-based gasoline and diesel fuel, average vehicle efficiency, and levels of driving. On-road transportation also comprises a significant proportion of GHG emissions statewide. In response, the state has enacted several transportation-related laws and regulations calling for petroleum reduction, development of low-carbon and alternative fuels, increased vehicle fuel efficiency, and coordinated land use and transportation planning that reduces GHG emissions from passenger cars and light-duty trucks.

**Electricity Generation and Natural Gas End-Use Sectors**

Electricity generation and natural gas end-uses (e.g., space and water heating, cooking, etc.) account for about one-third (33 percent) of GHG emissions in the region. Total consumption levels, efficiency of use, and fuel sources contribute to the level of GHG emissions from electricity generation. About two-thirds (67 percent) of the fuel used to generate the electricity consumed in the region comes from natural gas and out-of-state coal, both of which release GHG emissions when combusted, although natural gas produces fewer GHG emissions than coal and other fossil fuels. The level of efficiency of power plants, buildings, and end-use equipment also are factors that contribute to the level of emissions from electricity generation and natural gas end-uses.

**Existing Greenhouse Gas Emissions by Economic Sector**

GHG emissions also can be analyzed by economic sector. As shown in Figure III-2, the residential sector (i.e., passenger cars, light-duty trucks, electricity and natural gas consumption) accounts for more than half (56 percent) of all GHG emissions. This indicates that energy used by residents for personal travel and home use contribute significantly to regional GHG emissions.

**Figure III-2: Greenhouse Gas Emissions by Economic Sector**

![Diagram showing greenhouse gas emissions by economic sector]

Source: Energy Policy Initiatives Center, University of San Diego, 2008.
Future Projections for Greenhouse Gas Emissions

Under a “business-as-usual” scenario in which current energy use trends and policies do not change, GHG emissions in the region will be approximately 43 MMT CO₂E in 2020, approximately 26 percent greater than the 2006 level, and 48 percent higher than the 1990 level. Emissions would be even greater in 2030 under a business-as-usual scenario. The projected increases in GHG emissions for on-road transportation, natural gas, and electricity under business-as-usual scenarios are shown in Figures III-3 to III-5 below. Because the following figures are business-as-usual projections depicting the consequences of not taking action, the effect of new federal, state, and local policies is not shown.

Figure III-3: Projected Greenhouse Gas Emissions from On-road Transportation, 1990-2030

![Figure III-3: Projected Greenhouse Gas Emissions from On-road Transportation, 1990-2030](source: Energy Policy Initiatives Center, University of San Diego, 2008.)

Figure III-4: Projected Greenhouse Gas Emissions from Natural Gas End-Uses, 1990-2030

![Figure III-4: Projected Greenhouse Gas Emissions from Natural Gas End-Uses, 1990-2030](source: Energy Policy Initiatives Center, University of San Diego, 2008.)
Figure III-5: Projected Greenhouse Gas Emissions from Electricity Generation, 1990-2030

Source: Energy Policy Initiatives Center, University of San Diego, 2008.
THE SAN DIEGO REGION’S CHANGING CLIMATE

Except where otherwise noted, information presented in this section is based on the reports listed below, each of which presents a range of climate change impacts on California or the San Diego region using climate models and emissions scenarios from the Intergovernmental Panel on Climate Change (IPCC), the world’s leading scientific body for the assessment of climate change. Established by the United Nations Environment Program and World Meteorological Organization, the IPCC provides the world with a clear scientific view on the current state of climate change and its potential environmental and socio-economic consequences.

- San Diego Foundation’s Regional Focus 2050 Study. Summary and full versions of the report are available online at: http://www.sdfoundation.org/communityimpact/environment/Initiative-Climate2050.html
- California Climate Change Center’s Climate Change-Related Impacts in the San Diego Region by 2050. A draft version of the report is available online at: http://www.energy.ca.gov/2009publications/CEC-500-2009-027/CEC-500-2009-027-D.PDF

Introduction

The climate of the San Diego region is certain to change under even the most optimistic and aggressive scenarios to reduce global GHG emissions. Substantial emission reductions are essential for avoiding the worst impacts of climate change, but mitigation alone is not enough. Even if global emissions were immediately reduced to zero, the existing concentration of GHG emissions in the atmosphere would continue to cause the climate to change for the next several hundred years. Compounded with projected population growth, climatic changes are expected to become significantly more rapid and severe unless global GHG emissions are leveled off in the next few years and then significantly reduced over the coming decades.

By 2050, average annual temperatures in our region are projected to be between 1.5 and 4.5 degrees Fahrenheit. Greater increases will occur in summer, with peak temperatures consistently reaching the upper 80s and low 90s. Larger temperature increases are expected in inland areas as compared to the coastal zone (the area within about 30 miles [50 kilometers] of the ocean). Though precipitation is expected to maintain the existing Mediterranean pattern with dry summers and most rainfall happening in the winter months, rainfall amounts are expected to vary widely from year to year, leaving the region highly vulnerable to drought.

Adaptation planning can minimize the damage caused by climate change. According to the Pew Center on Global Climate Change, adaptation refers to “Actions by individuals or systems to avoid, withstand, or take advantage of current and projected climate changes and impacts.” (1)

Climate changes and their associated impacts vary greatly from location to location. Although national and international action is essential, many important decisions about how best to manage systems affected by climate change are made at the local and regional levels (1). Regional and local planning should reinforce and complement the recommendations given at the state and federal levels. In an effort to begin a process of collaborative adaptation planning in California, the Governor issued Executive Order S-13-08 (2008), which led to completion of the State’s first comprehensive Climate Adaptation Strategy (CAS) in 2009. The CAS summarizes the best known science on climate change impacts in seven specific sectors and provides recommendations on how to manage against those threats.
The remainder of this section describes the projected impacts climate change is expected to have on the San Diego region by 2050. Because the effects of atmospheric GHG accumulations on the climate are very long-lasting, these impacts will likely worsen after 2050, unless global greenhouse gas concentrations are significantly reduced over the coming years and decades.

It is beyond the scope of the Climate Action Strategy to identify adaptation measures for all of the expected impacts of climate change. However, development and implementation of such measures will be critical to protecting the region from the impacts of climate change. The strategy focuses on adaptation measures available for SANDAG and local government consideration in addressing impacts to transportation and energy infrastructure, which are described in the Smart Growth Land Use and Low Carbon Transportation and Clean Energy and Efficient Buildings sections, respectively.

Impacts on Public Health

Extreme Temperature Events

Heat waves, which during the past 15 years have killed more Californians than all other declared disasters combined, will be more common, last longer, and reach higher temperatures. Potential health impacts from these extreme heat events include heat stroke, heat exhaustion, and the exacerbation of existing medical conditions. Those at highest risk are the elderly, infants, and socially-isolated people with pre-existing illnesses. Extreme temperature events can be exacerbated in urban areas due to the urban heat island effect. Exposed surfaces like building roofs and pavement absorb heat and cause surface and air temperature in surrounding areas to be hotter than less developed or undeveloped areas. Urban heat islands increase demand for air conditioning, particularly during periods of peak electricity demand.

Wildfires

The existing habitat and climate conditions make the region vulnerable to extreme fire events. Warmer temperatures and more frequent droughts caused by climate change will intensify wildfire conditions, marked by drier, more flammable vegetation and longer periods of hot, dry Santa Ana winds. By 2050, these conditions are expected to result in larger, more frequent, and longer-lasting wildfires, during summer and especially fall, when Santa Ana wind intensity is at its highest. Larger, more frequent, and longer-lasting wildfires are expected to result in loss of human life, up to billions of dollars in property damage, business closures, increased fire-fighting and emergency services costs, and expensive recovery and restoration efforts.

Air Quality

Studies have shown a link between heat and the formation of ground-level ozone, the primary component of “smog.” In the San Diego region, days over 90 degrees Fahrenheit exceed the state ozone standard 16% of the time (2). Ozone is not emitted directly but forms when nitrogen oxide emissions and volatile organic compounds react with heat and sunlight (2). By 2050, the San Diego region is expected to experience greater exposure to ground-level ozone due to a climate change-induced increase in number of hot and sunny days. Increased ground-level ozone tends to aggravate asthma and increase airway reactivity and inflammation.

Infectious Disease

The likelihood of changes in temperature, humidity, and rainfall in San Diego will affect the geographic distribution and quantity of arthropod vectors (e.g., mosquitoes, ticks). As a result, the risk of contracting infectious disease from vectors will also be altered by climate change. Climate change may also affect ranges and population densities of animal hosts (e.g., rodents, rabbits).
• West Nile Virus (WNV) (vector: mosquito). Increased variability in precipitation may impact incidence of WNV, though use of municipal water systems by mosquitoes as breeding sites may reduce the impacts of changing precipitation patterns. Higher temperature, on the other hand, is linked to increased dispersal and transmission of WNV (3).

• Hantavirus (vector: rodent). Increased variability in precipitation is likely to increase food supply of rodents during years with higher rainfall and more flooding. Humans contract Hantavirus cardiopulmonary syndrome when they come into contact with infected rodents or their excrement. Increased development and recreational activities within the unincorporated areas of San Diego County in years where host populations are elevated will increase the potential for contact between humans and disease hosts and vectors.

• Plague (vector: flea; host: rodent). Increased variability in precipitation is likely to increase food supply of rodents during years with higher rainfall and more flooding. Increased development and recreational activities within areas like unincorporated San Diego County due to population growth will increase the potential for contact between humans and disease hosts and vectors.

• Malaria and Dengue Fever (vector: mosquito). Higher temperatures for the San Diego region could facilitate the local establishment of these historically tropical diseases.

Impacts on Water Supply

Demand for Water

Based on current projections for growth and extrapolation of current consumption levels, demand for water is expected to significantly outpace the supply available from all sources, in part because of climate change. Extended and more frequent drought conditions would reduce local groundwater supplies about 7 percent per year on average and increase our dependence imported water from distant sources like the Colorado River and Sacramento-San Joaquin River Delta.

