Report on the

Integration of

Air Quality Management and

Climate Protection

Prepared for the Bay Area Air Quality Management District and the

Sonoma County Waste Management Agency by the

Climate Protection Campaign and the Community Clean Water Institute

June 2005

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Abstract

This report,[1] funded by the Bay Area Air Quality Management District, describes the results of a study of the integration of air quality management and climate protection. An inventory of Bay Area climate protection efforts finds seventeen local jurisdictions in the Bay Area Air Quality Management District participating in Cities for Climate Protection® as of Spring 2005. A national review of efforts to connect climate protection and air quality management at the regional level finds multi-state collaboration, state level action plans, and signs that climate protection will soon be an important area within the Air District's purview. An analysis of the relation between the Bay Area Air Quality Management District's Air Quality plans and climate protection plans reveals areas of harmonization, as well as differences in the plans' focus on supply versus demand.

A menu of model ordinances for approaching climate protection is offered. For local governments, ICLEI's Cities for Climate Protection program is an excellent starting point. Potential frameworks are described for integrating air pollution and climate protection programs based on the three categories used by the Air District to describe its various measures. A fourth category, used by Cities for Climate Protection, is also considered.

Seven recommendations for the Air District are offered:

1. Become the leader and institutional home for climate protection in the Bay Area
2. Develop Bay Area partnerships, starting with ABAG and MTC, for climate protection policy, programs, and funding to ensure significant GHG emission reductions
3. Encourage and provide support for Bay Area local governments to join and follow the Cities for Climate Protection program
4. Develop a framework that fosters rigorous critical thinking and analysis to identify, promote, and implement solutions that are commensurate with the scale of the problem
5. Implement market-based measures
6. Build public support for climate protection
7. Position the Air District to regulate GHG emissions

A list of references and resources for more information, and a summary of stakeholder interviews conducted in researching this report are also provided.

[1] This report is posted at www.climateprotectioncampaign.org

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Project background

Climate change is a global phenomenon with local implications. Local and regional actions affect the overall amount of greenhouse gas emitted, and can affect larger areas by offering inspiring examples.

"Climate change is the biggest problem that civilization has had to face in 5,000 years."

--Sir David King, British Chief Scientific Advisor

In 2002 the Sonoma County Mayors' and Council members' Association sent a letter to the Chair of the Board of the Bay Area Air Quality Management District encouraging the district to support climate protection. In June 2003, the Air District Board approved a request for financial support of a two-part study comprised of a GHG inventory for all sectors of Sonoma County, and research regarding actions underway regionally and nationwide in which air quality and climate protection efforts are being integrated. The project work statement is shown on the following page. The Sonoma County Waste Management Agency served as administrator for the study.

The Phase One study report, "Inventory of greenhouse gases emitted in Sonoma County," was completed in January 2005.[2] This report is intended for use by other communities as an example of how to inventory their emissions. The key finding of this study was that from 1990 to 2000, Sonoma County's greenhouse gas emissions increased overall by 28 percent. Key factors for this rise are an increase in vehicle miles traveled of 42.5 percent, and an increase in population of 18 percent.

Recommendations made as part of the study describe actions to reduce greenhouse gas emissions. It was recommended that Sonoma County launch an initiative through which representatives from diverse sectors of the community convene to consider and adopt an emission reduction target; and create, adopt, and commit to implementing a plan for reaching the target. It was specifically recommended that Sonoma County adopt a 20 percent reduction from 1990 levels by 2010[3], a bold step that would begin to align Sonoma County's production of greenhouse gas emissions with the scientific imperative. Scientists say that we need to reduce emissions of carbon dioxide, the major GHG, by 50 to 70 percent to stabilize its concentration in the atmosphere, and can succeed in making such reductions using solutions that exist today.

[2] The Phase One report is posted at www.climateprotectioncampaign.org

[3] On May 21, 2005, a diverse group of community representatives from throughout Sonoma County studied community greenhouse gas emission reduction targets, and recommended that Sonoma local governments adopt a target to reduce emissions by 25 percent from 1990 levels by 2015. The County Board of Supervisors and nine city councils have yet to consider this recommendation, but it is anticipated that they will before the end of 2005.

Project work statement

Phase One: Inventory of the greenhouse gases emitted in Sonoma County

	Task	Description
A.	Analysis: Inventory of GHG emissions	Greenhouse gas emission inventory for Sonoma County broken down into at least three sources – residential, business, and governmental.
B.	Recommendations: Targets	Recommendations for GHG emission reduction targets for Sonoma County.
C.	Recommendations: Next Steps	Recommendations for next steps for reducing GHG emissions in Sonoma County, and how these next steps relate to the BAAQMD's Air Quality Plans.
D.	Research: Input from stakeholders	A list of the stakeholders involved in producing the inventory report with copies of minutes of meetings with stakeholders
E.	Public outreach	Copies of newspaper articles and other print media coverage, if any, for these efforts listed above.

