

Addressing Climate Change at the Project Level California Attorney General's Office



Under the California Environmental Quality Act (CEQA), local agencies have a very important role to play in California's fight against global warming – one of the most serious environmental effects facing the State today. Local agencies can lead by example in undertaking their own projects, insuring that sustainability is considered at the earliest stages. Moreover, they can help shape private development. Where a project as proposed will have significant global warming related effects, local agencies can require feasible changes or alternatives, and impose enforceable, verifiable, feasible mitigation to substantially lessen those effects. By the sum of their actions and decisions, local agencies will help to move the State away from “business as usual” and toward a low-carbon future.

Included in this document are various measures that may reduce the global warming related impacts at the individual project level. (For more information on actions that local governments can take at the program and general plan level, please visit the Attorney General's webpage, “CEQA, Global Warming, and General Plans” at <http://ag.ca.gov/globalwarming/ceqa/generalplans.php>.)

As appropriate, the measures can be included as design features of a project, required as changes to the project, or imposed as mitigation (whether undertaken directly by the project proponent or funded by mitigation fees). The measures set forth in this package are examples; the list is not intended to be exhaustive. Moreover, the measures cited may not be appropriate for every project. The decision of whether to approve a project – as proposed or with required changes or mitigation – is for the local agency, exercising its informed judgment in compliance with the law and balancing a variety of public objectives.

Mitigation Measures by Category

Energy Efficiency

Incorporate green building practices and design elements.	The California Department of Housing and Community Development's Green Building & Sustainability Resources handbook provides extensive links to green building resources. The handbook is available at http://www.hcd.ca.gov/hpd/green_build.pdf. The American Institute of Architects (AIA) has compiled fifty readily available strategies for reducing fossil fuel use in buildings by fifty percent. AIA “50 to 50” plan is presented in both guidebook and wiki format at http://wiki.aia.org/Wiki%20Pages/Home.aspx.
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Meet recognized green building and energy efficiency benchmarks.	For example, an ENERGY STAR-qualified building uses less energy, is less expensive to operate, and causes fewer greenhouse gas emissions than comparable, conventional buildings. http://www.energystar.gov/index.cfm?c=business.bus_index. California has over 1600 ENERGY STAR-qualified school, commercial and industrial buildings. View U.S. EPA's list of Energy Star non-residential buildings at http://www.energystar.gov/index.cfm?fuseaction=labeled_buildings locator. Los Angeles and San Francisco top the list of U.S. cities with the most ENERGY STAR non-residential buildings. http://www.energystar.gov/ia/business/downloads/2008_Top_25_cities_chart.pdf. Qualified ENERGY STAR homes must surpass the state's Title 24 energy efficiency building code by at least 15%. Los Angeles, Sacramento, San Diego, and San Francisco-Oakland are among the top 20 markets for ENERGY STAR homes nationwide. http://www.energystar.gov/ia/new_homes/mil_homes/top_20_markets.html. Builders of ENERGY STAR homes can be more competitive in a tight market by providing a higher quality, more desirable product. See http://www.energystar.gov/ia/partners/manuf_res/Horton.pdf. There are a variety of private and non-profit green building certification programs in use in the U.S. See U.S. EPA's Green Building / Frequently Asked Questions website, http://www.epa.gov/greenbuilding/pubs/faqs.htm. Public-Private Partnership for Advancing Housing Technology maintains a list of national and state Green Building Certification Programs for housing. See http://www.pathnet.org/sp.asp?id=20978. These include the national Leadership in Energy and Environmental Design (LEED) program, and, at the state level, Build it Green's GreenPoint Rated system and the California Green Builder program. Other organizations may provide other relevant benchmarks.
Install energy efficient lighting (e.g., light emitting diodes (LEDs)), heating and cooling systems, appliances, equipment, and control systems.	Information about ENERGY STAR-certified products in over 60 categories is available at http://www.energystar.gov/index.cfm?fuseaction=find_a_product. The California Energy Commission maintains a database of all appliances meeting either federal efficiency standards or, where there are no federal efficiency standards, California's appliance efficiency standards. See http://www.appliances.energy.ca.gov/. The Electronic Product Environmental Assessment Tool (EPEAT) ranks computer products based on a set of environmental criteria, including energy efficiency. See http://www.epeat.net/AboutEPEAT.aspx. The nonprofit American Council for an Energy Efficient Economy maintains an Online Guide to Energy Efficient Commercial Equipment, available at http://www.aceee.org/ogeece/ch1_index.htm. Utilities offer many incentives for efficient appliances, lighting, heating and cooling. To search for available residential and commercial incentives, visit Flex Your Power's website at http://www.fypower.org/.