Water Supply

Climate change is projected to reduce the amount of water available from the imported sources upon which our region relies. For example, recent projections for the Colorado River range from a 6 to 45 percent decline by 2050 as a result of the changing climate. The amount of water imported to the San Diego region from the Sacramento-San Joaquin River Delta is dependent on several factors. Projections of warmer temperatures and more precipitation falling as rain instead of snow will lead to flooding and increased stress on the already strained Delta levee system (4).

Spring snowmelt, which historically provided a reliable supply of water after winter storms, will likely be lower due to an expected 25 percent snowpack reduction in the Sierra Nevada Mountains by 2050. Other environmental factors may limit the amount of water available for export to our region. For example, efforts such as the CALFED Bay-Delta Program are trying to balance water supply needs with environmental goals supporting freshwater habitat for fish and other wildlife in the Delta. Furthermore, rising sea level threatens the freshwater Delta with saltwater intrusion and increased bayside stress to the already distressed levee system. Overall, our region faces a possible water supply shortfall of 18 percent by 2050, and quite possibly sooner.

Impacts on Agriculture

San Diego’s unique topography creates a wide variety of microclimates supporting over 200 different agricultural commodities (5). In 2008, despite a drought and a slowing economy, the County of San Diego reported a 1 percent annual increase, likely due to increased value of important products like nursery crops and avocados (5). Between now and 2050, climate change could impact our region’s agriculture, and exacerbate our water supply situation, by increasing demand for irrigation to meet higher evaporative demand associated with warmer and drier conditions.
Even today, existing farms are faced with high water costs (5). Climate change also will also change the geographic distribution of crop pests, though understanding the potential for crop loss from pests requires further research (6).

**Impacts on Biodiversity and Habitats**

Along with one other county, the San Diego region has the most plants and animals at risk of extinction in the continental United States. While in many cases human population growth and development have fragmented critical habitat areas, the impacts of climate change will compound the threats facing already vulnerable plant and animal species. Though most species are often able to adapt to changing conditions, unnaturally rapid shifts in temperature, sea level rise, and drought due to climate change may outpace the ability of some species to adapt and survive.

**Forests**

Extended drought can stress individual trees, increasing their susceptibility to insect attack by species like the bark beetle. Warmer winter temperatures can also facilitate insect attack by increasing insect survival and populations. Temperature increases will also minimize the extent of the cooler-climate forests. Reduced forest habitat can impact forest-dependent fish and wildlife species. Changes in fire regimes can impact the ability of a forest to recover after wildfire.

**Southern California Shrublands**

Due to rising temperatures and changes in precipitation, chaparral and coastal sage scrub are expected to seek to move to higher elevations where temperatures are cooler and precipitation is greater. Associated animal species will adjust their ranges, though oftentimes not concurrently with the vegetation, potentially resulting in a new mix of species and ecosystems. Projected increases in non-native grasses and fire frequency could substantially reduce the range and extent of future shrublands.

**Deserts**

Desert plant and animal species are adapted to extreme conditions of aridity and heat. With climate change, most deserts are expected to become hotter and drier (6), and in California models are predicting expansion of deserts, though not apparent by 2050 (4).

**Freshwater Ecosystems and Vernal Pools**

Climate change is predicted to directly and indirectly affect the hydrology and ecology of freshwater systems in our region. Freshwater ecosystems, particularly vernal pools, are dependent on annual rainfall and extremely sensitive to pollution, habitat degradation, and invasive species. To date, there has not been extensive study on the effects of climate change on vernal pools (7).

**Impacts on Ocean and Coastal Resources**

Climate change threatens the coastal resources like beaches, harbors, lagoons, wetlands, and seaside cliffs that comprise our 70 miles of coastline and represent a fundamental element of our region’s beauty, economy, unique identify, and quality of life.

**Sea Level Rise**

There are three climate change-related causes for the accelerated pace of global sea level rise: increased sea surface temperature creating thermal expansion the water, retreat of arctic sea ice, and melting of alpine glaciers. By 2050, average sea level in San Diego is projected to be 1 to 1.5 feet higher than today, making lasting changes to the coastline and threatening one of our greatest environmental and economic assets.
As ocean water levels rise relative to land, coastal sediments are sequestered offshore (8). Without action, beaches will shrink and some could disappear entirely as a result. Streets, homes, recreation areas, businesses, and boardwalks near the shoreline will experience flooding more often, causing increased risk of damage to property and infrastructure. Other low-lying places like San Diego International Airport will likely be vulnerable to large-scale emergency and evacuation situations, especially during high surf and winter storm periods.

Coastal habitats such as salt marshes and rocky intertidal areas will be exposed to more sea water. When natural or manmade barriers like cliffs, seawalls, or buildings impede the ability of those habitats to retreat landward, their range is reduced until they are completely underwater. Places in the San Diego region like the Cabrillo National Monument and Scripps Coastal Reserve are bordered by steep cliffs and likely to lose much of their intertidal habitats to sea level rise. In all of Southern California, where 91 percent of wetlands have already been lost and many remaining wetlands are stressed by pollution, invasive species, and altered hydrology, sea level rise poses yet another threat to coastal wetland habitats (9).

**Ocean Acidification**

Oceans absorb and are significantly affected by the carbon dioxide emissions increasingly emitted into the atmosphere. To date, oceans have absorbed about one-third of all anthropogenic carbon dioxide emissions, resulting in a significant acidification of seawater (10). Ocean acidification causes problems similar to those experienced in freshwater lakes from acid rain. In particular, acidification impedes the formation of protective skeletons of crabs, sea urchins, abalones, oysters, and plankton species, potentially having profound impacts on the entire marine food chain. As the oceans become more acidic, the fertilization, development, and metabolic function of many marine species such as kelp, a commercially harvested species for San Diego-based CP Kelco, will be increasingly impacted.
Transportation of people and goods is the single largest source of GHG emissions in our region, with passenger cars and light-duty trucks alone responsible for 41 percent of all emissions. The three primary strategies for reducing GHG emissions in the on-road transportation sector are to: (1) increase vehicle fuel efficiency, (2) reduce the carbon content of transportation fuels, and (3) better coordinate land use and transportation planning, and related measures, policies, and investments. While the majority of needed reductions will come from State-level actions under the first two strategies, local and regional actions under the third strategy also are needed for California to meet its GHG reduction goals.

State agencies like the California Air Resources Board and California Energy Commission are responsible for and in the process of actively implementing regulations and programs related to the first two strategies, although regional and local actions can also contribute to increased use of low-carbon alternative fuels. These standards and programs at the State level are expected to achieve the majority of the GHG reductions needed in the transportation sector to achieve the statewide 2020 target under Assembly Bill 32. The California Light-Duty Vehicle Greenhouse Gas Standards and the Low Carbon Fuel Standard are expected to account for about 90 percent of the reductions needed from the transportation sector. Additional transportation-related GHG reductions will need to come from actions at the regional and local levels.

Local governments and SANDAG have the ability and authority to regulate, provide incentives, collaboratively plan, and make infrastructure investments that affect land use patterns, the transportation system, and other public infrastructure investments. The remaining approximately 10 percent of needed transportation-related GHG reductions are expected to come from Metropolitan Planning Organizations like SANDAG through coordinated land use and transportation planning, and related measures, policies, and investments to reduce GHG emissions per the requirements of Senate Bill 375. Coordination of local land use planning, including the identification of sites for affordable housing with regional transportation planning are essential to the successful implementation of SB 375. And the state has enacted legislation (SB 375) that puts the responsibility for the third strategy at the regional and local government level.

**Senate Bill 375 and the Regional Transportation Plan**

Federal and state laws require that SANDAG prepare a long-range transportation plan and make an air quality conformity determination every four years - the next RTP update (2050 RTP) is scheduled for adoption in 2011. In the next update, SANDAG will be the first major metropolitan planning organization in the state to prepare an RTP that complies with the provisions of Senate Bill (SB) 375 (Statutes of 2008). In effect, SB 375 requires the next RTP update to achieve targets for GHG reductions from passenger cars and light-duty trucks for 2020 and 2035. The statute requires a new element of the RTP called a Sustainable Communities Strategy (SCS), which must show how regional GHG reduction targets, to be established by the California Air Resources Board (CARB), would be achieved through development patterns, transportation infrastructure investments, and/or transportation measures or policies that are determined to be feasible. The SCS also must address housing needs and protection of sensitive resource areas. If the SCS does not meet regional GHG reduction targets, an Alternative Planning Strategy must be developed to demonstrate how the targets could be achieved. Although local land use planning and coordination with regional transportation planning are essential to the successful implementation of SB 375, local governments are not subject to its GHG reduction targets or other requirements.
Land use and transportation planning seek to identify land, infrastructure and other resources needed to accommodate our growing population and economy while maintaining and enhancing quality of life. In the past, such growth has been associated with increased vehicle miles traveled (VMT) and related GHG emission increases. Since 1980, national VMT has increased about three times faster than population growth. While there are many reasons, factors like land use segregation, long trip distances, and transportation systems, policies and urban design that favor vehicle travel over walking, bicycling and public transit are critical, and are a direct result of past land use planning decisions and transportation investments. Generally speaking, segregated, low-density land use patterns and automobile-oriented transportation investments and urban design do not reduce are not conducive to reducing GHG emissions.

According to its Environmental Impact Report, the transportation projects, funding allocations, policies, and adopted local land use plans identified in SANDAG's the adopted SANDAG 2030 RTP would increase annual transportation-related GHG emissions by 30 percent by 2030, relative to baseline (2006) conditions. Transportation-related GHG emissions need to be lower than they are today by 2030, although the state California Air Resources Board will not establish final targets for GHG reduction from passenger cars and light-duty trucks until September 2010. The land use plans and transportation investments and policies identified in the adopted RTP collectively do will not contribute to lower transportation-related GHG emissions.

According to the 2030 Regional Growth Forecast, our population is expected to increase by about 32 percent by 2030 relative to 2006. In addition, total daily on-road gasoline and diesel fuel consumption per capita are projected to increase by about 4 percent, and daily VMT per capita is expected to increase by about 3 percent by 2030. This indicates that VMT and transportation-related GHG emissions are projected to increase slightly faster than population growth under adopted regional transportation and local land use plans. Meeting transportation-related GHG reduction targets will require decreases in per capita emissions.

