OPTIONS FOR ADDRESSING CLIMATE CHANGE
IN SAN LUIS OBISPO COUNTY
November 16, 2005

Background

Strong evidence now exists that significant global warming is occurring. This evidence comes from direct measurements of rising surface air temperatures and subsurface ocean temperatures and from phenomena such as increases in average global sea levels, retreating glaciers, and changes to many physical and biological systems. Most of the warming in recent decades cannot be explained by natural causes and is attributed to atmospheric accumulation of heat-trapping or "greenhouse" gases (GHGs) caused by human activities. This warming has already led to changes in the Earth's climate. The National Aeronautics and Space Administration, National Academy of Sciences, National Oceanic and Atmospheric Administration, International Panel on Climate Change and other eminent scientific bodies throughout the world have conducted extensive research documenting significant changes over a wide variety of climate and ecosystem indicators. Some of the most current findings include:

- Analyses of ice core samples that show concentrations of carbon dioxide (CO_2) in the atmosphere remained stable at about 280 ppm for thousands of years up until 1750, the start of the industrial age. CO_2 levels have increased 35% since then, to approximately 375 ppm today. This is the highest atmospheric level in the past 420,000 years.
- Concentrations of other greenhouse gases caused by human activities, such as methane and nitrous oxides, have also increased by 17% and 151%, respectively, over the same period.
- Average global surface temperatures have shown a corresponding increase of more than 1° F over the past 100 years, with a 9° F average increase in the polar regions. The nine warmest years on record have all occurred since 1980.
- More than 20% of the polar ice cap has melted away since 1979, and glaciers worldwide are rapidly receding. Snowmelt across the western U.S. is now occurring 1-5 weeks earlier, and the rainfall to snowfall ratio is increasing.
- Global sea levels have risen 4-8 inches over the past 100 years, a rate 3 times faster than any previous period in history.
- Natural land-based and ocean habitats and ecosystems are now shifting in response to these climate changes, significantly affecting native vegetation, wildlife populations and migration patterns.
- Extreme weather events are increasing in frequency and intensity, resulting in a 10-fold increase in economic losses in just the past 50 years.

These are just a few of the climate change indicators documented to date. Projections of potential future impacts vary depending on the climate models used, future emissions assumptions and a number of other variables that must be considered. There will always be uncertainty in trying to understand a system as complex as the world's climate; however, the worldwide scientific community agrees on one thing: the impacts we are currently experiencing

will increase in severity and scope in the future. Because CO_2 and other greenhouse gases can persist in the atmosphere for long periods (50–100 years), even if GHG emissions were stabilized instantly at today's levels, the climate would still continue to change as it adapts to the increased emissions of recent decades. Further changes in climate are therefore unavoidable and will be further compounded as emissions continue to increase; it's the rate of change and location of specific impacts that are uncertain. Thus, scientists warn that while we urgently need to curb greenhouse gas emissions, we must also prepare for the adverse consequences of the warming trend already underway.

California is particularly vulnerable to the potential impacts of climate change due to its geography and demographics. Projected increases in extreme temperature and weather events, increased transmission of infectious diseases, and higher air pollution levels could significantly impact public health and mortality rates in our large and aging population. California's long and densely inhabited coastline could suffer extensive and irreversible damage to property and sensitive wetlands due to a predicted 1-3 foot rise in sea levels over the next century. Our $30 billion agriculture industry is highly susceptible to altered temperature and rainfall patterns, and the increased pests and diseases that may accompany those changes; Central Coast grape growers, our largest industry, are especially at risk. Finally, California's heavy reliance on its rapidly shrinking water supply will face considerable challenges as the Sierra snowpack, which functions as the state's largest reservoir, could shrink by a third by 2060, and to half its historic size by 2090.

The various scenarios outlined above are just the tip of the iceberg, so to speak. They underscore the enormous magnitude of the issue and the need to initiate actions now to limit the severity and extent of future impacts. The following sections describe the major sources of greenhouse gases, actions underway at community, national and international levels to combat the problem, and recommendations for actions the District can take locally to help address the issue.