Phase Two: Integration of air quality and climate protection efforts and BAAQMD's role

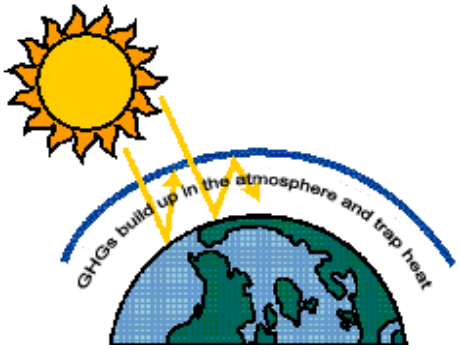
	Task	Description
A.	Research: District-wide inventory	Inventory of climate protection efforts throughout the Bay Area Air Quality Management District, and identification of the best models for climate protection found in the District. Description of the coordination, if any, between climate protection and air quality in these efforts.
B.	Research: Nationwide review	Description of the results of a nationwide review of how climate protection and air quality management are being connected and coordinated at the regional level. Identification of the most effective models for making this connection.
C.	Analysis: Relation between plans	Analysis of the relation between the BAAQMD's Air Quality Plans and climate protection plans, including identification of the overlaps, gaps, and areas of synergy.
D.	Recommendations: Model ordinance(s)	Model ordinance(s) for local government that addresses and integrate climate protection and air quality management.
E.	Recommendations: Model framework	Description of a model framework for programs – local, regional, and multi-county – that both protect the climate and improve air quality.
F.	Recommendations: Next steps	Description of recommended next steps for the BAAQMD.
G.	Resources: Possible funding sources	A list of possible funding sources for climate protection and clean air efforts.
H.	Resources: Other	A list of resources for more information about the above.
I.	Research: Source of information	A list of the stakeholders involved in producing the report with copies of minutes of meetings with stakeholders.
J.	Final Report	A presentation to the BAAQMD Board with the results of the project.

A. Global climate change: Description and significance[4]

Heat from the sun is trapped near the Earth's surface by naturally occurring gases. This greenhouse effect stabilizes earth's temperature at an average of approximately 60°F, making Earth habitable for humankind.

The major greenhouse gas from human activity, carbon dioxide (CO_2), is produced when gasoline, diesel, natural gas, coal and other fossil fuels combust. Methane (CH_4), the second most important greenhouse gas from human activity, is a byproduct of organic decomposition.

As human population and consumption has increased, so has the amount of greenhouse gas emitted into Earth's atmosphere. In the mid 1850s there was about 280 parts per million of carbon dioxide in the atmosphere; now there is about 379. Human activity has increased the blanket of heat-trapping gas surrounding the Earth, magnified the greenhouse effect, and increased Earth's average temperature by an average of more than 1°F over the last 100 years.



Climate change is caused by a manmade blanket of carbon dioxide that surrounds the earth and traps in heat.

Scientists prefer the term climate change to global warming because climatic changes vary across the planet, from place to place and season to season. With climate change comes extreme weather – both record-breaking hotter and colder temperatures, both droughts and floods. For example, between 1995 and 1998 there were a record 33 hurricanes in the U.S. In August 2004, Hurricane Charley with winds of 145 miles per hour in Florida, caused $7.4 billion in damages and killed 27 people. For many areas in the U.S., droughts in 1998 were among the worst ever. Currently, the western part of North America is in the midst of one of the worst droughts in 500 years. While no single weather event can be attributed to global climate change, the pattern of increasing extreme weather can, say climatologists.

The world's foremost authority on climate change, the International Panel on Climate Change (IPCC), involves thousands of scientists worldwide who study atmospheric changes, their potential impacts, and appropriate policy responses. Having verified the increase in greenhouse gas, the rise in temperatures, and the impacts on Earth's living systems, these scientists concluded that global climate change imperils life on Earth. In 1995, the IPCC specified that stabilizing the concentration of carbon dioxide required an immediate reduction in CO_2 emissions of 50 to 70 percent, and required further reductions thereafter until the year 2100.[5]

[4] This section on global climate change originally appeared in "Greenhouse Gas Emission Inventory for all sectors of Sonoma County, California, 2005. www.climateprotectioncampaign.org

[5] IPCC second assessment synthesis of scientific-technical information relevant to interpreting article 2 of the UN Framework Convention on Climate Change, 1995, the summary for policymakers, page 9, http://www.ipcc.ch/pub/sa(E).pdf See also "Climate Change Research - Facts, uncertainties and responses," Astrid Zwick, Antonio Soria http://www.jrc.es/pages/iptsreport/vol05/english/art-en1.doc

B. Types and strengths of greenhouse gases[6]

Processes that generate, absorb, and destroy greenhouse gases determine its concentration in the atmosphere, currently less than 1 percent. Major greenhouse gases besides carbon dioxide and methane are nitrous oxide (N_2O), chlorofluorocarbons (CFCs), and ozone (O_3).[7] Water vapor (H_2O) also contributes to the greenhouse effect, but human activity has little impact on it, according to scientists.

The IPCC identified the strength of each type of GHG based on its ability to trap heat, defined as cumulative radiative forcing.[8] Global warming potential also takes into account the atmospheric lifetimes of GHGs.