Past investments and decisions that shaped the region’s land use patterns and transportation systems are major determinants of current GHG emissions and will continue to be into the future. Once in place, land use patterns and transportation infrastructure typically remain part of the built environment and influence travel behavior and GHG emissions for several decades, perhaps longer. As a result, it is imperative that future planning take into account the climate change implications of transportation infrastructure and land use investments for the duration of their useful lives. This is important because transportation and land use choices made today will affect our GHG emissions for years and likely several decades into the future.

**Approach for Addressing Climate Change in the Transportation Sector**

Acknowledging the critical role of State standards to improve vehicle technology and increase the use of low-carbon alternative fuels, this section focuses on available policy measures SANDAG, local governments, or other regional entities could choose to implement or influence to reduce GHG emissions through coordinated land use and transportation planning and related measures, policies and investments.

The remainder of this section describes and identifies the many types of land use and transportation-related policy measure options available to help the region SANDAG and local governments achieve the level of GHG reductions from the on-road transportation sector, with a focus on helping SANDAG identify measures to reduce GHG emissions from passenger cars and light-duty trucks as required in future updates of the RTP, -sought by state goals and legislation and demanded by climate science. While some policy measure options to reduce GHG emissions have not historically been a part of transportation and land use planning in our region, many of the available options to address climate change involve continuing and expanding investments the region has already made and actions we already take for other reasons related to our quality of life.
Past decisions and investments in walkable, smart growth communities planning, expand and improve public transportation network, promote bicycling, vanpooling and carpooling demand management have a positive impact on our all contribute to lower GHG emissions, and create a foundation on which the region can build to further reduce its GHG emissions over the coming years and decades.

The remainder of this section describes and identifies the types of actions SANDAG and local governments can take to reduce GHG emissions from the on-road transportation sector, with a focus on helping SANDAG identify measures to achieve SB 375 targets for reducing GHG emissions from passenger cars and light-duty trucks. The discussion is organized around three goals that will help the region reduce transportation-related GHG emissions through integrated land-use and transportation planning at the regional and local levels:

1. Reduce total miles of vehicle travel,
2. Minimize GHG emissions when vehicles are used, and
3. Support increased use of low carbon, alternative fuels.

A fourth goal is intended to help the region prepare for potential impacts to the transportation system:

4. Protect transportation infrastructure from climate change impacts.

Purpose of the Transportation-related Policy Measures

The section identifies objectives for each of the goals, and available policy measures that, if implemented, would achieve the goals and objectives. The goals, objectives and policy measures are intended to serve as a guide for integrating transportation-related climate change considerations into existing plans as they are updated. Since preparing the Regional Transportation Plan is one of the primary responsibilities of SANDAG, the primary focus of this section is in identifying measures that could help to reduce GHG emissions from passenger cars and light-duty trucks and comply with Senate Bill 375.

The goals, objectives or policy measures listed herein are given priority over any other; they are solely intended to inform decision-makers of available options for addressing climate change and complying with new requirements like Senate Bill 375. It is likely that a variety of policy measures from each of the goal areas will need to be considered and implemented if the region is to be successful in reducing greenhouse gases from the transportation sector. The actual mix of measures implemented by SANDAG to reduce GHG emissions from on-road transportation will be determined through the next update development of the 2050 RTP. Where needed, further analysis of these broad land use and transportation policy measures will be performed as part of the 2050 RTP update development process to understand a variety of issues associated with their implementation including refined GHG reduction estimates, possible barriers to regional or local implementation, cost implications, and their impact on important regional quality of life indicators related to economic, environmental, and social issues.

The information provided in this section can help inform SANDAG decision-making during its process of developing a Sustainable Communities Strategy to meet or exceed its GHG reduction targets under SB 375 through the next RTP update the development of the 2050 RTP.
GOAL 1. REDUCE TOTAL MILES OF VEHICLE TRAVEL

State-level efforts to reduce transportation-related emissions through fuel efficient vehicles and low carbon fuels are critical but will not succeed if the amount of driving – also known as vehicle miles traveled (VMT) – continues to follow past trends and rates of increase. For example, statewide projections indicate that California will not achieve the long-term 2050 goal for emissions reduction unless VMT is reduced by at least 17 percent on a statewide level. The trend of VMT growth must be slowed, stopped, and soon reversed in order to successfully lower GHG emissions from the on-road transportation sector.

Lowering VMT means providing high-quality opportunities to make trips by alternative means to driving alone such as walking, bicycling, ridesharing, and public transit, and by making vehicle trips shorter. This can be accomplished through improved land use and transportation planning and related measures, policies and investments affecting the options people have when they travel. The following objectives can help the region lower the amount of vehicle travel: design of neighborhoods and communities in accordance with our region’s adopted smart growth principles, expansion and new development of transportation systems to support low-carbon mobility options like public transit, vanpooling, carpooling, walking and bicycling, and reducing demand for single occupancy vehicle travel.

Since existing land use patterns and transportation infrastructure are the result of several decades of investments, the effects of smart growth will likely be incremental in the near term. But over the long term, smart growth neighborhoods and communities will be essential to achieving more significant GHG reductions.

Objective 1a. Create smart growth neighborhoods and communities in which most if not all basic daily needs and public transit service are safely accessible on foot or by bicycle.

Using our region’s smart growth principles to create neighborhoods and communities in which most if not all daily needs and public transit service are accessible on foot or by bicycle will be critical to reducing our GHG emissions. The regional strategy for accommodating population growth through an adopted smart growth policy lowers VMT by creating neighborhoods and communities in which walking, bicycling, and public transit are viable travel options and vehicle trips are relatively short. The SANDAG study Trip Generation for Smart Growth: Guidelines for the San Diego Region (2010) shows that existing smart growth areas in the San Diego region have fewer vehicle trips and miles traveled and a greater number of walking, bicycling and public transit trips than conventional, non-smart growth development due to characteristics like mixture of uses and activities, variety of nearby destinations, transportation infrastructure and urban design conducive to walking and bicycling, and high quality access to public transit.

Neighborhoods and communities in which people walk, bike, and ride public transit are typically characterized by a more concentrated and diverse mix of land uses complemented by sidewalks, bike paths and lanes, buildings that front directly onto public streets, a variety of housing types and choices, and an interconnected and rich street grid that slows and disperses vehicle traffic. Smart growth also leads to lower water consumption and related household and infrastructure costs than conventional development patterns, and would contribute to the goal to reduce water-related energy use and GHG emissions identified in the Clean Energy and Efficient Buildings section.

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9 http://www.epa.gov/dced/pdf/growing_water_use_efficiency.pdf
The affordability of housing and transportation and access to employment play a critical role in determining where people live, how much they travel, and, therefore, directly affect transportation-related GHG emissions. Integrating social equity considerations like affordability, displacement, gentrification, and jobs-housing fit (providing affordable housing that matches well with wage levels of nearby jobs) in smart growth development can lower VMT and contribute to GHG reductions by allowing groups with moderate and lower incomes to live affordably in areas closer to their jobs with improved access to services and affordable travel options like public transit. Failure to consider social equity factors may lead to exclusion, limited employment opportunities, dispersed development, and, therefore higher VMT.

Under SB 375, the areas identified to house all economic segments of the regional population through Regional Housing Needs Assessment (RHNA) process in a manner that is consistent with the land use pattern of the SCS. Planning that integrates the siting of affordable housing (in addition to market rate housing) into pedestrian and bicycle-friendly smart growth areas with access to public transit will increase the potential for transportation-related GHG reductions.

Through an ongoing collaborative process among SANDAG and local jurisdictions, smart growth opportunity areas are identified as places that could accommodate higher residential and employment densities within pedestrian-friendly activity centers connected to other activity centers by public transit. The SANDAG Smart Growth Concept Map (Figure 1) illustrates the nearly 200 locations of existing, planned, and potential smart growth opportunity areas in seven smart growth place type categories, reflecting the notion that smart growth is not a “one-size-fits-all” concept. The Map also shows the relationship between smart growth areas and existing, planned, and potential public transit service.

SANDAG uses the Map to provide funding incentives for transportation and transportation-related infrastructure improvements and planning efforts that support smart growth development through the TransNet Smart Growth Incentive Program (SGIP). Two percent of annual TransNet revenues are allocated to the SGIP, for a total of $280 million or $7 million per year over the life of the 40-year measure. Moreover, the SANDAG Smart Growth Design Guidelines include some discussion of the GHG reduction benefits of smart growth land use and alternative transportation choices like walking, bicycling, and public transportation. The adopted SANDAG Smart Growth Concept Map, along with habitat conservation areas and major employment areas, will serve as a basis for the SCS. Habitat protection and similar efforts to safeguard sensitive resources facilitates smart growth and GHG reductions by limiting development in certain areas and contributing to more compact urban form. Protection of sensitive resources areas, such as including land protected under Habitat Conservation Plans like the Multi-Species Conservation Plan and Multi-Habitat Conservation Program and the TransNet Environmental Mitigation Program to mitigate habitat impacts for regional transportation projects, must be integrated into and consistent with other components of the SCS. Integration of habitat planning and protection of other sensitive resource areas with smart growth planning can help promote more compact urban form and related transportation alternatives that contribute to lower transportation-related GHG emissions.

Continuing and expanding upon our region’s ongoing smart growth efforts will be critical to lowering the amount of vehicle travel and reducing our GHG emissions. In addition, designing neighborhoods in accordance with smart growth principles is essential to the success of the next objective: developing systems to promote low carbon transportation options like walking, bicycling, and public transit.
Policy Measures

Available measures to create smart growth neighborhoods and communities in which most if not all basic daily needs and public transit service are safely accessible on foot or by bicycle include:

- Continue to encourage and assist local governments in implementing planned and potential smart growth areas as identified on the Smart Growth Concept Map (SANDAG)
- Give strong consideration to existing and planned smart growth areas in the prioritization of transportation projects and related investments and decisions to reduce GHG emissions (SANDAG)
- Identify additional ways SANDAG can support the planning and development of smart growth areas through its transportation investments and other funding decisions (SANDAG)
- Use the Smart Growth Concept Map as a starting point for the land use component of the Sustainable Communities Strategy (SANDAG)
- Integrate sensitive resource area protection activities with efforts to promote compact smart growth development patterns and reduce transportation-related GHG emissions (SANDAG and local government)
- Implement transportation infrastructure that increases transit connectivity and walking and biking as alternative modes in smart growth areas (SANDAG and local governments)
- Implement supportive policies that promote infill development, higher densities, affordable housing, jobs-housing fit, mixed uses, improved pedestrian and bicycle connections, and open space preservation (SANDAG and local governments)
- Coordinate public investments related to transportation, energy, water supply, parks, open space, and others in a manner that supports smart growth development (SANDAG and local governments)
Figure 1: SANDAG Smart Growth Concept Map
Objective 1b. Expand and Develop New Systems for Low Carbon Modes of Transportation.