Greenhouse Gases and Their Sources

Carbon dioxide (CO_2) is the most dominant greenhouse gas; however a number of other heat-trapping gases also contribute significantly to climate change, including methane, nitrous oxide, sulfur hexafluoride, hydrochlorofluorocarbon and perfluorocarbon. Statewide data for 2002 shows that CO_2 makes up approximately 84% of total GHGs by volume, with nitrous oxide and methane representing approximately 6% and 7% respectively. Hexafluoride is far less abundant, yet molecule for molecule its global warming potential is nearly 24,000 times greater than CO_2.

Fossil fuel combustion is responsible for 97% of all CO_2 emissions worldwide; mobile sources are a major component, especially in California where they contribute approximately 40% of all CO_2 emissions. Electric power generation and the industrial sector combined account for another 40%, with smaller, scattered sources responsible for the remainder. The District does not currently maintain a CO_2 emissions inventory because it is not a regulated pollutant; however, we do have preliminary emissions data from some of our larger sources. Methane emissions from large landfills are regulated and thus are tracked through our permit system. None of the other identified GHGs are currently tracked by the District.

Current Programs Addressing Climate Change

Today, action is occurring at many levels of government and the private sector to reduce, avoid and to better understand the risks associated with climate change. The following is a brief summary highlighting just some of these efforts.

International Level

- Kyoto Protocol: The Kyoto Protocol is the first international treaty to mandate reductions in GHG emissions. The treaty went into effect on February 16, 2005 following Russia's ratification in November 2004. Signatories to the treaty pledge to reduce their GHG emissions below 1990 levels between 2008 and 2012. Different targets apply to different countries. The European Union's overall target is an 8 percent reduction; Germany committed to a 25 percent cut, and the U.K. to 20 percent. Canada's target is 6 percent. The United States had a target of 7 percent before dropping out of the treaty.
- Cities for Climate Protection (CCP): This international program enlists cities to adopt policies and implement measures to achieve quantifiable reductions in local greenhouse gas emissions, improve air quality, and enhance urban livability and sustainability. More than 650 local governments worldwide (including 150 in the U.S.) participate in the CCP by committing to implement five milestones: 1) Conduct a baseline emissions inventory and forecast; 2) Adopt an emissions reduction target for the forecast year; 3) Develop a Local Action Plan to meet the target; 4) Implement the plan; and 5) Monitor progress and adjust as appropriate.
- Other Efforts: World leadership on climate change is centered in Europe. As part of its Kyoto commitment, the European Union has adopted the first international emissions trading program for carbon dioxide emissions, involving 12,000 facilities across the EU, including power plants, steel mills and other energy-intensive industries. Also, over 130 European Cities have joined the CCP campaign.

  Britain has established a goal of reducing carbon dioxide emissions by 60 percent by 2050, and has adopted an energy policy to reduce emissions with a "Climate Change Levy" to fund energy efficiency and low-carbon technologies.

  Over 200 local governments representing over 78 percent of Australia's population are participating in CCP-Australia. The Australian government's Greenhouse Office provides grants to help councils advance on the five CCP milestones. Australia has also pioneered a program called "Milestone Five Plus" for cities that have completed the CCP five milestones and are prepared to go even farther.

National Level

- Federal Government: The United States has backed out of the Kyoto Protocol citing concerns over potential economic impacts of implementation. Most federal efforts are currently focused on additional climate change research coordinated by the U.S. Global Change Research Program. In June 2001, the U.S. Climate Change Research Initiative was established to study areas of uncertainty about global climate change science and identify priority areas where investments can make a difference. The Secretary of Commerce, working with other agencies, was directed to set priorities for additional

investments in climate change research, review such investments, and to improve coordination among Federal agencies.

- National Organizations: The State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO) are the two national associations of air pollution control agencies in 54 states and territories and more than 165 metropolitan areas across the country. STAPPA/ALAPCO developed a report in 1999, *"Reducing Greenhouse Gases and Air Pollution: A Menu of Harmonized Options,"* to identify and assess strategies that simultaneously reduce conventional air pollution and greenhouse gases, known as "harmonized strategies." They recently developed software designed to help state and local governments calculate the benefits of such harmonized strategies.