Global Warming Potential of major greenhouse gases [9]

	Greenhouse gas	Estimated Lifetime (years)	Global Warming Potential		
			20 years	100 years	500 years
	Carbon Dioxide (CO_2)	50-200[10]	1	1	1
	Methane (CH_4)	12.0	62	23	7
	Nitrous Oxide (N_2O)	114	275	296	156
Chlorofluorocarbons (CFCs)	$CFCl_3$ (CFC-11)	45	6300	4600	1600
	CF_2Cl_2 (CFC-12)	100	10200	10600	5200
	$CClF_3$ (CFC-13)	640	10000	14000	16300
	$C_2F_3Cl_3$ (CFC-113)	85	6100	6000	2700
	$C_2F_4Cl_2$ (CFC-114)	300	7500	9800	8700
	C_2F_5Cl (CFC-115)	1700	4900	7200	9900

[6] Reference: Hong Kong Observatory: http://www.hko.gov.hk/wxinfo/climat/greenhs/e_grnhse.htm Please note that these figures are from the IPCC's Third Assessment Report. The protocol followed for this report follows the U.S. inventory as well as the recommendation of the IPCC, i.e., to continue to use the GWPs from the IPCC's Second Assessment report through the end of the first reporting period when inventories will shift over to the Third Assessment Report.

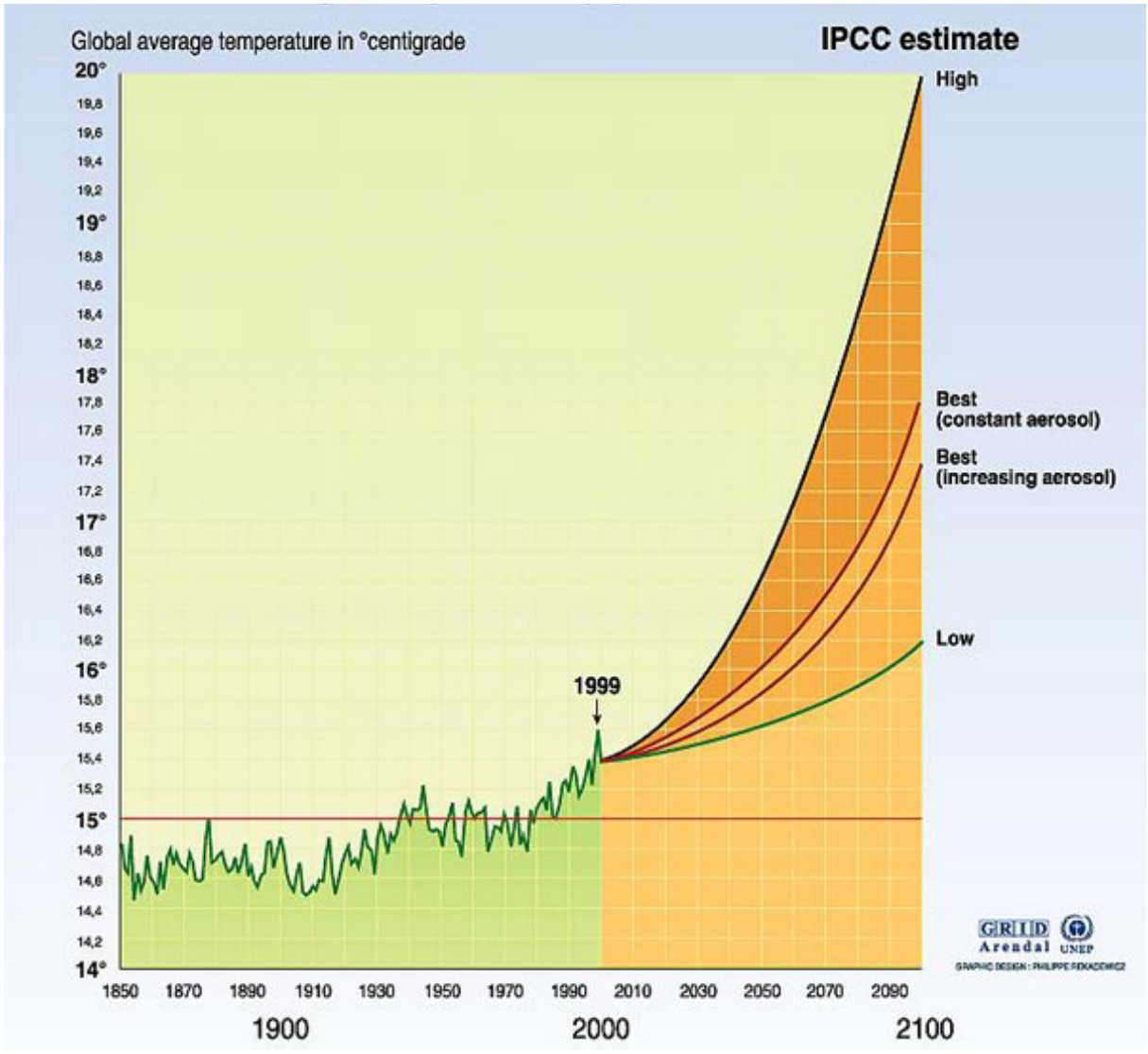
[7] Tropospheric ozone concentrations in the Northern Hemisphere may have increased since preindustrial times because of human activity, resulting in positive radiative forcing. Although not yet well characterized, this forcing is estimated to be about 0.4 Wm2 (15% of that from the long-lived greenhouse gases). However, the observations of the most recent decade show that the upward trend has slowed significantly or stopped. IPCC Summary for Policy Makers http://www.ipcc.ch/pub/sarsum1.htm

[8] Radiative forcing considers the difference between the present and some future time caused by a unit mass of greenhouse gas emitted now, expressed relative to CO_2. Radiative forcing is defined as a change in average net radiation at the top of the troposphere (tropopause) due to a change in either solar or infrared radiation. A radiative forcing perturbs the balance between incoming and outgoing radiation. A positive radiative forcing tends on average to warm the Earth's surface; a negative radiative forcing tends on average to cool the Earth's surface.