Reducing miles of vehicle travel will require expanding existing systems and developing new ones that provide transportation alternatives with low or even zero GHG emissions. These “low carbon” transportation systems will serve pedestrians, bicycles, and public transit. Other transportation system investments may also be needed to promote low carbon travel, such as high occupancy vehicle (HOV) lanes and related infrastructure to facilitate vanpooling and carpooling, and, in certain corridors, public transit service. In particular, infrastructure for low carbon modes of transportation should be integrated with smart growth neighborhoods and infrastructure to create areas in which a resident’s basic daily needs and access to public transit service are safely accessible on foot or by bicycle. Integrating smart growth land uses and low carbon transportation systems will be essential to lowering miles of vehicle travel and achieving significant GHG reductions, particularly over the long-term.

The region has and continues to take steps to expand and develop new systems that promote low carbon alternatives to driving. For example, SANDAG is developing an Urban Area Transit Strategy to evaluate strategies that could significantly increase the attractiveness and use of transit in the urban area and maximize peak-period trips on transit, bicycle, and foot. The results of the study will be incorporated into the next update of the RTP. The study also will also examine short-term action plans and implementation strategies to increase the use of transit. SANDAG is also continues to be actively involved in several efforts to promote walking and bicycling, including developing bicycle and pedestrian infrastructure projects, a regional Safe Routes to School strategy, bicycle master plans, community active transportation studies, neighborhood safety and traffic calming projects, bicycle parking, and as well as education and awareness programs.

While many factors are important, having secure funding sources, particularly for public transit operations, will be critical to our region’s success in developing low carbon transportation systems.

Policy Measures

Available measures to expand and develop new systems for low carbon modes of transportation include:

- Give greater consideration to transportation modes and related investments that contribute to short- and long-term GHG reductions in future RTP updates (SANDAG)
- Increased and priority funding and system investments for public transit (including stable and secure funding for transit operations) for public transit (SANDAG and local governments)
- Implement transit performance improvements (e.g., queue jumps, dedicated lanes, etc.) (SANDAG and local governments)
- Implement transit quality improvements (e.g., real-time information, safety and cleanliness, etc.) (SANDAG and transit agencies/local governments)
- Coordination of low carbon transportation funding and investments like walking, bicycling and public transit with smart growth development (SANDAG and local governments)
- Implement regional bicycle corridor improvements and supportive infrastructure (SANDAG and local governments)
- Implement the Regional Bicycle Master Plan (SANDAG)
- Implement the regional Safe Routes to School strategy (SANDAG)
Objective 1c. Reduce Demand for Single Occupancy Vehicle Travel.

Vehicles will continue to be the logical mode choice for many individual trips for the foreseeable future. A primary reason is the automobile orientation of existing neighborhoods and communities and transportation systems. In addition, smart growth and low carbon transportation infrastructure are long term strategies to reduce GHG emissions.

Because of the need to achieve emissions reductions in the near term (e.g., SB 375 identifies 2020 as the near term target year), it is necessary to examine policy measures that can relatively quickly achieve reductions in VMT and GHG emissions while our region creates the smart growth communities, builds low carbon transportation systems, and makes other long-term investments critical to systematically lowering our emissions. Managing demand for single occupancy vehicle travel will be an important strategy for achieving short-term reductions in the amount of vehicle travel and GHG emissions.

The region has and continues to take steps to reduce demand for drive alone trips. The SANDAG’s Transportation Demand Management (TDM) Program known as iCommute provides free assistance to San Diego regional businesses and agencies in establishing and implementing customized TDM programs that reduce traffic congestion and GHG emissions. Services offered through iCommute include:

- Regional vanpool program, providing a $400-a-month subsidy for each van in the program,
- On-line ridematching services for carpools, vanpools, and schoolpools via the RideMatcher tool,
- Measurement of TDM benefits to the environment via the TripTracker tool,
- Information on other TDM options including transit, bicycling, and telework options.

Additional types of measures to reduce demand include teleworking, carpooling and vanpooling, alternative work schedules, certain vehicle pricing measures as well as parking pricing, and parking management and reform.

Policy Measures

Available measures to reduce demand for single occupancy vehicle travel include:

- Provide financial incentives to support increased vanpooling (SANDAG)
- New or expanded policies, programs, and incentives to promote carpooling (SANDAG and local governments)
- Encourage or require employers to institute telework programs (SANDAG and local governments)
- Encourage or require employers to institute alternative work schedules (SANDAG and local governments)
- Encourage or require employers to institute programs that provide financial incentives for commuters to reduce their vehicle trips and use alternative transportation modes like walking, bicycling, public transit, vanpooling, and carpooling, often as an alternative to subsidized employee parking (SANDAG and local governments). Examples include:
  - Parking Cash Out: commuters offered subsidized parking are also offered the cash equivalent if they use alternative travel modes.
  - Travel Allowances: financial payments provided to employees in lieu of parking subsidies. Commuters could use the travel allowance to pay for parking or for another travel mode.
  - Transit and Rideshare Benefits: free or discounted fares provided to employees.
  - Reduced Employee Parking Subsidies: commuters who drive would pay a portion or all of their parking costs.
- Reduce parking requirements and/or initiate parking maximums in smart growth areas (local governments)
- Establish on-street parking fees in smart growth areas (local governments)
- Support investments to provide high-performance broadband connectivity to every business, government agency, non-profit organization, and residence to enable widespread e-commerce and telecommuting (SANDAG and local governments)
- Evaluate and support or implement vehicle pricing measures such as cordon (area) tolls, a fuel or carbon tax, a per mile fee for vehicle travel, and pay-as-you-drive insurance (SANDAG and local governments)
- Implement strategies that prioritize HOVs – carpools, vanpools, and public transit vehicles – on the road and for parking (SANDAG and local governments)
- Implement car and bicycle sharing programs (SANDAG and local governments)

**GOAL 2. MINIMIZE EMISSIONS WHEN VEHICLES ARE USED**

Minimizing emissions when vehicles are used involves measures to promote efficient vehicle travel in the transportation system. Vehicles operating in congested traffic conditions or at higher speeds inefficiently consume fuel and generate a higher level of GHG emissions relative to vehicles operating under more efficient conditions. Creating efficient traffic conditions is also important to promote efficient travel by public transit services routes and high occupancy vehicle HOVs using our arterial and highway systems. SANDAG can promote operation of vehicles at more efficient speeds through efforts to reduce traffic congestion, limit vehicle speeds, and promote overall fuel efficient driving practices. Pricing policies are an option for managing the use of transportation facilities, particularly when there is limited capacity, such as during rush hours. Conversion of existing HOV facilities to high occupancy toll (HOT) lanes, or general purpose facilities to toll facilities, are ways in which pricing could be used to manage demand. In the San Diego region, development of new HOT lanes and new toll lanes – rather than the conversion of existing facilities – has been the adopted approach to pricing.

**Objective 2a. Reduce Traffic Congestion**

Characteristics of traffic congestion like idling, slow vehicle speeds, and repetitive braking and accelerating lead to inefficient vehicle operation and consumption of fuel, and therefore higher GHG emissions relative to vehicles operating in more efficient conditions. Eliminating or reducing congestion can lead to more efficient travel conditions for vehicles and GHG savings. However, measures to relieve congestion also have the potential to induce additional vehicle travel during uncongested periods, particularly over the long-term, which can partially or fully offset the GHG reductions achieved in the short-term from congestion relief. Since potential for demand inducement will likely vary depending on the type of congestion relief measure, careful study of potential induced demand will be needed to determine a more complete understanding of the effect of congestion relief measures on GHG reductions.

**Policy Measures**

Available measures to reduce traffic congestion include:

- Make improvements to relieve congestion (e.g., bottlenecks) (SANDAG)
- Conduct education campaigns or similar efforts to promote efficient driving habits (eco-driving) (SANDAG and local governments)
- Implement congestion pricing programs on congested highways and regionally significant arterial roadways (SANDAG)
- Implement neighborhood traffic calming projects (e.g., replace stop-controlled intersections with roundabouts) (local governments)
- Continue to coordinate traffic signals to facilitate efficient traffic conditions (SANDAG and local governments)
- Promote transportation alternatives for special events (e.g., professional sporting events, concerts) (SANDAG and local governments)
- Convert general purpose lanes to toll lanes on highways and arterials (SANDAG and local governments)

**Objective 2b. Promote Efficient Vehicle Speeds**

Similar to vehicles operating in congested conditions, vehicles moving at high speeds result in less efficient engine operations and higher fuel consumption relative to vehicles operating at lower, more fuel efficient speeds. Inefficient driving practices such as quick acceleration also lead to higher fuel consumption. Moreover, slower vehicle speeds can improve overall traffic flow and result in less congestion because slower moving vehicles are less likely to cause accidents that lead to congestion. The current maximum speed limit in the regional transportation system is 65 mph in most cases, though it is not uncommon to find vehicle speeds in excess of that level not being uncommon on our regional transportation system. Changing the speed limit would require state action for interstate highways and state routes. Promoting efficient driving practices or “eco-driving” could be accomplished through education and awareness programs.

**Policy Measures**

Available measures to promote efficient vehicle speeds include:

- Encourage the State and other appropriate agencies to support the establishment and enforcement of a lower speed limit (e.g., 55 mph) on the regional transportation system (SANDAG)
- Promote fuel-efficient or “eco-driving” practices, such as reducing idling, slower driving speeds, and gentle accelerations, as a new driver education program or integrated with existing programs (SANDAG and local governments)

**Goal 3. Promote Use of Low Carbon, Alternative Fuels**

In addition to coordinated land use and transportation planning, the San Diego region can reduce GHG emissions by promoting the use of alternative “low carbon” transportation fuels. While efforts related to low carbon fuels are primarily happening at the state and federal levels and in the private sector, the region can promote their implementation by facilitating infrastructure siting and streamlined permitting for infrastructure installation.