Use passive solar design, e.g., orient buildings and incorporate landscaping to maximize passive solar heating during cool seasons, minimize solar heat gain during hot seasons, and enhance natural ventilation. Design buildings to take advantage of sunlight.	See U.S. Department of Energy, Passive Solar Design (website) http://www.energysavers.gov/your_home/designing_remodeling/index.cfm/mytopic=10250. See also California Energy Commission, Consumer Energy Center, Passive Solar Design (website) http://www.consumerenergycenter.org/home/construction/solardesign/index.html. Lawrence Berkeley National Laboratories' Building Technologies Department is working to develop innovative building construction and design techniques. Information and publications on energy efficient buildings, including lighting, windows, and daylighting strategies, are available at the Department's website at http://btech.lbl.gov.
Install light colored "cool" roofs and cool pavements.	A white or light colored roof can reduce surface temperatures by up to 100 degrees Fahrenheit, which also reduces the heat transferred into the building below. This can reduce the building's cooling costs, save energy and reduce associated greenhouse gas emissions, and extend the life of the roof. Cool roofs can also reduce the temperature of surrounding areas, which can improve local air quality. See California Energy Commission, Consumer Energy Center, Cool Roofs (webpage) at http://www.consumerenergycenter.org/coolroof/. See also Lawrence Berkeley National Laboratories, Heat Island Group (webpage) at http://eetd.lbl.gov/HeatIsland/.
Install efficient lighting, (including LEDs) for traffic, street and other outdoor lighting.	LED lighting is substantially more energy efficient than conventional lighting and can save money. See http://www.energy.ca.gov/efficiency/partnership/case_studies/TechAsstCity.pdf (noting that installing LED traffic signals saved the City of Westlake about \$34,000 per year). As of 2005, only about a quarter of California's cities and counties were using 100% LEDs in traffic signals. See California Energy Commission (CEC), Light Emitting Diode Traffic Signal Survey (2005) at p. 15, available at http://www.energy.ca.gov/2005publications/CEC_400_2005_003/CEC_400_2005_003.PDF. The California Energy Commission's Energy Partnership Program can help local governments take advantage of energy saving technology, including, but not limited to, LED traffic signals. See http://www.energy.ca.gov/efficiency/partnership/.
Reduce unnecessary outdoor lighting.	See California Energy Commission, Reduction of Outdoor Lighting (webpage) at http://www.energy.ca.gov/efficiency/lighting/outdoor_reduction.html.

Use automatic covers, efficient pumps and motors, and solar heating for pools and spas.	During the summer, a traditional backyard California pool can use enough energy to power an entire home for three months. Efficiency measures can substantially reduce this waste of energy and money. See California Energy Commission, Consumer Energy Center, Pools and Spas (webpage) at http://www.consumerenergycenter.org/home/outside/pools_spas.html. See also Sacramento Municipal Utilities District, Pool and Spa Efficiency Program (webpage) at http://www.smud.org/en/residential/saving-energy/Pages/poolspa.aspx.
Provide education on energy efficiency to residents, customers and/or tenants.	Many cities and counties provide energy efficiency education. See, for example, the City of Stockton's Energy Efficiency website at http://www.stocktongov.com/energysaving/index.cfm. See also "Green County San Bernardino," http://www.greencountysb.com at pp. 4-6. Businesses and development projects may also provide education. For example, a homeowners' association (HOA) could provide information to residents on energy-efficient mortgages and energy saving measures. See The Villas of Calvera Hills, Easy Energy Saving Tips to Help Save Electricity at http://www.thevillashoa.org/green/energy/. An HOA might also consider providing energy audits to its residents on a regular basis.

Renewable Energy and Energy Storage

Meet "reach" goals for building energy efficiency and renewable energy use.	A "zero net energy" building combines building energy efficiency and renewable energy generation so that, on an annual basis, any purchases of electricity or natural gas are offset by clean, renewable energy generation, either on-site or nearby. Both the California Energy Commission (CEC) and the California Public Utilities Commission (CPUC) have stated that residential buildings should be zero net energy by 2020, and commercial buildings by 2030. See CEC, 2009 Integrated Energy Policy Report (Dec. 2009) at p. 226, available at http://www.energy.ca.gov/2009publications/CEC-100-2009-003/CEC-100-2009-003-CMF.PDF; CPUC, Long Term Energy Efficiency Strategic Plan (Sept. 2008), available at http://www.cpuc.ca.gov/PUC/energy/Energy+Efficiency/eespl/.
Install solar, wind, and geothermal power systems and solar hot water heaters.	The California Public Utilities Commission (CPUC) approved the California Solar Initiative on January 12, 2006. The initiative creates a \$3.3 billion, ten-year program to install solar panels on one million roofs in the State. Visit the one-stop GoSolar website at http://www.gosolarcalifornia.org/. As mitigation, a developer could, for example, agree to participate in the New Solar Homes program. See http://www.gosolarcalifornia.org/builders/index.html. The CPUC is in the process of establishing a program to provide solar water heating incentives under the California Solar Initiative. For more information, visit the CPUC's website at http://www.cpuc.ca.gov/puc/energy/solar/swh.htm. To search for available residential and commercial renewable energy incentives, visit Flex Your Power's website at http://www.fypower.org/.

Install solar panels on unused roof and ground space and over carports and parking areas.	In 2008 Southern California Edison (SCE) launched the nation's largest installation of photovoltaic power generation modules. The utility plans to cover 65 million square feet of unused commercial rooftops with 250 megawatts of solar technology – generating enough energy to meet the needs of approximately 162,000 homes. Learn more about SCE's Solar Rooftop Program at http://www.sce.com/solarleadership/solar-rooftop-program/general-faq.htm. In 2009, Walmart announced its commitment to expand the company's solar power program in California. The company plans to add solar panels on 10 to 20 additional Walmart facilities in the near term. These new systems will be in addition to the 18 solar arrays currently installed at Walmart facilities in California. See http://walmartstores.com/FactsNews/NewsRoom/9091.aspx. Alameda County has installed two solar tracking carports, each generating 250 kilowatts. By 2005, the County had installed eight photovoltaic systems totaling over 2.3 megawatts. The County is able to meet 6 percent of its electricity needs through solar power. See http://www.acgov.org/gsa/Alameda%20County%20-%20Solar%20Case%20Study.pdf. In 2007, California State University, Fresno installed a 1.1-megawatt photovoltaic (PV)-paneled parking installation. The University expects to save more than \$13 million in avoided utility costs over the project's 30-year lifespan. http://www.fresnostatenews.com/2007/11/solarwrapup2.htm.
Where solar systems cannot feasibly be incorporated into the project at the outset, build "solar ready" structures.	U.S. Department of Energy, A Homebuilder's Guide to Going Solar (brochure) (2008), available at http://www.eere.energy.gov/solar/pdfs/43076.pdf.
Incorporate wind and solar energy systems into agricultural projects where appropriate.	Wind energy can be a valuable crop for farmers and ranchers. Wind turbines can generate energy to be used on-site, reducing electricity bills, or they can yield lease revenues (as much as \$4000 per turbine per year). Wind turbines generally are compatible with rural land uses, since crops can be grown and livestock can be grazed up to the base of the turbine. See National Renewable Energy Laboratory, Wind Powering America Fact Sheet Series, Wind Energy Benefits, available at http://www.nrel.gov/docs/fy05osti/37602.pdf. Solar PV is not just for urban rooftops. For example, the Scott Brothers' dairy in San Jacinto, California, has installed a 55-kilowatt solar array on its commodity barn, with plans to do more in the coming years. See http://www.dairyherd.com/directories.asp?pgID=724&ed_id=8409 (additional California examples are included in article.)