[9] Global warming potential following the instantaneous injection of 1 Kg of each GHG, relative to 1 Kg of CO_2. Table is based on information found in the IPCC Third Assessment Report, 2001. Derivations of global warming potentials require knowledge of the fate of the emitted gas (typically not well understood) and the radiative forcing due to the amount remaining in the atmosphere (reasonably well understood). GWPs typically encompass $\pm$ 35% uncertainty relative to CO_2 reference.

[10] Different removal processes result in a varying CO_2 lifetime, U.S. Environmental Protection Agency, April 2002, http://yosemite.epa.gov/oar/globalwarming.nsf/UniqueKeyLookup/SHSU5BUM9T/$File/ghg_gwp.pdf

Projected changes in global temperature



Global average 1856-1999 and projection estimates to 2100

Source: Temperatures 1856-1999: Climatic Research Unit, University at East Anglia, Norwich UK. Projection: IPCC report 95.

World Scientists' Warning to Humanity

Human beings and the natural world are on a collision course. Human activities inflict harsh and often irreversible damage on the environment and on critical resources. If not checked, many of our current practices put at serious risk the future that we wish for human society and the plant and animal kingdoms, and may so alter the living world that it will be unable to sustain life in the manner that we know. Fundamental changes are urgent if we are to avoid the collision our present course will bring about."

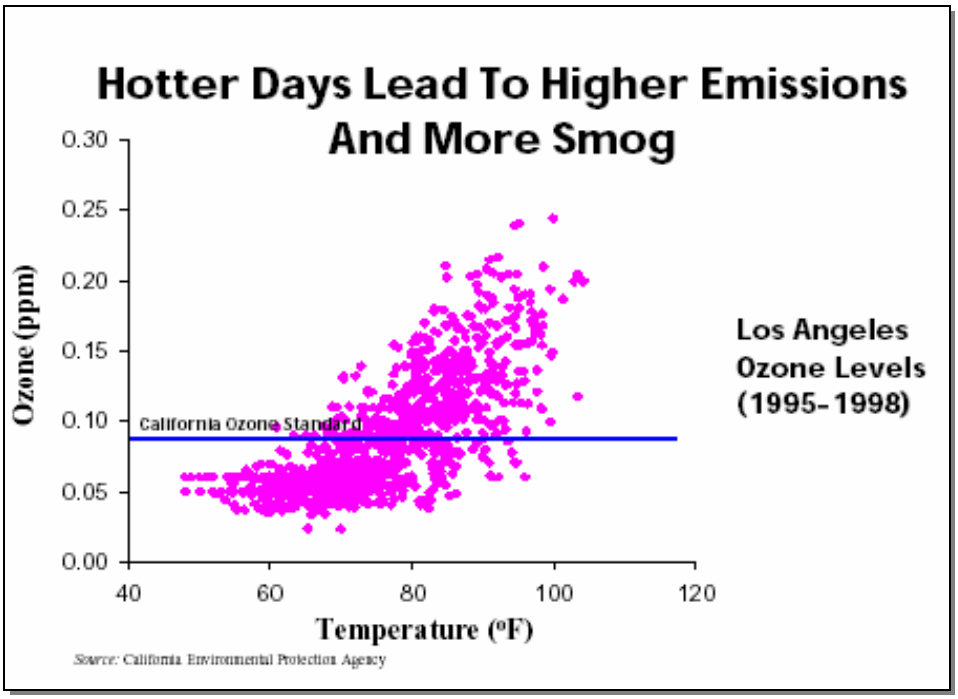
--Signed in 1992 by more than 1,600 scientists, including 102 Nobel laureates, from 70 countries

http://www.ucsusa.org/ucs/about/page.cfm:pageID=1009

C. Relationship between global climate change and air quality

The higher temperatures forecast by scientists will worsen air quality in several ways. Ozone formation tends to increase with higher temperatures, strong sunlight, and a stable air mass, as shown in the following graph. Higher temperatures also increase air pollution by causing vegetation to emit more natural hydrocarbon, engines such as air conditioners to work harder, fuel evaporation to increase, and demands on power plants to increase as well.[11]

Recent research confirms that global climate change will likely trigger increases in smog and health problems.[12] The research predicts that by 2050 the number of smog-alert days in selected U.S. cities will increase by about 60%, accompanied by more lung diseases including asthma, more hospital admissions, and more premature deaths.[13]



Just as climate change exacerbates air pollution, air pollution also exacerbates climate change. Incomplete combustion of fossil fuels, biofuels, and biomass produces black carbon, also called

[11] "Global Warming and Greenhouse Gas Emissions from Motor Vehicles," AB 1493 (Pavley) Briefing Package, prepared by the California Environmental Protection Agency, http://www.energy.ca.gov/global_climate_change/documents/AB1493_PRESENTATION.PDF

[12] See for example, "Potential Impacts of Climate Variability and Change on Air Pollution-Related Health Effects in the United States," Susan Bernard et. al., Environmental Health Perspectives, May 2001; "Taking Our Breath Away: The Health Effects of Air Pollution and Climate Change," David Suzuki Foundation, 1998; "Climate Change: Hidden Health Benefits of Greenhouse Gas Mitigation," Luis Cifuentes et. al., Science Magazine, August 2001.