State Level

Since federal policy on climate change has not been forthcoming, states have taken the lead on developing climate policies and initiatives. These policies are being implemented across all economic sectors through a variety of approaches. Following is a brief description of the efforts in California and other states:

- California: On June 1, 2005, California Governor Schwarzenegger signed an Executive Order establishing statewide greenhouse gas emission targets to reduce emissions to 2000 levels by 2010, to reduce emissions to 1990 levels by 2020, and to reduce emissions by 80 percent below 1990 levels by 2050. The California Environmental Protection Agency (CalEPA) is coordinating this effort through the Climate Action Team, which includes the Secretary of the Business, Transportation and Housing Agency, Secretary of the Department of Food and Agriculture, Secretary of the Resources Agency, Chairperson of the Air Resources Board, Chairperson of the Energy Commission and President of the Public Utilities Commission. The following describes some of these efforts:
    - *The California Air Resource Board* (ARB) has adopted new emission standards for light duty vehicles requiring manufacturers to achieve maximum feasible reduction of GHG emissions starting with the 2009 model year.
    - *The California Climate Action Registry* (Registry) is a public/private partnership created by the state of California to encourage companies, government agencies and other organizations that do business in California to voluntarily measure and report their greenhouse gas emissions. To date, the Registry has over 45 members including all major utilities, a number of California companies, cities, government entities and non-governmental organizations.
    - *The California Energy Commission* (CEC) develops and implements both building and appliance energy efficiency standards, prepares California's GHG inventory, develops transportation fuel policy and programs, and manages climate change research programs.
    - *The California Public Utilities Commission* (CPUC) coordinates with the CEC on energy efficiency programs and the Renewable Portfolio Standard. The CPUC requested that its regulated energy utilities address key issues pertaining to climate change. The CPUC requires regulated utilities to employ a "greenhouse gas factor" when evaluating competitive bids to supply energy; this factor is designed to capture the financial risk of emitting GHGs. The CPUC is also investigating the creation of a "carbon cap" on each regulated utility.

- Other States: Thirty-nine states have completed inventories of their total GHG emissions. Twenty-eight states have completed Climate Action Plans that identify and evaluate feasible and effective policies to reduce their GHG emissions through a combination of public and private sector policies and programs. States are setting targets for emission reductions, increasing the efficiency of energy systems, and encouraging investment in renewable energy. State governments cite a variety of reasons for action, including promoting economic development, reducing vulnerability to fluctuating energy prices, and preventing damages from climate change to the states' resources.

Local Level

- City and Regional Governments: On February 16, 2005, the day the Kyoto Protocol came into effect worldwide, Seattle Mayor Greg Nickels launched a climate protection initiative of U.S. mayors. Over 170 mayors from 40 states representing a total population of approximately 38 million citizens have now joined Mayor Nichols. Through the initiative, participating cities commit to take the following three actions:
    - Strive to meet or beat the Kyoto Protocol targets in their own communities through actions ranging from anti-sprawl land-use policies to urban forest restoration projects to public information campaigns;
    - Urge their state governments and the federal government to enact policies and programs to meet or beat the greenhouse gas emission reduction target suggested for the United States in the Kyoto Protocol – 7 percent reduction from 1990 levels by 2012; and
    - Urge the U.S. Congress to pass the bipartisan Climate Stewardship Act, which would establish a national emissions trading system.
- Air Regulatory Agencies: Many air pollution control agencies throughout the nation have begun to develop or implement measures to track and reduce GHG emissions. Many of these efforts focus on developing multi-pollutant emission reduction strategies that include CO_2 as a pollutant. Most of the emission reduction efforts are oriented toward energy generation and mobile source emissions and often include cap and trade programs that set emission limits and allow affected sources to buy or sell credits to achieve their reduction goals.
    - *Bay Area Air Quality Management District:* On June 1, 2005, the BAAQMD Board of Directors established a Climate Protection Program to address GHG emissions that lead to climate change and have the potential to increase smog in the region. One of the first actions of the District under this new program was to inventory the GHG emissions produced throughout the Bay Area. They have also recently produced a "Report on the Integration of Air Quality Management and Climate Protection" that presents a series of recommendations for the air district to implement to help address climate change throughout the region, including a menu of model climate protection ordinances that can be adopted by local jurisdictions.