Include energy storage where appropriate to optimize renewable energy generation systems and avoid peak energy use.	See National Renewable Energy Laboratory, Energy Storage Basics (webpage) at http://www.nrel.gov/learning/eds_energy_storage.html. California Energy Storage Alliance (webpage) at http://storagealliance.org/about.html. Storage is not just for large, utility scale projects, but can be part of smaller industrial, commercial and residential projects. For example, Ice Storage Air Conditioning (ISAC) systems, designed for residential and nonresidential buildings, produce ice at night and use it during peak periods for cooling. See California Energy Commission, Staff Report, Ice Storage Air Conditioners, Compliance Options Application (May 2006), available at http://www.energy.ca.gov/2006publications/CEC-400-2006-006/CEC-400-2006-006-SF.PDF.
Use on-site generated biogas, including methane, in appropriate applications.	At the Hilarides Dairy in Lindsay, California, an anaerobic-lagoon digester processes the run-off of nearly 10,000 cows, generating 226,000 cubic feet of biogas per day and enough fuel to run two heavy duty trucks. This has reduced the dairy's diesel consumption by 650 gallons a day, saving the dairy money and improving local air quality. See http://www.arb.ca.gov/newsrel/nr021109b.htm; see also Public Interest Energy Research Program, Dairy Power Production Program, Dairy Methane Digester System, 90-Day Evaluation Report, Eden Vale Dairy (Dec. 2006) at http://www.energy.ca.gov/2006publications/CEC_500_2006_083/CEC_500_2006_083.PDF. Landfill gas is a current and potential source of substantial energy in California. See Tom Frankiewicz, Program Manager, U.S. EPA Landfill Methane Outreach Program, Landfill Gas Energy Potential in California, available at http://www.energy.ca.gov/2009_energy/policy/documents/2009-04-21_workshop/presentations/05-SCS_Engineers_Presentation.pdf. There are many current and emerging technologies for converting landfill methane that would otherwise be released as a greenhouse gas into clean energy. See California Integrated Waste Management Board, Emerging Technologies, Landfill Gas-to-Energy (webpage) at http://www.ciwmb.ca.gov/LEACentral/TechServices/EmergingTech/default.htm.

Use combined heat and power (CHP) in appropriate applications.	Many commercial, industrial, and campus-type facilities (such as hospitals, universities and prisons) use fuel to produce steam and heat for their own operations and processes. Unless captured, much of this heat is wasted. CHP captures waste heat and re-uses it, e.g., for residential or commercial space heating or to generate electricity. See U.S. EPA, Catalog of CHP Technologies at http://www.epa.gov/chp/documents/catalog_of_%20chp_tech_entire.pdf and California Energy Commission, Distributed Energy Resource Guide, Combined Heat and Power (webpage) at http://www.energy.ca.gov/distgen/equipment/chp/chp.html. The average efficiency of fossil-fueled power plants in the United States is 33 percent. By using waste heat recovery technology, CHP systems typically achieve total system efficiencies of 60 to 80 percent. CHP can also substantially reduce emissions of carbon dioxide. http://www.epa.gov/chp/basic/efficiency.html. Currently, CHP in California has a capacity of over 9 million kilowatts. See list of California CHP facilities at http://www.eea-inc.com/chpdata/States/CA.html. The Waste Heat and Carbon Emissions Reduction Act (Assembly Bill 1613 (2007), amended by Assembly Bill 2791 (2008)) is designed to encourage the development of new CHP systems in California with a generating capacity of not more than 20 megawatts. Among other things, the Act requires the California Public Utilities Commission to establish (1) a standard tariff allowing CHP generators to sell electricity for delivery to the grid and (2) a "pay as you save" pilot program requiring electricity corporations to finance the installation of qualifying CHP systems by nonprofit and government entities. For more information, see http://www.energy.ca.gov/wasteheat/.
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Water Conservation and Efficiency

Incorporate water-reducing features into building and landscape design.	According to the California Energy Commission, water-related energy use – which includes conveyance, storage, treatment, distribution, wastewater collection, treatment, and discharge – consumes about 19 percent of the State's electricity, 30 percent of its natural gas, and 88 billion gallons of diesel fuel every year. See http://www.energy.ca.gov/2007publications/CEC_999_2007_008/CEC_999_2007_008.PDF. Reducing water use and improving water efficiency can help reduce energy use and greenhouse gas emissions.
Create water-efficient landscapes.	The California Department of Water Resources' updated Model Water Efficient Landscape Ordinance (Sept. 2009) is available at http://www.water.ca.gov/wateruseefficiency/landscapeordinance/technical.cfm. A landscape can be designed from the beginning to use little or no water, and to generate little or no waste. See California Integrated Waste Management Board, Xeriscaping (webpage) at http://www.ciwmb.ca.gov/organics/Xeriscaping/.