[13] "Heat Advisory: How Global Warming causes More Bad Air Days, July 2004, http://www.nrdc.org/globalWarming/heatadvisory/heatadvisory.pdf

soot or particulate matter. The impact of these air pollutants on global temperature is very complex.[14] Some climate scientists assert that their overall impact is to heat the atmosphere.[15]

Air pollution and climate change share causes and solutions. Reduction in fossil fuel consumption reduces both criteria pollutants and GHG emissions. Many criteria pollutants, specifically the various oxides of nitrogen (NOx) produced during combustion originate from fossil fuel combustion, as does carbon dioxide (CO_2), the primary greenhouse gas. Volatile organic compounds (VOCs) are ozone precursors, and will under certain circumstances, produce methane. Reducing VOCs improves air quality and helps protect the climate. According to the 2003 Clean Air Plan, the Air District is able to measure VOCs as related to methane as part of its current ozone planning.

Electricity, transportation, and industrial sectors account for most of the U.S. anthropogenic emissions of criteria pollutants and GHG emissions. Electric and transportation sectors are the largest aggregate producers of GHG emissions, with each accounting for about 35 percent to 40 percent of total emissions.[16] For all sectors, the two essential steps to both clean the air and protect the climate are improving energy efficiency and switching to lower-carbon or zero-net-carbon fuels, i.e., renewables.

Clean air solutions do not necessarily translate to climate protection. Smog-creating air pollution decreased substantially in the U.S. following the Clean Air Act of 1970. By contrast, CO_2 emissions rose during the same period because air quality tactics such as "tailpipe" controls and smokestack scrubbers have little or no impact on carbon dioxide. In fact, some clean air technologies actually increase CO_2 by lowering plant efficiency, thus requiring more energy to be used. Some alternative fuels that are good for air quality either have no effect or increase GHG emissions. Congestion management measures like signal synchronization often reduce emissions only temporarily. Emissions may actually increase in the long run because short-term traffic relief encourages people to drive more. Although strategies that cut standard air pollution often miss GHG emissions, strategies that reduce GHG emissions almost always improve air quality as well.[17]

> In continuing to address criteria pollutant nonattainment challenges, state and local officials have the opportunity to capture significant GHG emission reductions. The most effective path for achieving this goal is to ensure that, in obtaining emission reductions needed for criteria pollutant attainment, the applied strategies are ones that also provide GHG reduction benefits, rather than measures that are ineffective or counterproductive from a GHG perspective.
>
> "Reducing Greenhouse Gases and Air Pollution: A Menu of Harmonized Options," STAPPA /ALAPCO

[14] "Climate Change Overview: Technical support document for staff proposal regarding reduction of greenhouse gas emissions from motor vehicles," California Environmental Protection Agency, Air Resources Board, August 6, 2004, http://www.arb.ca.gov/cc/factsheets/august_tsd/overview_august.pdf
[15] See, for example, "Defusing the Global Warming Time Bomb," James Hansen, Scientific American, March 2004.
[16] "Reducing Greenhouse Gases and Air Pollution: A Menu of Harmonized Options," October 1999, STAPPA/ALAPCO, http://www.4cleanair.org/comments/execsum.PDF
[17] "Converging solutions: Clean air and climate protection," ICLEI fact sheet by Chris Giovinazzo, undated.

Many initiatives that aim to both clean the air and protect the climate are emerging. One recent development with potentially far-reaching impacts is the suit filed in July 2004 against five major utilities by attorneys general from eight states including California, and officials from New York City. The suit charges that greenhouses gas emissions from the utility companies are creating a public nuisance. The suit seeks a court order to require the utilities to reduce these emissions. Attorneys general contend that they must act because normal regulatory approaches such as action from the E.P.A., Congress, and the administration, have failed to adequately address the threat posed by utilities' GHG emissions.[18]

Passage of AB1493 in 2002, California's law to regulate greenhouse gas emissions, represents the first-ever mandatory reduction of greenhouse gas pollutants from vehicles in the U.S. The legislation directed the Air Resources Board to develop regulations for automobile manufacturers to achieve maximum feasible reductions in GHG emissions. In September 2004, the California Air Resources Board voted unanimously to adopt standards that cut carbon dioxide emissions by 25 percent starting with the 2009 model year.[19]

The two major national associations of air pollution control agencies, State and Territorial Air Pollution Program Administrators (STAPPA) and the Association of Local Air Pollution Control Officials (ALAPCO) in 1999 issued a substantial education resource guide to help state and local officials identify and assess harmonized strategies and policies to reduce air pollution and address climate change simultaneously.[20] Also, STAPPA/ALAPCO together with ICLEI in 2003 released software called CACPS – Clean Air and Climate Protection Software – to help state and local governments track criterion air pollution and GHG emissions.[21]

ICLEI has more recently developed a web-based emissions tool for both climate protection and air quality called Harmonized Emissions Analysis Tool (HEAT). Features include:

- Protocols for GHG and air pollution emissions
- Co-benefit information on NO_x, SO_x, CO, VOCs, and PM emissions
- Data repository for hundreds of inventories and action plans
- Architecture for features such as agriculture, health, and carbon trading
- Multi-country and multi-lingual web-based interface