San Luis Obispo County Air Pollution Control District

Many of the programs currently implemented by the District to reduce emissions and exposure to criteria and toxic air pollutants have ancillary benefits in reducing greenhouse gas emissions. The following is a brief summary of these programs:

- Rules and Regulations: Numerous rules adopted by the Board and implemented by the District to address criteria pollutant emissions also have the side benefit of reducing greenhouse gases. For instance, several District rules address conventional emissions from combustion sources such as boilers, heaters and engines that often result in equipment modifications or replacement that improves the energy efficiency of those units and reduces fossil fuel use. Similarly, rules that regulate or prohibit open burning activities reduce CO_2 emissions from that activity. District Rule 426 regulates landfill emissions of methane.

- Clean Fuels: The District is actively involved in and supports the efforts of the Central Coast Clean Cities Coalition (C5), a local nonprofit coalition which promotes the use of cleaner alternative fuel technologies. With over 40 % of the greenhouse gas emissions coming from mobile sources, these efforts are an essential tool in reducing fossil fuel use and associated CO_2 emissions.

- Development Review: Through the California Environmental Quality Act (CEQA) review process the District evaluates impacts from land use development projects and recommends measures to reduce emissions. Mitigation measures focus on reducing emissions from motor vehicles and improving energy efficiency, both of which directly reduce criteria pollutants and GHGs. Such strategies include incorporation of energy efficiency measures (increased insulation, high efficiency appliances and lighting, passive and active solar systems, etc.) that go beyond current building standards; and including Smart Growth principles into the project design to reduce vehicle trips and increase the viability of alternative transportation.

- Grant Programs: Many emission reduction projects funded through the various grant programs administered by the District result in replacement or retrofit of older, high emission engines with cleaner and more efficient engines that simultaneously reduce fuel use, thus reducing CO_2 emissions. Conversion of stationary and mobile diesel engines to natural gas or electric motors also serves to reduce CO_2 emissions.

- Transportation Choices Program: In partnership with SLO Regional Rideshare, Ride-On and the APCD, the Transportation Choices Program (TCP) is a free program offered to businesses and organizations throughout SLO County to reduce employee and student commute trips and promote the use of alternative transportation.

- Pollution Prevention: The Pollution Prevention Program promotes the use of and publicly recognizes small businesses which successfully employ pollution prevention and emission reduction techniques as part of routine operating procedures. Many of the businesses so recognized have incorporated operational changes that reduce their emissions through efficiency improvements that also reduce fuel and product use and saves energy.

- Public Outreach: The APCD implements a number of outreach campaigns to promote a variety of clean air programs, including backyard burning reduction programs, clean car awareness, pollution prevention, energy efficiency and transportation alternatives, all of which promote community consciousness and lifestyle choices that can help reduce our impacts on climate change.

Potential Additional District Actions to Address Climate Change

As shown above, the District currently implements several programs focused on conventional pollutants that also provide supplemental benefits in reducing greenhouse gas emissions. Staff has evaluated a number of potential additional actions that could be implemented to specifically address climate change at the local level. Listed below are those identified by staff as feasible and reasonable to implement, in whole or in part, along with an estimate of the initial and ongoing staff resources required to execute the measure:

1. ***Prepare a countywide inventory of greenhouse gas emissions***. An inventory of all permitted and unpermitted sources in the District would provide a better understanding of the primary GHG sources in our area and enhance our ability to develop programs targeted at reducing those emissions. The District currently develops an inventory of criteria pollutant emissions each year for all sources in the county. Adding CO_2 and select other GHGs to this existing effort would require developing calculation methods for some sources, modifying our current survey forms and databases slightly to accommodate the additional information, and entering and tracking the data in our database.
    - *Initial Effort:* 160 hours to modify forms and databases and develop quantification methods.
    - *Ongoing Effort:* 30-40 hours per year to track data and update database. This work is typically performed by student interns.
    - *Direct Costs:* None – minimal expenses currently incurred by existing program are already included in annual budget.
2. ***Target a percentage of mitigation grant funds for greenhouse gas emission reductions.*** The District administers a number of emission reduction grant programs. While those funded by the State are restricted in their use, mitigation fees from local projects are not subject to those restrictions. The Board could direct that a set percentage of mitigation funds be targeted for GHG emission reduction projects or other outreach activities aimed at climate protection. Staff would develop project evaluation criteria for Board adoption to guide funding recommendations.
    - *Initial Effort:* 20 hours to develop evaluation criteria
    - *Ongoing Effort:* No additional workload is anticipated as the amount of funding would not increase; a portion of existing staff efforts would just be redirected to a new project category.
    - *Direct Costs:* None beyond costs for administering existing grant programs.
3. ***Evaluate and quantify the GHG reduction benefits from existing district programs.*** As described in the preceding section, the District currently implements a variety of programs that provide ancillary benefits in addressing climate change; however, those benefits have not been quantified. It would be useful to quantify the GHG emission reductions achieved by each program to determine current benefits and how programs could be modified to improve those benefits.