SANDAG is a logical entity for helping to coordinate, plan and identify suitable locations for alternative fuel infrastructure. As a regional planning agency, SANDAG can ensure that alternative fuel considerations are integrated with development of the regional transportation network and recommend specific alternative fuel and vehicle technologies for different transportation sectors that are tailored to the unique characteristics of the region. Local governments have authority over siting and permitting of alternative fuel vehicle infrastructures.

State and federal energy policy provides significant opportunities for the region to increase the deployment of alternative fuel vehicles and infrastructure, including funding and tax credits. Moreover, a variety of alternative fuel vehicles in multiple vehicle classes are available now or will be in the near future, including factory-made and commercially available vehicles from major automobile manufacturers and after-market vehicle conversions and retrofits. Much government funding, research, and private sector investment is focused on the development of plug-in hybrids, electric vehicles, and biofuels. In addition, hydrogen, natural gas, and propane are also the focus of public and private sector research and dollars.
The promotion of low carbon, alternative fuels provides the added benefit of reducing regional reliance on imported petroleum. The federal Energy Independence and Security Act of 2007 identified increased vehicle efficiency and increased supply of alternative fuels as two measures to enhance national energy security and reduce the nation’s reliance on petroleum imports. By coordinating a regional alternative transportation infrastructure effort and supporting local alternative fuel developers, SANDAG and local governments can help the San Diego region become more energy independent.

SANDAG has developed relationships with a variety of regional stakeholders regarding alternative fuels, including the San Diego Regional Clean Fuels Coalition and the Clean Transportation Program at SDG&E. SANDAG will also partner in the recently-announced American Recovery and Reinvestment Act (ARRA) funded project between eTec and Nissan North America (eTec Nissan project) to deploy up to 1,000 all-electric vehicles and establish up to 2,250 private and publicly accessible charging points in the San Diego region as part of the largest transportation electrification project in U.S. history.

**Policy Measures**

Available measures to promote the use of alternative fuel vehicles include:

- Create an action plan that incorporates alternative fuel vehicles into SANDAG and local government-owned vehicle fleets, and the vehicle and equipment fleets of contractors and funding recipients, such as the vehicle fleet for the SANDAG Regional Vanpool Program or for local government trash haulers (SANDAG and local governments)
- Develop a regional approach to infrastructure planning for alternative fuels by facilitating continued development of a public-private strategic alliance (SANDAG)
- Support electricity and natural gas tariffs that encourage their use as transportation fuels (SANDAG and local governments)
- Develop streamlined permitting requirements and standardized design guidelines and siting criteria for all types of electric charging stations (e.g., single- and multi-family residential, commercial, public access, etc.) (SANDAG and local governments)
- Accelerate the transition to plug-in hybrid electric and battery electric vehicles by developing a regional plan for the installation of a public access electric car charging network, as recommended in the Regional Alternative Fuels, Vehicles, and Infrastructure Report (SANDAG)
- Work with SDG&E to understand the potential impacts of widespread plug-in hybrid and electric vehicle deployment on the electricity grid (SANDAG)

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**Goal 4. Protect Transportation Infrastructure from Climate Change Impacts**

In addition to being the number one source of climate change emissions in our region, the transportation sector is also threatened by the impacts of climate change. More frequent extreme hot days and prolonged extreme heat periods would increase the risk of buckling of highways and warping of railroad tracks, along with general premature deterioration or failure of transportation infrastructure. More frequent and more severe wildfires followed by rainfall can increase the risk of mudslides which can disrupt major infrastructure like roadways and rail lines. Accelerated sea level rise and stronger storm surges are likely to cause some of the greatest impacts on California’s transportation infrastructure including vital lines of coastal transportation, densely developed urban areas, ports, airports, and other lifeline transportation systems.
Adapting transportation infrastructure to prepare for climate change is emerging as a new concern for designing future projects as well as maintaining our current system. As such, the tools and methodologies for evaluating and adapting to impacts are still in the early stages of development. (12).

**Objective 4a. Protect transportation infrastructure from damage due to extreme heat**

**Policy Measures**

- Direct research at developing materials for transportation infrastructure that is better suited to withstand high temperatures.
- Accelerate inspections schedules and prepare for increased maintenance and costs.
- Utilize adaptive management and monitoring to determine which, if any, adaptive strategies should be incorporated in transportation planning.
- Address adaptation issues in the design of new projects and when improvements are made to existing infrastructure.

**Objective 4b. Protect transportation infrastructure from sea level rise and associated higher storm surges**

**Policy Measures**

- Develop a climate vulnerability plan that will identify areas in San Diego at high risk of damage from sea level rise and storm surges.
- Modify standards for project design and construction to account for increased potential storm surge elevations and frequency.
- Engage a multi-disciplinary team of climate change and coastal experts along with hydraulics and bridge design specialists during scoping process of coastal bridge projects.
- Utilize adaptive management and monitoring to determine which, if any, adaptive strategies should be incorporated in transportation planning.
- Address adaptation issues in the design of new projects and when improvements are made to existing infrastructure.

**Objective 4c. Protect transportation infrastructure from wildfire-associated mudslides**

**Policy Measure**

- Improve bank stabilization and erosion control measures near important transportation lines after wildfires.
- Address adaptation issues in the design of new projects and when improvements are made to existing infrastructure.
Conservation, energy efficiency, and clean onsite generation reduce GHG emissions. The easiest ton of greenhouse gases to remove from the atmosphere is one that is not emitted in the first place. State agency and regional utility actions are responsible for the majority of reductions in the energy sector, but there are actions that regional and local governments can take to leverage existing policies and programs to achieve additional GHG savings.

Electricity generation and natural gas end-uses (e.g., space and water heating) account for about one-third (33 percent) of GHG emissions in the San Diego region. Factors contributing to the level of emissions from electricity include total consumption and fuel sources. About two-thirds (67 percent) of the fuel used to generate electricity consumed in the region are fossil fuels like natural gas and coal. Factors contributing to GHG emissions from energy include:

1. The carbon intensity and location of energy supplies,
2. The efficiency of power plants and the transmission network,
3. The efficiency of buildings, and
4. The efficiency of end-use equipment.

Recommended regional and local government energy policies focus on the following:

- Improved energy planning
- Reducing energy consumption
- Expanding clean energy supply

The State’s Climate Change Scoping Plan identifies local government measures to reduce inefficient energy use from municipal operations and the community-at-large. Local governments have authority to adopt mandatory and voluntary reach codes that require higher degrees of energy efficiency and lower GHG emissions than state codes require. According to a 2009 GHG analysis performed by the Energy Policy Initiatives Center (EPIC) at the University of San Diego, significant potential for regional GHG savings are found by improving the efficiency of existing buildings and new construction (reducing energy consumption), and increasing installation of distributed energy systems like solar photovoltaics, combined heat and power (CHP), and solar water heating. Figures 2 and 3 show regional electricity and natural gas consumption by end-use sector. Commercial and residential sectors consume the most energy and are forecasted to produce the most GHG emissions from electricity and natural gas end uses.

**GOAL 1. REDUCE ENERGY USE IN RESIDENTIAL AND COMMERCIAL BUILDINGS**

Reducing energy use through efficiency is the first priority in the state’s preferred loading order. Energy efficiency provides direct and measurable benefits like cost savings for the end user and reduced GHG emissions for a community. One way local governments can do this is through their ability to regulate existing buildings and new construction. The EPIC analysis shows the vast majority (89 percent) of energy savings potential lies in the region’s existing building stock, with more modest savings potential (11 percent) through new construction.
Existing state and utility programs to reduce electricity and natural gas consumption include building and appliance standards routinely strengthened, wide-ranging energy efficiency and renewable energy programs, and the purchase of renewable energy supplies to meet future electricity demand and replace more carbon intensive options.

The goals and actions outlined here complement the measures detailed in the SANDAG Regional Energy Strategy (RES), which was approved by the Board of Directors in December 2009. The RES includes expanded discussions of these topics.

**Figure 2. Projected Electricity Consumption (Gigawatt-hours), 2007-2030**

![Projected Electricity Consumption Chart](image)

Source: Energy Policy Initiatives Center, University of San Diego, 2008. SANDAG Regional Energy Strategy, Figure 4-3, 2009.

**Figure 3. Existing and Projected Natural Gas Consumption, 2007-2030**

![Projected Natural Gas Consumption Chart](image)

Source: Energy Policy Initiatives Center, University of San Diego, 2008. SANDAG Regional Energy Strategy, Figure 4-6, 2009.

**Green Building Practices**

Green buildings reduce energy consumption, use water more efficiently and utilize materials with recycled content, thus saving money, natural resources, and GHG emissions. Many local governments have adopted voluntary or mandatory reach codes equivalent to the Leadership in Energy and Environmental Design (LEED) green building standards. To ensure the greatest reductions in GHG emissions from green building programs, minimum levels of energy efficiency should be required.

In 2004, Governor Schwarzenegger signed Executive Order S-20-04 regarding Green Buildings, which sets a goal of reducing energy use in state-owned buildings by 20 percent by 2015 (from a 2003 baseline) and encourages the private commercial sector to set the same goal. The state’s Green Building Action Plan provides policy guidance and strategies for how the state will meet this goal.

In January 2010, California became the first state in the nation to adopt mandatory Green Building Standards Code (CALGREEN) requiring all new buildings in the state to be more energy efficient and environmentally responsible. CALGREEN is part of Title 24, California’s building energy code, which will be—and it will be effective as of January 1, 2011.
CALGREEN requires every new building constructed in California to reduce water consumption by 20 percent, divert 50 percent of construction waste from landfills, and install low pollutant-emitting materials. According to CARB, these provisions will reduce GHG emissions by approximately 3 million metric tons equivalent in 2020. The California Green Building Directory is an online informational tool providing details about state-owned green buildings that are energy-efficient and environmentally friendly.