In Europe, the European Environmental Agency has issued a report that analyzes the linkages between climate protection and air quality.[22]

[18] "New environmental cops: state attorneys general," Christian Science Monitor, July 22, 2004, http://www.csmonitor.com/2004/0722/p03s01-usju.html
[19] "California Goes Ahead With Disputed Smog Plan," UPI, September 24, 2004, http://www.spacedaily.com/news/pollution-04c.html
[20] "Reducing Greenhouse Gases and Air Pollution: A Menu of Harmonized Options," October 1999, STAPPA/ALAPCO, http://www.4cleanair.org/comments/execsum.PDF
[21] Clean Air and Climate Protection Software http://www.cacpsoftware.org
[22] "Air pollution and climate change policies in Europe: exploring linkages and the added value of an integrated approach," European Environment Agency, http://reports.eea.eu.int/technical_report_2004_5/en/tab_content_RLR

Project results

A. Review of climate protection in the Bay Area

Local government initiatives
Increasingly, local jurisdictions in the San Francisco Bay Area are addressing the threat of climate change. As of Spring 2005, 17 local jurisdictions in the Bay Area Air Quality Management District participate in *Cities for Climate Protection®,* an international program led by *ICLEI – Local Governments for Sustainability* whose U.S. headquarters are located in Berkeley. Over 600 communities participate in this campaign worldwide, over 150 of them in the U.S. Bay Area jurisdictions participating in Cities for Climate Protection (CCP) include:

Berkeley	Novato	San Jose
Cotati	Oakland	County of Santa Clara
Fairfax	Petaluma	Santa Rosa
County of Marin	Rohnert Park	Sebastopol
Marin Municipal Water District	San Anselmo	County of Sonoma
	San Francisco	City of Sonoma

Additionally, Cloverdale, Healdsburg, and Windsor, located in Sonoma County but in the North Sonoma County Air Pollution Control District, are part of the program.

The CCP program consists of five milestones:

Milestone One:	Inventory greenhouse gas emission production
Milestone Two:	Set a target for emission reduction
Milestone Three:	Create a plan for meeting the target
Milestone Four:	Implement the plan
Milestone Five:	Monitor progress and adjust as appropriate

Municipalities focus on GHG emissions produced by their internal operations, on emissions produced by all sectors in the jurisdiction, or first one and then the other.

The table on the following page indicates progress Bay Area municipalities have made as part of the CCP program.

To show actual calculations that relate criteria air pollutants and greenhouse gas emissions, the table on page 13 lists the types and amounts of criteria air pollutants associated with electricity and natural gas consumption and with transportation that were produced in 1990 and 2000 by all sectors in Sonoma County. At the bottom of the table are the tons of GHG emissions also produced annually due to electricity and natural gas consumption and transportation in Sonoma County by all sectors.

Bay Area Cities for Climate Protection Progress

	Milestone 1 Inventory	Milestone 2 Target	Milestone 3 Plan	Milestone 4 Implementation	Milestone 5 Track progress
1. BERKELEY					
Internal Operations	X	X			
Community wide	X	X	X		
2. COTATI					
Internal Operations	X	X			
Community wide	*				
3. FAIRFAX					
Internal Operations					
Community wide		X			
4. COUNTY OF MARIN					
Internal Operations	X	X	X		
Community wide	X	X	X		
5. MARIN MUNICIPAL WATER DISTRICT					
Internal Operations					
Community wide					
6. NOVATO					
Internal Operations					
Community wide					
7. OAKLAND					
Internal Operations	X	X			
Community wide	X	X	X		
8. PETALUMA					
Internal Operations	X				
Community wide	*				
9. ROHNERT PARK					
Internal Operations	X	X			
Community wide	*				
10. SAN ANSELMO					
Internal Operations					
Community wide					
11. SAN FRANCISCO					
Internal Operations	X	X	X		
Community wide	X	X	X		
12. SAN JOSE					
Internal Operations	X				
Community wide					
13. COUNTY OF SANTA CLARA					
Internal Operations					
Community wide					
14. COUNTY OF SONOMA					
Internal Operations	X	X			
Community wide	X				
15. SANTA ROSA					
Internal Operations	X				
Community wide	*				
16. SEBASTOPOL					
Internal Operations	X	X			
Community wide	*				
17. CITY OF SONOMA					
Internal Operations	X				
Community wide	*				

* A community-wide inventory was done for the County of Sonoma as a whole.

Criteria air pollutants and GHG emissions from electricity, natural gas, and transportation, Sonoma County[23]

Year	1990	2000
Electricity, Residential		
NOx (lbs)	2,198,354.6	2,508,106.5
SOx (lbs)	737,769.1	899,483.2
CO (lbs)	862,427.9	1,032,895.6
VOC (lbs)	130,978.2	153,652.8
PM10 Output (lbs)	544,147.3	678,475.7
Electricity, Commercial		
NOx (lbs)	1,020,529.1	1,322,711.7
SOx (lbs)	531,332.5	711,951.2
CO (lbs)	496,335.6	671,637.4
VOC (lbs)	66,027.6	88,467.0
PM10 Output (lbs)	391,185.1	536,659.9
Electricity, Industrial		
NOx (lbs)	737,307.4	944,563.1
SOx (lbs)	478,067.4	624,921.5
CO (lbs)	341,523.9	455,321.6
VOC (lbs)	44,962.3	59,425.9
PM10 Output (lbs)	244,630.7	332,558.4
Transportation, all sectors		
NOx (lbs)	14,256,605.7	16,144,446.1
SOx (lbs)	1,150,990.3	740,877.0
CO (lbs)	109,961,555.0	108,143,640.2
VOC (lbs)	12,558,115.2	11,601,103.1
PM10 Output (lbs)	704,872.3	518,316.7
Totals		
NOx (lbs)	18,212,796.7	20,919,827.4
SOx (lbs)	2,898,159.4	2,977,232.9
CO (lbs)	111,661,842.5	110,303,494.7
VOC (lbs)	12,800,083.3	11,902,648.8
PM10 Output (lbs)	1,884,835.4	2,066,010.7
GHG (tons eCO2)	2,545,990	3,393,158