- *Initial Effort:* 20-50 hours/program (250 hrs total) to develop quantification methods and perform initial calculations; a software tool developed by a group of state air agencies for this purpose may reduce this level of effort. An additional 10 hours/program could be spent to evaluate ways to increase its climate protection effectiveness.
- *Ongoing Effort:* 10 hours/program (60 hrs total) to perform annual calculations.
- *Direct Costs:* None.

4. ***Develop public education and outreach campaigns on climate change.*** Staff could add climate protection, energy efficiency, and ways to reduce greenhouse gas emissions at home and in the workplace to ongoing outreach efforts on existing programs. A basic primer on causes and potential impacts of climate change could be added to our website with links to other informative sites and resources on the topic. A brochure could also be developed on climate change and what individuals can do to make a difference.
    - *Initial Effort:* 80-100 hours to determine strategy and content for outreach campaigns, develop initial promotional materials and website content and initiate campaign.
    - *Ongoing Effort:* Minimal additional effort – would likely reprioritize efforts on one or more existing outreach campaigns to accommodate new focus.
    - *Direct Costs:* $3000-$5000 for initial promotional material development.

5. ***Encourage and provide support for local governments to join the Cities for Climate Protection program.*** Encouraging local government entities to join and participate in this international program would significantly increase the amount of GHG emission reductions that could be achieved locally. The District could provide support in helping local entities calculate emission inventories and develop harmonized strategies for addressing climate protection through development of model ordinances and guidelines that each jurisdiction could tailor to their individual goals. Staff could also provide technical assistance to local stakeholders and create an information clearinghouse to assist local initiatives.
    - *Initial Effort:* 60-80 hours to research and compile model ordinances and guidelines (this work could be contracted). An additional 30-40 hours to initially promote the program to jurisdictions.
    - *Ongoing Effort:* 40 hours/year in staff support to local jurisdictions.
    - *Direct Costs:* $6000-$8000 if initial research is contracted to consultant. Minimal direct costs otherwise.
6. ***Develop partnership with Cal Poly for addressing climate change:*** Form a strategic partnership with Cal Poly to develop a program, curriculum or other approach for engaging students in Environmental Engineering, City and Regional Planning, Natural Resource Management and other applicable disciplines to help assess local GHG emissions and impacts, help develop assessment and evaluation tools to aid local stakeholders in their efforts, and/or become involved in District outreach programs on climate change. Students involved in this endeavor could receive school credits and/or potentially intern with the District.

- *Initial Effort:* 50-70 hours to meet with faculty and scope potential programs, develop selected approaches, and begin initial implementation.
- *Ongoing Effort:* 50 hours/year in overseeing and assisting student activities.
- *Direct Costs:* Currently unknown, but likely not substantial; could require some financial assistance to University to help with program development and implementation costs. Student intern costs are already factored into our annual budget.

7. ***Join the California Climate Registry and encourage local industry participation***. By becoming a Registry participant the District will have a unique opportunity to influence future statewide policies addressing GHG issues, gain important information for managing emissions in a more cost effective manner and set an example for other companies, agencies and municipalities in the area. Membership requires calculation, certification and reporting of all GHGs generated by the member entity through an internet software tool provided to members.
    - *Initial Effort:* 10 hours to learn and use calculation software and to identify and compile documentation needed to certify emissions.
    - *Ongoing Effort:* 3 hours/year to calculate emissions and compile documentation.
    - *Direct Costs:* $400 annual membership fee; $400-$1500 for annual third-party certification.