Objective 1a. Retrofit Existing Buildings to Reduce Energy Use

Six actions were identified in the Regional Energy Strategy that local and regional government should address as top energy priorities. One is to develop a regional building retrofit program to reduce inefficient electricity and natural gas use in our existing building stock. The EPIC analysis identified the residential sector as having the greatest potential for total energy savings at 48 percent, and the commercial sector representing 24 percent.

A priority of the RES is the retrofit of the region’s existing building stock. The EPIC analysis identified the residential sector as having the greatest potential for total energy savings at 48 percent, and the commercial and industrial sectors representing 24 percent and 17 percent of potential savings, respectively.

A large proportion of the region’s existing buildings were constructed prior to full implementation of the state’s minimum building energy code (Title 24): approximately sixty percent of residential buildings and forty percent of the commercial buildings. Because the useful life of buildings typically spans decades, a significant number of existing buildings will still be in use in 2030.

Comprehensive programs that integrate all potential energy-saving aspects for a building, creating prioritized packages of measures, achieve larger GHG reductions than singular programs. Also, financing to undertake building retrofits is becoming more available through Property Assessed Clean Energy (PACE) programs, also known as AB 811-style programs in California. PACE programs allow local governments to offer sustainable energy project loans to eligible property owners.

Comprehensive programs that integrate all potential energy-saving aspects for a building, creating prioritized packages of measures, achieve larger GHG reductions than singular programs. In California, financing to undertake building retrofits is becoming more available through Property Assessed Clean Energy (PACE) programs, also known as AB 811 programs. PACE programs allow local governments to offer sustainable energy project loans to eligible property owners. Financing programs need to be identified that address the upfront costs of retrofits.

Policy Measures

- Provide energy efficiency planning assistance to local governments through the Sustainable Region Program with SDG&E (SANDAG)
- Establish or support building energy rating and disclosure policies that inform building owners of their energy usage (SANDAG or local governments)
- Promote policies that lead to energy efficiency retrofits in existing buildings (SANDAG and local governments)
- Support increased use of solar water heating in residential, pool, and commercial uses to offset natural gas demand (e.g., pre-plumb policies) (SANDAG or local governments)
- Create financing programs to pay for energy projects and improvements that reduce GHG emissions (SANDAG or local governments)
Objective 1b. Maximize Efficiency in New Residential and Commercial Construction

The EPIC’s GHG analysis of local government policy options to reduce GHG emissions found that energy efficiency beyond Title 24 requirements (i.e., reach codes) could achieve moderate emissions reductions at a low cost in the commercial sector, and much lower GHG savings at a higher cost in the residential sector. Voluntary and mandatory reach codes for new commercial and residential construction yield less GHG savings due to the small amount of new construction as a proportion of the total building stock and the fact that California’s building energy code is stringent and updated regularly.

A big bold strategy of the state’s Long-term Energy Efficiency Strategic Plan calls for Zero Net Energy (ZNE) buildings. Through a combination of energy efficient design features and onsite clean distributed generation, ZNE buildings result in no net purchases from the electricity or gas grid, thereby avoiding the associated GHG emissions from power plants and the grid. Increased installation of high-efficiency technologies like solar hot water heaters and combined heat and power systems are strategies to offset natural gas use and meet energy needs more efficiently.

Policy Measures

- Develop a policy to include energy star appliances in new construction (local governments)
- Exceed Title 24 energy requirements for new construction through regulations or incentives that work toward the state’s goal of zero net energy new homes by 2020 and zero net energy new commercial buildings by 2030 (local governments)
- Increase enforcement of building energy requirements to reduce the rate of noncompliance (local governments)

Goal 2. Increase Use of Renewable Energy

Increasing the use of renewables and distributed energy systems is the state’s second priority for meeting our resource needs. Clean, nonrenewable onsite power like combined heat and power systems also are needed to reduce the GHG intensity of energy consumed in the region, which concurrently also reduced GHG emissions. Local governments have the opportunity to supplement ongoing state and utility efforts to increase the use of renewable energy and help the region achieve additional GHG emissions reductions by encouraging or requiring installation of on-site renewable and combined heat and power systems.

Objective 2a. Promote installation of clean, onsite energy systems

Distributed energy systems like rooftop solar photovoltaics, fuel cells, and combined heat and power systems can produce electricity during peak times and reduce demand on the electricity grid. Distributed energy systems are small-scale power generation technologies located close to the load being served. These decentralized systems are complementary to traditional electric power systems, can increase grid reliability and reduce the need for additional central peaking units. Additionally, installing energy efficient equipment prior to purchase of an onsite power system reduces the carbon intensity of a building.

Policy Measures

- Revise, or support revision of, local zoning policies, homeowner association codes, and other codes to remove hindrances and promote installation of photovoltaic (PV) or other distributed renewable energy systems (e.g., require or provide incentives for new construction to pre-wire for PV installation) (SANDAG or local governments)
- Explore opportunities and applications for local governments to demonstrate advanced energy storage technologies at municipal sites (local governments)
- Combine energy assessments and energy efficiency improvements with installation of distributed energy systems to reduce system costs and maximize energy savings (SANDAG or local governments)
- Establish financing programs (using public or private sources) that residents and businesses can access to install distributed energy systems as well as conduct energy assessments and make energy efficiency retrofits to existing buildings (SANDAG or local governments)
- Monitor and support a feed-in-tariff or other policies that will facilitate increased, cost-effective installation of small-scale renewable energy systems like solar photovoltaics (SANDAG or local governments)
- Identify local barriers to distributed generation (DG) installations, including combined heat and power systems, and provide supportable and applicable solutions across jurisdictions to reduce confusion for builders, contractors, and officials, about technologies, costs and benefits (SANDAG or local governments)
- **Promote the use of high efficiency distributed generation technologies like combined heat and power (SANDAG or local governments)**
- **Conduct analysis of potential applications for CHP systems in the region (e.g., industrial, hotel, etc.) (SANDAG or local governments)**
- Encourage local home builders to participate in the New Solar Homes Partnership to install solar photovoltaics on new homes in the region (SANDAG or local governments)

**Objective 2b. Promote large-scale renewable energy projects**

The EPIC analysis used in support of this strategy, identified increases in large-scale renewable energy as the top GHG reduction strategy for the energy sector (the state’s Pavley Standard that improves vehicle efficiency is the first), consistent with analysis of the California Air Resources Board's San Diego region. The primary way to accomplish this is through utility-scale renewable energy systems like wind farms and solar power arrays. California’s Renewables Portfolio Standard (RPS) originally required retail sellers of electricity to procure 20 percent of retail sales from renewable energy by 2017. The 20 percent RPS requirement was later accelerated to the end of 2010 and a 33 percent requirement for 2020 was recommended by multiple state agencies and is in the process of being implemented. SANDAG and local governments can support increased large-scale renewable energy use as described below. More detail on supporting large-scale renewable energy is provided in the Regional Energy Strategy.

**Policy Measures**

- Identify potential locations in the region that could accommodate utility-scale renewable energy infrastructure (SANDAG or local governments)
- Explore options to pre-permit zones of appropriate land for renewable energy development (SANDAG or local governments)
- Support cost-effective transmission access and related infrastructure that will help the region meet or exceed requirements for procuring renewable resources while protecting environmental and other resources (SANDAG or local governments)

**Goal 3. Reduce Water-Related Energy Use and GHG Emissions.**

In the San Diego region, water and energy resources are closely connected. Large amounts of energy are needed to pump, treat, deliver, and recycle water, in addition to customer end-uses like heating and cooling water. Power plants primarily use water for cooling, which can impact local water supplies. The preceding section, Smart Growth Land Use and Low Carbon Transportation, describes the relationship among land development patterns, water use, and related energy use and GHG emissions.
California’s water systems are highly embedded with energy relative to national averages. The state’s major conveyance systems move water to end users over hundreds of miles and thousands of feet in elevation. The State Water Project (SWP) consumes energy by pumping water 2,000 feet over the Tehachapi Mountains -- the highest lift of any water system in the world.

The San Diego region currently imports more than 80 percent of its water and is at the farthest, most energy intensive, end of the SWP and Colorado River Aqueduct. Imported water from the SWP and Colorado River will likely be constrained by various factors including enforcement of the Colorado River Compact, environmental restrictions on water from the SWP, and the impacts of climate change such as reduced snowpack levels in the Sierra Nevada.

There are various strategies for satisfying additional water demand as the region continues to grow, each of which is embedded with different amounts of energy use and GHG emissions. These strategies include conservation, recycling, additional imports, and desalination. The estimated energy intensity of each strategy should be included in the consideration of various water choices. In 2005, the California Energy Commission estimated energy intensity of water strategies provided below, expressed in kilowatt hours of electricity per acre foot of water (kWh/af). Estimated energy intensity of each strategy according to the California Energy Commission, expressed in kilowatt hours of electricity per acre foot of water (kWh/af), is provided below.

- Status quo: 6,900 kWh/af
- Conservation: 6,030 kWh/af
- Recycling: 6,620 kWh/af
- Imperial Irrigation District Transfer: 6,940 kWh/af
- Additional State Water Project: 7,100 kWh/af
- Seawater desalination: 7,260 kWh/af

Generally speaking, water conservation and recycling have the lowest embedded energy and GHG emissions of available options for meeting future water demand.

**Objective 3a. Integrate measures that save both water and energy into any regional building retrofit program(s)**

As of 2005, water-related energy use annually accounts for 19 percent of the state’s electricity consumption, 30 percent of non-power plant natural gas consumption, and use of 88 million gallons of diesel fuel. Peak demand for water generally coincides with peak demand for electricity. The California Energy Commission identifies water conservation and efficiency as the best, most energy efficient way to serve future demand.