Install water-efficient irrigation systems and devices, such as soil moisture-based irrigation controls and use water-efficient irrigation methods.	U.S. Department of Energy, Best Management Practice: Water-Efficient Irrigation (webpage) at http://www1.eere.energy.gov/femp/program/waterefficiency_bmp5.html. California Department of Water Resources, Landscape Water Use Efficiency (webpage) at http://www.water.ca.gov/wateruseefficiency/landscape/. Pacific Institute, More with Less: Agricultural Water Conservation and Efficiency in California (2008), available at http://www.pacinst.org/reports/more_with_less_delta/index.htm.
Make effective use of graywater. (Graywater is untreated household waste water from bathtubs, showers, bathroom wash basins, and water from clothes washing machines. Graywater to be used for landscape irrigation.)	California Building Standards Commission, 2008 California Green Building Standards Code, Section 604, pp. 31-32, available at http://www.documents.dgs.ca.gov/bsc/2009/part11_2008_calgreen_code.pdf. California Department of Water Resources, Dual Plumbing Code (webpage) at http://www.water.ca.gov/recycling/DualPlumbingCode/. See also Ahwahnee Water Principles, Principle 6, at http://www.lgc.org/ahwahnee/h2o_principles.html. The Ahwahnee Water Principles have been adopted by City of Willits, Town of Windsor, Menlo Park, Morgan Hill, Palo Alto, Petaluma, Port Hueneme, Richmond, Rohnert Park, Rolling Hills Estates, San Luis Obispo, Santa Paula, Santa Rosa, City of Sunnyvale, City of Ukiah, Ventura, Marin County, Marin Municipal Water District, and Ventura County.
Implement low-impact development practices that maintain the existing hydrology of the site to manage storm water and protect the environment.	Retaining storm water runoff on-site can drastically reduce the need for energy-intensive imported water at the site. See U.S. EPA, Low Impact Development (webpage) at http://www.epa.gov/nps/lid/. Office of Environmental Health Hazard Assessment and the California Water and Land Use Partnership, Low Impact Development at http://www.coastal.ca.gov/nps/lid-factsheet.pdf.
Devise a comprehensive water conservation strategy appropriate for the project and location.	The strategy may include many of the specific items listed above, plus other innovative measures that are appropriate to the specific project.
Design buildings to be water-efficient. Install water-efficient fixtures and appliances.	Department of General Services, Best Practices Manual, Water-Efficient Fixtures and Appliances (website) at http://www.green.ca.gov/EPP/building/SaveH2O.htm. Many ENERGY STAR products have achieved their certification because of water efficiency. See California Energy Commission's database, available at http://www.appliances.energy.ca.gov/.

Offset water demand from new projects so that there is no net increase in water use.	For example, the City of Lompoc has a policy requiring new development to offset new water demand with savings from existing water users. See http://www.cityoflompoc.com/utilities/pdf/2005_uwmp_final.pdf at p. 29.
Provide education about water conservation and available programs and incentives.	See, for example, the City of Santa Cruz, Water Conservation Office at http://www.ci.santa-cruz.ca.us/index.aspx?page=395 ; Santa Clara Valley Water District, Water Conservation at http://www.valleywater.org/conservation/index.shtm ; and Metropolitan Water District and the Family of Southern California Water Agencies, Be Water Wise at http://www.bewaterwise.com . Private projects may provide or fund similar education.

Solid Waste Measures

Reuse and recycle construction and demolition waste (including, but not limited to, soil, vegetation, concrete, lumber, metal, and cardboard).	Construction and demolition materials account for almost 22 percent of the waste stream in California. Reusing and recycling these materials not only conserves natural resources and energy, but can also save money. For a list of best practices and other resources, see California Integrated Waste Management Board, Construction and Demolition Debris Recycling (webpage) at http://www.ciwmb.ca.gov/condemo/ .
Integrate reuse and recycling into residential industrial, institutional and commercial projects.	Tips on developing a successful recycling program, and opportunities for cost-effective recycling, are available on the California Integrated Waste Management Board's Zero Waste California website. See http://zerowaste.ca.gov/. The Institute for Local Government's Waste Reduction & Recycling webpage contains examples of "best practices" for reducing greenhouse gas emissions, organized around waste reduction and recycling goals and additional examples and resources. See http://www.ca-ilg.org/wastereduction.
Provide easy and convenient recycling opportunities for residents, the public, and tenant businesses.	Tips on developing a successful recycling program, and opportunities for cost effective recycling, are available on the California Integrated Waste Management Board's Zero Waste California website. See http://zerowaste.ca.gov/ .
Provide education and publicity about reducing waste and available recycling services.	Many cities and counties provide information on waste reduction and recycling. See, for example, the Butte County Guide to Recycling at http://www.recyclebutte.net. The California Integrated Waste Management Board's website contains numerous publications on recycling and waste reduction that may be helpful in devising an education project. See http://www.ciwmb.ca.gov/Publications/default.asp?cat=13. Private projects may also provide waste and recycling education directly, or fund education.