[23] Figures generated using STAPPA/ALAPCO and ICLEI's Clean Air and Climate Protection Software.

Bay Area Air Quality Management District
Acknowledging the overwhelming scientific evidence that the temperature of the earth's surface and oceans are rising, the Board of Directors of the Bay Area Air Quality Management District established a Climate Protection Program on June 1, 2005. This program will address greenhouse gas emissions that lead to climate change and have the potential to increase smog in the region.[24] One of the first actions the Air District undertook as part of its new climate protection program was to inventory the greenhouse gas emissions produced throughout the Bay Area.

California Climate Action Registry
The California Climate Action Registry is a non-profit public/private partnership established by California statute that serves as a voluntary greenhouse gas (GHG) registry to protect, encourage, and promote early actions to reduce GHG emissions. The Registry is developing protocols for calculating GHG reductions, and provides reporting software called CARROT to the approximately forty companies and government Registry participants. Members of the Registry located and/or working in the Bay Area include Bay Area Air Quality Management District, BP, California Energy Commission, California Environmental Protection Agency, California Public Utility Commission, Calpine, Catholic HealthCare West, Clif Bar Inc., Energy Foundation, Environmental Defense, Pacific Forest Trust, Pacific Gas and Electric Company, and the Union of Concerned Scientists.[25]

Comparing the Registry's with Cities for Climate Protection, the Registry's primary focus is business while CCP focuses on local governments. The Registry mainly addresses documenting businesses' and other entities' GHG emissions (CCP Milestone 1), including documenting any reductions (Milestone 4). Milestones 2, 3, and 5 of the CCP program - setting a target, making a plan, and monitoring and modifying as needed - are not a focus of the Registry. The Registry also is set up to provide "credit for early action" in anticipation of a future carbon trading market. Documentation using the CCP software may eventually be used for the same purpose, but currently it is promoted for more immediate reasons such as saving money through energy efficiency, and reducing air pollution including GHG emissions.

PUC-funded energy efficiency programs
A portion of Californian's utility payments goes into a public goods fund that totals hundreds of millions of dollars annually. The California Public Utility Commission dispenses these funds to improve the energy efficiency and overall operation of California's electricity and natural gas systems. Programs in the Bay Area, most under the auspices of PG&E, receive these funds. Examples of some of the PUC-funded programs in the Bay Area are the Local Government Energy Partnership, the California Energy Efficiency Program, Green Schools, and the Marin Energy Management Team.[26]

[24] "Climate Change and Protection," Bay Area Air Quality Management District, http://www.baaqmd.gov/pln/climatechange.htm
[25] California Climate Action Registry, http://www.climateregistry.org
[26] California Public Utility Commission Energy Efficiency and Conservation Program, http://www.cpuc.ca.gov/static/industry/electric/energy+efficiency/index.htm

Flex Your Power
Flex Your Power is California's statewide energy efficiency marketing and outreach campaign. Initiated in 2001, Flex Your Power is a partnership of California's utilities, residents, businesses, institutions, government agencies, and nonprofit organizations working to save energy. In Silicon Valley, Flex Your Power has joined with Silicon Valley Leadership Group, Sustainable Silicon Valley, and PG&E, to reduce energy use and carbon dioxide emissions. Partners in "Flex Your Power Silicon Valley" facilitate energy efficiency improvements and demand reduction commitments to ensure reliable power, protect the environment and deliver costs savings to Valley businesses.[27]

Energy Star
Energy Star is a dynamic government/industry partnership that offers businesses and consumers nationwide energy-efficient solutions to save money while protecting the environment. Energy Star offers technical information and tools to help organizations and consumers choose energy-efficient solutions and best management practices. Over the past decade, this program has advanced such technological innovations as LED traffic lights, efficient fluorescent lighting, power management systems for office equipment, and low standby energy use.[28]

Business initiatives
The Bay Area private sector has also taken leadership in climate protection. One of the best-known initiatives was announced by a coalition of major Silicon Valley companies on March 29, 2004. The companies - Hewlett-Packard, Oracle, Calpine, Lockheed, ALZA, Life Scan and PG&E - along with the city of San Jose, NASA Ames Research Center and the Santa Clara Valley Water District, set a goal of cutting Santa Clara County's carbon dioxide emissions to 20 percent below 1990 levels by 2010 – about three times the reductions which would have been required by the Kyoto Protocol.[29]

The Bay Area Green Business program, led by the Association of Bay Area Governments, looks at energy use as a factor in designating a business as “green.” Greenhouse gas emissions are not specifically analyzed, however.