**Policy Measures**

- Coordinate efforts to reduce water and energy use with the San Diego County Water Authority, local water districts and other agencies including the US Environmental Protection Agency’s WaterSense program (SANDAG or local governments)
- Increase energy conservation and efficiency of water end-uses in the residential and commercial sectors, with priority on the largest end uses of water (e.g., landscape irrigation, toilets, and showers) and the water end-uses with the most embedded energy (e.g., dishwashers, residential clothes washers, and commercial laundries) (local government)
- Identify existing and new financing mechanisms (e.g., on-bill financing [property tax or utility] and low interest loans) that end users can utilize to reduce water-related energy consumption (e.g., purple pipe to support use of reclaimed water) (SANDAG or local governments)
- Promote energy efficiency, demand response and clean onsite generation efforts to local governments that own or operate water pumping stations and water or wastewater treatment facilities (SANDAG or local governments)
Objective 3b. Use reclaimed water to decrease the amount of GHG emissions attributed to meeting regional water needs

Water reclamation is the fastest growing source of new supplies in the state. After treatment to stringent health and quality standards, recycled water can displace use of fresh water for power plant cooling, industrial processes, landscape irrigation, and groundwater replenishment. The San Diego region has made substantial investment in water reclamation.

The City of San Diego has constructed two reclamation facilities – North City Water Reclamation Plant and South Bay Water Reclamation Plant. The cities of Encinitas and Solana Beach, acting as the San Elijo Joint Powers Authority, operate the San Elijo Water Reclamation Facility, a wastewater treatment and water reclamation plant. In addition, two recycled water reservoirs provide operational storage for the water reclamation program.

Indirect Potable Reuse (IPR) is another method for using reclaimed water. For example, Orange County has operated a facility since January 2008. As of the writing of this document, the City of San Diego is undertaking a pilot Indirect Potable Reuse (IPR) project to determine the viability and cost-effectiveness of treating existing city-owned wastewater to potable standards and distributing via the existing potable water distribution system. Reuse of processed reclaimed water can reduce GHG emissions to the extent it displaces more energy intensive water supply options in the region. Reuse of processed reclaimed water would save energy and reduce GHG emissions to the extent it displaces the embedded energy of water supply that would have otherwise been used to meet water demand.

Policy Measures

- Support or identify uses for existing unused reclaimed water to decrease the amount of water imported to the San Diego region (SANDAG or local governments)
- Support projects to meet water demand by treating and reusing processed reclaimed water to potable water standards, such as the City of San Diego Indirect Potable Reuse (IPR) project (SANDAG and local governments)
- Identify and support programs for residential re-use of gray water to decrease the amount of energy needed to meet residential water needs (SANDAG or local governments)
- Support landscape design educational programs to help residential and commercial customers install low water use landscaping, thereby reducing water-related energy use (SANDAG or local governments)

GOAL 4. PROTECT ENERGY INFRASTRUCTURE FROM CLIMATE CHANGE IMPACTS

For the San Diego region, protecting energy infrastructure from climate change impacts will focus largely on impacts related to hotter temperatures, longer and more extreme heat waves, and sea level rise. Electricity and natural gas demand is highest when the temperature is high. Hot temperatures increase peak demand for electricity and make the electricity grid less efficient. By 2050, peak electricity demand is expected to increase by 60 percent to 75 percent, particularly during summer months when air conditioners are running. Because much of San Diego’s population growth is currently projected to occur in hotter inland areas over the next few decades, total electricity demand could strain the existing system and potentially lead to power outages.
By 2050, average sea level is projected to rise one to one and one half feet, which would cause lasting changes to the coastline. Substations, natural gas distribution lines and power lines in low-lying places could face loss or damage. By 2050, average sea level is projected to rise one to one and one half feet, making lasting changes to the coastline. Low-lying shoreline streets and buildings will be flooded more regularly, causing damage to property and infrastructure. Other low-lying places like the airport, the port, and military stations also will face flooding and associated loss or damage to energy infrastructure, especially during high surf and winter storm periods. Although the study of adaptation needs for electricity and natural gas infrastructure is outside the scope of this strategy, SANDAG and local governments should routinely reach out to SDG&E, the California Public Utilities Commission (CPUC), California Energy Commission and others as needed to understand how they are approaching adaptation issues affecting energy infrastructure critical to our region.

Objective 4a. Support modernization of the electricity grid.

Climate change impacts on the electricity system can be reduced by implementing the “smart grid” (i.e., modernizing the electricity grid with smart meters, smart end-use devices, and interactive communication technologies). Smart grid technologies can provide basic information about grid system performance that is not currently available, including problems with power lines and blackouts. Modern technologies will provide better infrastructure monitoring capabilities. In addition, pilot smart metering projects in the San Diego region and across the state have shown that consumers provided with information about their energy use and the actual cost of electricity based on the time of use, modified their consumption and reduced peak demand. The smart grid is one of the energy goals in the Regional Energy Strategy (RES) and is discussed in detail there.

Policy Measures

- Support mechanisms that encourage installation of smart appliances that interface with smart meters and provide real time electricity pricing information to consumers (SANDAG or local governments)
- Support rate structures that reflect the real time price of electricity (SANDAG or local governments)
- Support the rollout of advanced metering infrastructure that enables electric vehicles, distributed generation systems, and electricity consumption to be accurately monitored by end-users and the utility (SANDAG or local governments)
- Support educational information on the smart grid and smart meters (SANDAG or local governments)

Objective 4b. Utilize demand response and energy efficiency measures to reduce GHG emissions during peak periods.

Demand response measures entail reducing electricity and natural gas usage during peak demand periods. Shifting energy use away from peak periods can mitigate the need to run less efficient and higher GHG emitting power plants. Lower peak demand can improve air quality for the region, particularly in areas near peak electricity-producing power plants. Energy efficiency and demand response are each discussed in detail in the Regional Energy Strategy.

Policy Measures

- Participate in peak demand reduction programs and undertake peak demand reduction measures at local government facilities (local governments)
- Support a regional building retrofit program that can reduce overall and peak energy and water use in older structures (SANDAG and local governments)
- Exceed Title 24 energy requirements for new construction through policy or incentives that work toward an overall goal of zero net energy new homes by 2020 and zero net energy new commercial buildings by 2030 (local governments)
- Support fair and reasonable rate designs and incentives that encourage customers to reduce overall electricity consumption as well as during peak demand periods (SANDAG or local governments)
- Provide information and resources about peak demand and climate change, as well as environmental and monetary costs associated with peak electricity demand (SANDAG or local governments)

**Objective 4c. Study range of impacts on energy infrastructure.**

Research is starting to examine the impacts of climate change on the availability of wind power, which in 2009 accounted for about five percent of the total power mix for San Diego. (11). But the projected climate impacts on wind are highly uncertain at this time. Climate change will likely improve conditions for generating solar energy with increased number of warm and sunny days. Changes in precipitation resulting in changes to stream flow will impact hydroelectric generating facilities, particularly during the peak summer months when reservoirs are experiencing low water levels. Accelerated sea level rise and stronger storm surges are likely to cause impacts on any remaining coastal power plants.

**Policy Measures**

- Request periodic briefings from the utility (e.g., SDG&E), the California Public Utilities Commission (CPUC), and California Energy Commission on long-term adaptation issues regarding energy infrastructure (SANDAG or local governments)
- Monitor or participate in state agency adaptation efforts (SANDAG or local governments)
- Coordinate adaptation planning with other local and regional entities (SANDAG or local governments)
SANDAG and Local Government Operations

California’s Climate Change Scoping Plan encourages local governments to voluntarily adopt a GHG emissions reduction goal consistent with the statewide AB 32 target. This is equivalent to reducing communitywide GHG emissions to the 1990 level by the year 2020 (an approximate 15 percent reduction from the baseline 2006 level). Where 1990 data on a jurisdictional level is not available, local governments are encouraged to set a target using the most current and best available GHG emissions data for the jurisdiction.

City and county governments are essential partners to contributing to regional and statewide efforts to reduce GHG emissions because of their influence over significant local emissions sources, including land use, transportation, and energy. In addition, state agencies like the Attorney General’s office and various stakeholders are increasingly calling for the integration of climate change considerations into local government processes and decision-making, including their city and county operations, as well as large-scale planning and environmental documents (e.g., General Plan updates, Specific Plans, CEQA documents). Though small by comparison, emissions produced by local government buildings and facilities, vehicle fleets, employee commutes, and other operations offer an opportunity for local governments to lead by example. This section describes resources and approaches for SANDAG and local governments to reduce GHG emissions from their operations and in their communities (where applicable). This section also highlights examples of successful local government climate change efforts.

Goal 1. SANDAG and Local Governments Lead by Example

The California Air Resources Board (CARB), in partnership with the California Public Utilities Commission (CPUC), California Energy Commission, and others has developed a Local Government Toolkit to provide a “one-stop-shop” of guidance and resources to help city and county governments address climate change through local planning and action. The Toolkit’s strategies focus on local government actions that reduce emissions both from government operations and communitywide sources. The California Energy Commission also has updated its Energy Aware Planning Guide which provides additional helpful tools for local governments.

Objective 1a. Local governments prepare and adopt Climate Action Plans.

To help identify and prioritize opportunities to reduce GHG emissions from both municipal operations and more broadly from communitywide emissions, local governments can consider developing a climate action plan. The process of developing a climate action plan can facilitate a collaborative approach to achieving GHG emissions reductions through establishing goals and objectives, comparing short- and long-term strategies based on a number of factors (like cost-benefit), and identifying unique opportunities and circumstances in the community.

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<tr>
<th>California Cities and Counties with Climate Change Plans or GHG Inventories</th>
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Source: Governor’s Office of Planning and Research, October 30, 2009
ICLEI-Local Governments for Sustainability USA, a membership organization of local governments addressing climate change, identifies five milestones associated with local climate action planning. The five milestones provide a flexible framework that can accommodate varying levels of analysis, effort, and availability of data. Local governments interested in developing an action plan according to the five milestones can receive assistance by joining ICLEI.

Milestone 1 – Conduct a Baseline Emissions Inventory
Milestone 2 – Adopt an Emissions Reduction Target
Milestone 3 – Develop a Local Action Plan
Milestone 4 – Implement Policies and Measures
Milestone 5 – Monitor and Verify Results

City of Chula Vista: Climate Action Leader

The City of Chula Vista was one of the first participants in ICLEI’s climate change initiatives, joining in 1992 and drafting its first climate action plan in 1994 and updating it in 2000. In 2001, the Chula Vista City Council approved an energy plan comprised of eight energy management strategies that advance the interests of residents and businesses in energy conservation, supply, and procurement. The city has worked with ICLEI and the California Climate Action Registry to implement its Climate Action Plan. Chula Vista monitors its progress by performing annual emission inventories. In 2009, Chula Vista was the first public agency in San Diego County to receive the “Climate Action Leader” designation from the California Climate Action Registry.