Land Use Measures

Ensure consistency with “smart growth” principles – mixed-use, infill, and higher density projects that provide alternatives to individual vehicle travel and promote the efficient delivery of services and goods.	U.S. EPA maintains an extensive Smart Growth webpage with links to examples, literature and technical assistance, and financial resources. See http://www.epa.gov/smartgrowth/index.htm. The National Oceanic and Atmospheric Administration’s webpage provides smart growth recommendations for communities located near water. See Coastal & Waterfront Smart Growth (webpage) at http://coastalsmartgrowth.noaa.gov/. The webpage includes case studies from California. The California Energy Commission has recognized the important role that land use can play in meeting our greenhouse gas and energy efficiency goals. The agency’s website, Smart Growth & Land Use Planning, contains useful information and links to relevant studies, reports, and other resources. See http://www.energy.ca.gov/landuse/. The Metropolitan Transportation Commission’s webpage, Smart Growth / Transportation for Livable Communities, includes resources that may be useful to communities in the San Francisco Bay Area and beyond. See http://www.mtc.ca.gov/planning/smart_growth/. The Sacramento Area Council of Governments (SACOG) has published examples of smart growth in action in its region. See Examples from the Sacramento Region of the Seven Principles of Smart Growth / Better Ways to Grow, available at http://www.sacog.org/regional/funding/betterways.pdf.
Meet recognized “smart growth” benchmarks.	For example, the LEED for Neighborhood Development (LEED-ND) rating system integrates the principles of smart growth, urbanism and green building into the first national system for neighborhood design. LEED-ND is a collaboration among the U.S. Green Building Council, Congress for the New Urbanism, and the Natural Resources Defense Council. For more information, see http://www.usgbc.org/DisplayPage.aspx?CMSPageID=148.
Educate the public about the many benefits of well-designed, higher density development.	See, for example, U.S. EPA, Growing Smarter, Living Healthier: A Guide to Smart Growth and Active Aging (webpage), discussing how compact, walkable communities can provide benefits to seniors. See http://www.epa.gov/aging/bhc/guide/index.html. U.S. EPA, Environmental Benefits of Smart Growth (webpage) at http://www.epa.gov/dced/topics/eb.htm (noting local air and water quality improvements). Centers for Disease Control and Prevention (CDC), Designing and Building Healthy Places (webpage), at http://www.cdc.gov/healthyplaces/. The CDC’s website discusses the links between walkable communities and public health and includes numerous links to educational materials. California Department of Housing and Community Development, Myths and Facts About Affordable and High Density Housing (2002), available at http://www.hcd.ca.gov/hpd/mythsnfacts.pdf.

Incorporate public transit into the project's design.	Federal Transit Administration, Transit-Oriented Development (TOD) (webpage) at http://www.fta.dot.gov/planning/planning_environment_6932.html (describing the benefits of TOD as “social, environmental, and fiscal.”) California Department of Transportation (Caltrans), Statewide Transit-Oriented Development Study: Factors for Success in California (2002), available at http://transitorienteddevelopment.dot.ca.gov/miscellaneous/StatewideTOD.htm Caltrans, California Transit-Oriented Development Searchable Database (includes detailed information on numerous TODs), available at http://transitorienteddevelopment.dot.ca.gov/miscellaneous/NewHome.jsp. California Department of Housing and Community Development, Transit Oriented Development (TOD) Resources (Aug. 2009), available at http://www.hcd.ca.gov/hpd/tod.pdf.
Preserve and create open space and parks. Preserve existing trees, and plant replacement trees at a set ratio.	U.S. EPA, Smart Growth and Open Space Conservation (webpage) at http://www.epa.gov/dced/openspace.htm.
Develop “brownfields” and other underused or defunct properties near existing public transportation and jobs.	U.S. EPA, Smart Growth and Brownfields (webpage) at http://www.epa.gov/dced/brownfields.htm. For example, as set forth in the Local Government Commission’s case study, the Town of Hercules, California reclaimed a 426-acre brownfield site, transforming it into a transit-friendly, walkable neighborhood. See http://www.lgc.org/freepub/docs/community_design/fact_sheets/er_case_studies.pdf. For financial resources that can assist in brownfield development, see Center for Creative Land Recycling, Financial Resources for California Brownfields (July 2008), available at http://www.cclr.org/media/publications/8-Financial_Resources_2008.pdf.
Include pedestrian and bicycle facilities within projects and ensure that existing non-motorized routes are maintained and enhanced.	See U.S. Department of Transportation, Federal Highway Administration, Bicycle and Pedestrian Program (webpage) at http://www.fhwa.dot.gov/environment/bikeped/. Caltrans, Pedestrian and Bicycle Facilities in California / A Technical Reference and Technology Transfer Synthesis for Caltrans Planners and Engineers (July 2005), available at http://www.dot.ca.gov/hq/traffops/survey/pedestrian/TR_MAY0405.pdf. This reference includes standard and innovative practices for pedestrian facilities and traffic calming.

Transportation and Motor Vehicles

Meet an identified transportation-related benchmark.	A logical benchmark might be related to vehicles miles traveled (VMT), e.g., average VMT per capita, per household, or per employee. As the California Energy Commission has noted, VMT by California residents increased “a rate of more than 3 percent a year between 1975 and 2004, markedly faster than the population growth rate over the same period, which was less than 2 percent. This increase in VMT correlates to an increase in petroleum use and GHG production and has led to the transportation sector being responsible for 41 percent of the state’s GHG emissions in 2004.” CEC, <i>The Role of Land Use in Meeting California’s Energy and Climate Change Goals</i> (Aug. 2007) at p. 9, available at http://www.energy.ca.gov/2007publications/CEC-600-2007-008/CEC-600-2007-008-SF.PDF. Even with regulations designed to increase vehicle efficiency and lower the carbon content of fuel, “reduced VMT growth will be required to meet GHG reductions goals.” <i>Id.</i> at p. 18.
Adopt a comprehensive parking policy that discourages private vehicle use and encourages the use of alternative transportation.	For example, reduce parking for private vehicles while increasing options for alternative transportation; eliminate minimum parking requirements for new buildings; “unbundle” parking (require that parking is paid for separately and is not included in rent for residential or commercial space); and set appropriate pricing for parking. See U.S. EPA, <i>Parking Spaces / Community Places, Finding the Balance Through Smart Growth Solutions</i> (Jan. 2006), available at http://www.epa.gov/dced/pdf/EPAParkingSpaces06.pdf. Reforming Parking Policies to Support Smart Growth, Metropolitan Transportation Commission (June 2007) at http://www.mtc.ca.gov/planning/smart_growth/parking_seminar/ToolboxHandbook.pdf. See also the City of Ventura’s Downtown Parking and Mobility Plan, available at http://www.cityofventura.net/community_development/resources/mobility_parking_plan.pdf, and Ventura’s Downtown Parking Management Program, available at http://www.ci.ventura.ca.us/depts/comm_dev/downtownplan/chapters.asp.
Build or fund a major transit stop within or near the development.	“‘Major transit stop’ means a site containing an existing rail transit station, a ferry terminal served by either a bus or rail transit service, or the intersection of two or more major bus routes with a frequency of service interval of 15 minutes or less during the morning and afternoon peak commute periods.” (Pub. Res. Code, § 21064.3.) Transit Oriented Development (TOD) is a moderate to higher density development located within an easy walk of a major transit stop. http://transitorienteddevelopment.dot.ca.gov/miscellaneous/NewWhatisTOD.htm. By building or funding a major transit stop, an otherwise ordinary development can become a TOD.

Provide public transit incentives such as free or low-cost monthly transit passes to employees, or free ride areas to residents and customers.	See U.S. Department of Transportation and U.S. EPA, Commuter Choice Primer / An Employer's Guide to Implementing Effective Commuter Choice Programs, available at http://www.its.dot.gov/JPODOCS/REPTS_PR/13669.html. The Emery Go Round shuttle is a private transportation service funded by commercial property owners in the citywide transportation business improvement district. The shuttle links a local shopping district to a Bay Area Rapid Transit stop. See http://www.emerygoround.com/. Seattle, Washington maintains a public transportation "ride free" zone in its downtown from 6:00 a.m. to 7:00 p.m. daily. See http://transit.metrokc.gov/tops/accessible/paccessible_map.html#fare.
Promote "least polluting" ways to connect people and goods to their destinations.	Promoting "least polluting" methods of moving people and goods is part of a larger, integrated "sustainable streets" strategy now being explored at U.C. Davis's Sustainable Transportation Center. Resources and links are available at the Center's website, http://stc.ucdavis.edu/outreach/ssp.php.
Incorporate bicycle lanes, routes and facilities into street systems, new subdivisions, and large developments.	Bicycling can have a profound impact on transportation choices and air pollution reduction. The City of Davis has the highest rate of bicycling in the nation. Among its 64,000 residents, 17 percent travel to work by bicycle and 41 percent consider the bicycle their primary mode of transportation. See Air Resources Board, Bicycle Awareness Program, Bicycle Fact Sheet, available at http://www.arb.ca.gov/planning/tsaq/bicycle/factsht.htm. For recommendations on best practices, see the many resources listed at the U.S. Department of Transportation, Federal Highway Administration's Bicycle and Pedestrian website at http://www.fhwa.dot.gov/environment/bikeped/publications.htm. See also Caltrans Division of Research and Innovation, Designing Highway Facilities To Encourage Walking, Biking and Transit (Preliminary Investigation) (March 2009), available at http://www.dot.ca.gov/research/researchreports/preliminary_investigations/docs/pi-design_for_walking_%20biking_and_transit%20final.pdf.
Require amenities for non-motorized transportation, such as secure and convenient bicycle parking.	According to local and national surveys of potential bicycle commuters, secure bicycle parking and workplace changing facilities are important complements to safe and convenient routes of travel. See Air Resources Board, Bicycle Awareness Program, Bicycle Fact Sheet, available at http://www.arb.ca.gov/planning/tsaq/bicycle/factsht.htm.

Ensure that the project enhances, and does not disrupt or create barriers to, non-motorized transportation.	See, e.g., U.S. EPA's list of transit-related "smart growth" publications at http://www.epa.gov/dced/publications.htm#air, including Pedestrian and Transit-Friendly Design: A Primer for Smart Growth (1999), available at www.epa.gov/dced/pdf/ptfd_primer.pdf. See also Toolkit for Improving Walkability in Alameda County, available at http://www.acta2002.com/ped_toolkit/ped_toolkit_print.pdf. Pursuant to the California Complete Streets Act of 2008 (AB 1358, Gov. Code, §§ 65040.2 and 65302), commencing January 1, 2011, upon any substantive revision of the circulation element of the general plan, a city or county will be required to modify the circulation element to plan for a balanced, multimodal transportation network that meets the needs of all users.
Connect parks and open space through shared pedestrian/bike paths and trails to encourage walking and bicycling. Create bicycle lanes and walking paths directed to the location of schools, parks and other destination points.	Walk Score ranks the "walkability" of neighborhoods in the largest 40 U.S. cities, including seven California cities. Scores are based on the distance to nearby amenities. Explore Walk Score at http://www.walkscore.com/. In many markets, homes in walkable neighborhoods are worth more than similar properties where walking is more difficult. See Hoak, <i>Walk appeal / Homes in walkable neighborhoods sell for more: study</i>, Wall Street Journal (Aug. 18, 2009), available at http://www.marketwatch.com/story/homes-in-walkable-neighborhoods-sell-for-more-2009-08-18. By creating walkable neighborhoods with more transportation choices, Californians could save \$31 million and cut greenhouse gas emissions by 34 percent, according to a study released by Transform, a coalition of unions and nonprofits. See <i>Windfall for All / How Connected, Convenient Neighborhoods Can Protect Our Climate and Safeguard California's Economy</i> (Nov. 2009), available at http://transformca.org/windfall-for-all#download-report.
Work with the school districts to improve pedestrian and bike access to schools and to restore or expand school bus service using lower-emitting vehicles.	In some communities, twenty to twenty-five percent of morning traffic is due to parents driving their children to school. Increased traffic congestion around schools in turn prompts even more parents to drive their children to school. Programs to create safe routes to schools can break this harmful cycle. See California Department of Public Health, <i>Safe Routes to School</i> (webpage) and associated links at http://www.cdph.ca.gov/HealthInfo/injviosa/Pages/SafeRoutestoSchool.aspx. See also U.S. EPA, <i>Smart Growth and Schools</i> (webpage), available at http://www.epa.gov/dced/schools.htm. California Center for Physical Activity, <i>California Walk to School</i> (website) at http://www.cawalktoschool.com Regular school bus service (using lower-emitting buses) for children who cannot bike or walk to school could substantially reduce private vehicle congestion and air pollution around schools. See Air Resources Board, <i>Lower Emissions School Bus Program</i> (webpage) at http://www.arb.ca.gov/msprog/schoolbus/schoolbus.htm.