San Diego Regional Climate Protection Initiative

The San Diego Regional Climate Protection Initiative is a partnership between the San Diego Foundation, ICLEI-Local Governments for Sustainability, and local governments in San Diego County. The Initiative was established in 2009 to provide a regional platform for local governments to follow ICLEI’s Five-Milestone climate planning process. Through the Initiative, ICLEI worked with the cities of Carlsbad, Encinitas, Imperial Beach, La Mesa, National City, Poway, San Marcos, Solana Beach, Vista, and the County of San Diego to perform GHG inventories and forecasts; deliver trainings on climate mitigation and adaptation planning; and facilitate an information-sharing regional network. The project also supports workforce development for emerging professionals in the region through its “Climate Fellowship,” in which university students and recent graduates are placed in local government offices to conduct GHG inventories.

In 2009, ten local greenhouse gas inventories were completed and among the first in the state using CARB’s new Local Government Operations Protocol. The inventories included both government operations emissions and community-wide emissions, and were developed through coordination with various stakeholders in the region, including SANDAG, the Air Pollution Control District, and EPIC. Several local jurisdictions are now preparing Climate Action Plans based on these baseline inventories and forecasts.

California Climate Action Network

The Institute for Local Government (ILG) California Climate Action Network (CCAN) has produced a Best Practices Framework offering suggested policy actions to reduce GHG emissions in ten “Climate Leadership Opportunity Areas,” both in agency operations and the community at large.
Policy Measures

The following policy measures could be evaluated as individual programs or as part of a broader set of local government climate action strategies.

- Establish a cross-department team to address climate change mitigation and adaptation (local governments)
- Identify financing mechanisms to support climate change planning, such as low and no cost help from ICLEI, SANDAG’s Sustainable Region Program, and grant opportunities (SANDAG and local governments)
- Complete an inventory of municipal and community-wide GHG emissions (SANDAG and/or local governments)
- Develop and adopt a local climate action plan (local governments)

Objective 1b. SANDAG assess energy use of its operations

As detailed through the first half of the Strategy, SANDAG, with its member agencies, must determine how to meet requirements to reduce GHG emissions from cars and light trucks in the region. In addition, SANDAG can have its own operations assessed to determine the agency’s energy use and GHG emissions. With that data, SANDAG can lead by example by setting a GHG reduction target for its commercial building use, office equipment, vehicles and other daily functions. SANDAG can account for the GHG emissions generated by its employee commutes and identify opportunities to reduce its impact. As the metropolitan planning organization and council of governments, SANDAG does not have municipal buildings under its control (e.g., libraries, community centers, police stations and city halls) and SANDAG does not hold land-use authority to adopt building codes and other policy measures that would require changes in land use planning. SANDAG can continue to provide guidance through the development of strategies like this one and the Regional Energy Strategy, to better inform regional decision makers about choices they can make.

Policy Measures

The following policy measures could be evaluated as individual programs or as part of a broader set of regional climate action strategies.

- Establish a cross-department team to address climate change mitigation and adaptation (SANDAG)
- Regularly update a county-wide inventory of municipal and community-wide GHG emissions (SANDAG and/or local governments)
- Perform an energy assessment of SANDAG operations (SANDAG)
- Based on the assessment, identify opportunities to reduce inefficient use of electricity, natural gas and petroleum in SANDAG operations (SANDAG)

Objective 1cb. SANDAG and Local governments use cleaner energy supplies and reduce energy use

Local governments can lead by example by reducing their own energy use and using cleaner supplies like renewable energy and other distributed generation systems. It is easier to approach local businesses and residents about reducing GHG emissions if the local government has taken on this responsibility first. Reducing energy use also has direct and measurable benefits including cost savings that can be applied to other projects.
Energy use can be reduced by two related strategies: conservation and energy efficiency. Energy conservation refers to behavior changes that decrease energy use, such as turning off lights and changing thermostat settings. Energy efficiency includes programs that require buildings and appliances to be constructed in a manner that uses less energy, provide incentives for purchasing energy efficient equipment, and provide information and education to encourage people to save energy. Energy efficiency refers to structural changes, such as replacing appliances with more efficient models or tuning up building systems to improve their energy performance.

Cleaner energy supplies include small-scale power generation technologies such as photovoltaics, small wind turbines, and cogeneration systems located close to where energy is being used. Advantages of distributed energy systems include increased grid reliability, energy price stability, and reduced GHG emissions.

Transportation-related measures to reduce GHG emissions can increase mobility options and reduce the carbon intensity of fuel options. Reducing transportation demand also can be achieved by policies and programs such as telecommuting, alternative work schedules, carpooling or vanpooling, parking pricing, walking and biking.

Local Resources

SANDAG Sustainable Region Program: “Energy Roadmaps for Local Governments”

Beginning in 2010, SANDAG has undertaken an energy efficiency partnership with SDG&E that assists local governments by providing building energy assessments and energy management plans. SANDAG and SDG&E are calling these energy management plans “Energy Roadmaps” because they benchmark municipal energy usage and identify a framework that local governments can use to improve efficiency while reducing GHG emissions. The roadmaps identify energy-saving measures that can be integrated into local planning and permitting processes, ordinances, outreach and education efforts, and municipal operations. Additionally, the roadmaps include measures that local governments can implement for residents, businesses, and community-wide. This is a three-year expansion of the SANDAG’s Sustainable Region Program (SRP), which began as a pilot with the City of Carlsbad in Fiscal Year FY 2005.

During 2005 and 2006, the pilot SRP with the City of Carlsbad, identified almost $200,000 in available energy savings through cost-effective energy efficiency measures, and the City was able to save almost 500,000 kWh in energy consumption through local energy efficiency programs. Carlsbad continued to implement energy-saving measures after the pilot ended and has since achieved greater savings.

Additionally, the City of San Diego, and County of San Diego, and City of Chula Vista have had energy-saving, GHG-reducing partnership programs for several years. In 2008, they jointly produced a guidebook for municipal energy efficiency programs: Best in Class. SANDAG will be coordinating with these local government partners.

City of San Diego: Climate Change and the General Plan

In March 2008, the city adopted a General Plan Update that addressed climate change. Within its conservation element, information about climate change and city actions to address it were included. The conservation element included a table listing how climate change mitigation was addressed in several plan elements: Conservation, Land Use and Community Planning, Mobility (Circulation), Recreation, Public Facilities, Services and Safety, and Urban Design.
Since the 1970s, California has promoted energy efficiency through policies and programs that require buildings and appliances to be constructed in a manner that uses less energy. In September 2009, the CPUC approved the newest energy efficiency program cycle spanning 2010 – 2012. The CPUC established a three-year budget of $3.1 billion for Southern California Edison (SCE), Pacific Gas and Electric Company (PG&E), SDG&E, and Southern California Gas Company (SCG) to implement energy efficiency programs. This was the largest commitment ever made by a state to energy efficiency. The state estimates that this funding can create between 15,000 and 18,000 skilled green jobs statewide.

The energy efficiency programs are funded through a public goods charge on ratepayer utility bills. The local government partnerships also receive grant funding from this. These programs include technical assistance, rebates and incentives for various energy efficiency measures, and education and training.

In 2007, the state launched Go Solar California to bring customer awareness to the CPUC California Solar Initiative (CSI), the Energy Commission New Solar Homes Partnership (NSHP), and solar incentive programs offered by publicly-owned utilities. The CSI offers rebates to existing homes and non-residential energy customers installing solar systems in investor-owned utility (IOU) service areas. The NSHP offers incentives for home builders to construct solar homes. The goals of the program are to achieve 400 MW of installed solar capacity by the end of 2016, create a self-sustaining solar market without the need for government incentives, and foster sufficient market penetration in the new residential market so that 50 percent or more of new housing built by 2016 and thereafter will include solar systems. The Self-Generation Incentive Program (SGIP) provides rebates for customers who install wind turbines and fuel cells. SB 412 (Statutes of 2009) revises this program to provide incentives for certain non-renewable distributed generation systems. SGIP is administered by the CPUC and implemented through the IOUs and the California Center for Sustainable Energy.

*iCommute Program*

*iCommute* assists regional commuters by providing free carpool and ride matching services, a subsidized vanpool program, transit solutions, the regional bicycle program, Guaranteed Ride Home service, SchoolPool carpooling programs for parents, and information about teleworking. *iCommute* also provides free assistance to local businesses and local governments to help them develop and implement customized employee commuter benefit programs that lower costs, increase productivity, and help the environment.

The goal of *iCommute* is to manage and reduce traffic congestion during peak-times, as well as reduce GHG emissions and other environmental pollutants that result from commuters driving to work each day alone. The program is managed by SANDAG as part of the regional 511 transportation information program.

**Policy Measures**

The following policy measures could be evaluated as individual programs or as part of a broader set of local government climate action strategies.

- Work with other local and regional governments to assess federal and state programs and their impact on GHG emissions and mitigation efforts (SANDAG or local governments)
- Review major policies and programs in the early stages of development to identify ways to reduce related GHG emissions (SANDAG or local governments)
- Establish monitoring and annual reporting responsibilities and procedures for performance on sustainability and climate change (SANDAG or local governments)
- Support the integration of alternative transportation fuels and vehicles into local government fleets and the fleets of contractors (SANDAG or local governments)
- Implement programs and provide incentives to encourage reduced emissions from employee commute, including telecommuting, alternative work schedules, carpooling/vanpooling, and active transportation (SANDAG or local governments)
- Utilize all available rebates and incentives for energy efficiency and distributed generation installations, such as state public good programs and solar programs (SANDAG or local governments)
- Solicit site specific proposals for city facilities and economic development opportunities that include energy efficiency and distributed generation (SANDAG or local governments)
- Convert street lighting, water pumps, water treatment and other energy intensive operations to more efficient technologies (SANDAG or local governments)
- Consider lifecycle GHG emissions in local government purchasing decisions, include as evaluation criteria in selecting vendors, contractors, service providers and the like (SANDAG or local governments)
REFERENCES