Institute teleconferencing, telecommute and/or flexible work hour programs to reduce unnecessary employee transportation.	There are numerous sites on the web with resources for employers seeking to establish telework or flexible work programs. These include U.S. EPA's Mobility Management Strategies: Commuter Programs website at http://www.epa.gov/otaq/stateresources/rellinks/mms_commpgrams.htm; and Telework, the federal government's telework website, at http://www.telework.gov/. Through a continuing FlexWork Implementation Program, the Traffic Solutions division of the Santa Barbara County Association of Governments sponsors flexwork consulting, training and implementation services to a limited number of Santa Barbara County organizations that want to create or expand flexwork programs for the benefit of their organizations, employees and the community. See http://www.flexworksba.com/read_more_about_the_fSBp.html. Other local government entities provide similar services.
Provide information on alternative transportation options for consumers, residents, tenants and employees to reduce transportation-related emissions.	Many types of projects may provide opportunities for delivering more tailored transportation information. For example, a homeowner's association could provide information on its website, or an employer might create a Transportation Coordinator position as part of a larger Employee Commute Reduction Program. See, e.g., South Coast Air Quality Management District, Transportation Coordinator training, at http://www.aqmd.gov/trans/training.html.
Educate consumers, residents, tenants and the public about options for reducing motor vehicle-related greenhouse gas emissions. Include information on trip reduction; trip linking; vehicle performance and efficiency (e.g., keeping tires inflated); and low or zero-emission vehicles.	See, for example U.S. EPA, SmartWay Transport Partnership: Innovative Carrier Strategies (webpage) at http://www.epa.gov/smartway/transport/what-smartway/carrier-strategies.htm. This webpage includes recommendations for actions that truck and rail fleets can take to make ground freight more efficient and cleaner. The Air Resources Board's Drive Clean website is a resource for car buyers to find clean and efficient vehicles. The web site is designed to educate Californians that pollution levels range greatly between vehicles. See http://www.driveclean.ca.gov/. The Oregon Department of Transportation and other public and private partners launched the Drive Less/Save More campaign. The comprehensive website contains fact sheets and educational materials to help people drive more efficiently. See http://www.driveless.savemore.com/.
Purchase, or create incentives for purchasing, low or zero-emission vehicles.	See Air Resources Board, Low-Emission Vehicle Program (webpage) at http://www.arb.ca.gov/msprog/levprog/levprog.htm. Air Resource Board, Zero Emission Vehicle Program (webpage) at http://www.arb.ca.gov/msprog/zevprog/zevprog.htm. All new cars sold in California are now required to display an Environmental Performance (EP) Label, which scores a vehicle's global warming and smog emissions from 1 (dirtiest) to 10 (cleanest). To search and compare vehicle EP Labels, visit www.DriveClean.ca.gov.

Create a ride sharing program. Promote existing ride sharing programs e.g., by designating a certain percentage of parking spaces for ride sharing vehicles, designating adequate passenger loading and unloading for ride sharing vehicles, and providing a web site or message board for coordinating rides.	For example, the 511 Regional Rideshare Program is operated by the Metropolitan Transportation Commission (MTC) and is funded by grants from the Federal Highway Administration, U.S. Department of Transportation, the Metropolitan Transportation Commission, the Bay Area Air Quality Management District and county congestion management agencies. For more information, see http://rideshare.511.org/. As another example, San Bernardino Associated Governments works directly with large and small employers, as well as providing support to commuters who wish to share rides or use alternative forms of transportation. See http://www.sanbag.ca.gov/commuter/rideshare.html. Valleyrides.com is a ridesharing resource available to anyone commuting to and from Fresno and Tulare Counties and surrounding communities. See http://www.valleyrides.com/. There are many other similar websites throughout the state.
Create or accommodate car sharing programs, e.g., provide parking spaces for car share vehicles at convenient locations accessible by public transportation.	There are many existing car sharing companies in California. These include City CarShare (San Francisco Bay Area), see http://www.citycarshare.org/ ; and Zipcar, see http://www.zipcar.com/ . Car sharing programs are being successfully used on many California campuses.
Provide a vanpool for employees.	Many local Transportation Management Agencies can assist in forming vanpools. See, for example, Sacramento Transportation Management Association, Check out Vanpooling (webpage) at http://www.sacramento-tma.org/vanpool.html .
Create local "light vehicle" networks, such as neighborhood electric vehicle systems.	See California Energy Commission, Consumer Energy Center, Urban Options - Neighborhood Electric Vehicles (NEVs) (webpage) at http://www.consumerenergycenter.org/transportation/urban_options/nev.html. The City of Lincoln has an innovative NEV program. See http://www.lincolnev.com/index.html.
Enforce and follow limits idling time for commercial vehicles, including delivery and construction vehicles.	Under existing law, diesel-fueled motor vehicles with a gross vehicle weight rating greater than 10,000 pounds are prohibited from idling for more than 5 minutes at any location. The minimum penalty for an idling violation is now \$300 per violation. See http://www.arb.ca.gov/enf/complaints/idling_cv.htm .
Provide the necessary facilities and infrastructure to encourage the use of low or zero-emission vehicles.	For a list of existing alternative fuel stations in California, visit http://www.cleancarmaps.com/. See, e.g., Baker, <i>Charging-station network built along 101</i>, S.F. Chron. (9/23/09), available at http://articles.sfgate.com/2009-09-23/news/17207424_1_recharging-solar-array-tesla-motors.

Agriculture and Forestry (additional strategies noted above)

Require best management practices in agriculture and animal operations to reduce emissions, conserve energy and water, and utilize alternative energy sources, including biogas, wind and solar.	Air Resources Board (ARB), Economic Sectors Portal, Agriculture (webpage) at http://www.arb.ca.gov/cc/ghgsectors/ghgsectors.htm. ARB's webpage includes information on emissions from manure management, nitrogen fertilizer, agricultural offroad equipment, and agricultural engines. "A full 90% of an agricultural business' electricity bill is likely associated with water use. In addition, the 8 million acres in California devoted to crops consume 80% of the total water pumped in the state." See Flex Your Power, Agricultural Sector (webpage) at http://www.fypower.org/agri/. Flex Your Power, Best Practice Guide / Food and Beverage Growers and Processors, available at http://www.fypower.org/bpg/index.html?b=food_and_bev. Antle et al., Pew Center on Global Climate Change, Agriculture's Role in Greenhouse Gas Mitigation (2006), available at http://www.pewclimate.org/docUploads/Agriculture's%20Role%20in%20GHG%20Mitigation.pdf.
Preserve forested areas, agricultural lands, wildlife habitat and corridors, wetlands, watersheds, groundwater recharge areas and other open space that provide carbon sequestration benefits.	"There are three general means by which agricultural and forestry practices can reduce greenhouse gases: (1) avoiding emissions by maintaining existing carbon storage in trees and soils; (2) increasing carbon storage by, e.g., tree planting, conversion from conventional to conservation tillage practices on agricultural lands; (3) substituting bio-based fuels and products for fossil fuels, such as coal and oil, and energy-intensive products that generate greater quantities of CO₂ when used." U.S. EPA, Carbon Sequestration in Agriculture and Forestry, Frequently Asked Questions (webpage) at http://www.epa.gov/sequestration/faq.html. Air Resources Board, Economic Sectors Portal, Forestry (webpage) at http://www.arb.ca.gov/cc/ghgsectors/ghgsectors.htm.
Protect existing trees and encourage the planting of new trees. Adopt a tree protection and replacement ordinance.	Tree preservation and planting is not just for rural areas of the state; suburban and urban forests can also serve as carbon sinks. See Cal Fire, Urban and Community Forestry (webpage) at http://www.fire.ca.gov/resource_mgt/resource_mgt_urbanforestry.php.

Off-Site Mitigation

If, after analyzing and requiring all reasonable and feasible on-site mitigation measures for avoiding or reducing greenhouse gas-related impacts, the lead agency determines that additional mitigation is required, the agency may consider additional off-site mitigation. The project proponent could, for example, fund off-site mitigation projects that will reduce carbon emissions, conduct an audit of its other existing operations and agree to retrofit, or purchase verifiable carbon "credits" from another entity that will undertake mitigation.

The topic of off-site mitigation can be complicated. A full discussion is outside the scope of this summary document. Issues that the lead agency should consider include:

- The location of the off-site mitigation. (If the off-site mitigation is far from the project, any additional, non-climate related co-benefits of the mitigation may be lost to the local community.)
- Whether the emissions reductions from off-site mitigation can be quantified and verified. (The California Registry has developed a number of protocols for calculating, reporting and verifying greenhouse gas emissions. Currently, industry-specific protocols are available for the cement sector, power/utility sector, forest sector and local government operations. For more information, visit the California Registry's website at <http://www.climateregistry.org/>.)
- Whether the mitigation ratio should be greater than 1:1 to reflect any uncertainty about the effectiveness of the off-site mitigation.

Offsite mitigation measures that could be funded through mitigation fees include, but are not limited to, the following:

- Energy efficiency audits of existing buildings.
- Energy efficiency upgrades to existing buildings not otherwise required by law, including heating, ventilation, air conditioning, lighting, water heating equipment, insulation and weatherization (perhaps targeted to specific communities, such as low-income or senior residents).
- Programs to encourage the purchase and use of energy efficient vehicles, appliances, equipment and lighting.
- Programs that create incentives to replace or retire polluting vehicles and engines.
- Programs to expand the use of renewable energy and energy storage.
- Preservation and/or enhancement of existing natural areas (e.g., forested areas, agricultural lands, wildlife habitat and corridors, wetlands, watersheds, and groundwater recharge areas) that provide carbon sequestration benefits.
- Improvement and expansion of public transit and low- and zero-carbon transportation alternatives.