Environmental Entrepreneurs (E2), a national community of business people with a strong Bay Area presence, aims to protect the environment while building economic prosperity. E2 advocated for AB 1493, the California bill regulating CO_2 in automobile emissions, and is credited as one of the key factors for successful passage of the legislation.[30]

Pacific Forest Trust
Pacific Forest Trust, based in Santa Rosa, is a conservation organization dedicated to preserving private productive forestlands. A central goal of the organization is to help landowners derive

[27] Flex your power, http://www.fypower.org/
[28] Energy Star, http://www.energystar.gov/
[29] The Kyoto Protocol is the first international treaty to mandate reductions in GHG emissions. The treaty went into effect on February 16, 2005, after being signed and ratified by 122 countries and accounting for over 55% of global GHG emissions. The United States had a target of 7 percent reduction from a 1990 baseline before dropping out of the treaty in 2001.
[30] “Business group uses influence on emissions bill,” Kwan, Joshua, Mercury News, July 9, 2002, http://www.e2.org/ext/index.jsp?docId=662

financial return from conservation and stewardship. By selling the carbon in older forests, Pacific Forest Trust helps pay landowners for forest conservation. This protects the climate because trees absorb carbon dioxide and store it as biomass over centuries and millennia. Forest loss and unsustainable management are the second largest source of world CO_2 emissions, surpassed only by fossil fuel combustion.

In 2000, the Pacific Forest Trust brokered the first transaction of its kind in the U.S. It sold carbon emission reduction credits attributable to the conservation and good management of forests to Green Mountain Energy Company to offset carbon dioxide emissions associated with its corporate activities. The nearly 2,500 tons of carbon stored in the approximately 5,000 acres of forestland involved in the transaction equaled about half the emissions associated with Green Mountain's corporate activities. Redwood forests in San Mateo County were part of the 5,000 acres sold and conserved through this transaction. Redwood forests store more carbon than any other kind, according to the Pacific Forest Trust.[31]

[31] "Energy Company Buys Carbon Credits In Conserved California Redwood Forest," Pacific Forest Trust, November 9, 2000, http://www.pacificforest.org/news/nov9.html

B. Review of climate protection and air quality initiatives

U.S. mayors
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. By June 14, 2005, 165 mayors from 37 states representing a total population of approximately 35 million citizens had joined Mayor Nichols.[32]

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 emission trading system.

On June 13, 2005, Mayor Nickels' Climate Protection Agreement received unanimous support from U.S. Conference of Mayors at its annual meeting.[33]

Portland, Oregon
In June 2005 the City of Portland, Oregon, issued a report jointly with Multnomah County, documenting their progress on reducing greenhouse gas emissions. Highlights included:

- Absolute GHG emissions fell below 1990 levels for first time, albeit only slightly
- Per capital emissions fell 13% below 1990 levels

By comparison, U.S. emissions increased 13 percent during same period.[34]

California
Through the California Energy Commission, California has been engaged for several years in a broad public process to assess the major energy trends and issues facing California, and to recommend energy policies for the state. In 2003, the California Energy Commission adopted its first Integrated Energy Policy Report. In 2004, the Commission updated the report, including an assessment of the progress California made on the recommendations issued in 2003. One of the three focus areas of the 2004 update that bears directly on greenhouse gas production is acceleration of development of renewable energy generation.[35]

In addition, the California Energy Commission established the Climate Change Advisory Committee to make recommendations to the Energy Commission on the most equitable and

[32] U.S. Mayors Climate Protection Agreement, http://www.ci.seattle.wa.us/mayor/climate/quotes.htm#mayors
[33] "U.S. Mayors Endorse Nickels' Climate Protection Agreement," http://www.ci.seattle.wa.us/news/detail.asp?ID=5260&Dept=40
[34] "A progress report on the City of Portland and Multnomah County Local Action Plan on Global Warming," June 2005, "http://www.sustainableportland.org/osd_pubs_global_warming_report_6-2005.pdf
[35] Executive Summary of "The Commission Final Report: Integrated Energy Policy Report 2004 Update," http://www.energy.ca.gov/2004_policy_update/index.html

efficient ways to implement international and national climate change requirements based on costs, technical feasibility, current energy and air quality policies and greenhouse gas emissions reductions and trends since 1990. The Advisory Committee meets quarterly, and discusses strategies, analyses, and proposed recommendations to reduce greenhouse gas emissions in the state, anticipating future national and international climate change requirements. Among the areas the Committee is studying are "cap-and-trade" proposals. Staff to the Committee recently presented findings that California's total GHG emissions will grow by 32 percent from 1990 levels by 2020 unless policy changes are made to the way Californians live and conduct business.[36]

To address supply and pollution problems associated with the 50 to 100 hours per year of highest demand and strain on California's electricity supply system, the Commission recommended that the State accelerate implementation of its demand response programs to signal the actual price of electricity to customers.[37]

In 2002, California passed AB1493, landmark legislation to reduce greenhouse gas emissions from motor vehicles. Following its passage, the legislature directed the California Air Resources Board (CARB) to develop regulations for automobile manufacturers to achieve maximum feasible reductions in greenhouse gas emissions starting in 2008. Although AB1493 addresses only mobile source emissions, many view it as a harbinger of legislation that will regulate stationary sources of greenhouse gases emissions as well. The adoption of this rule makes California the nation's only state that has regulated motor vehicles for their contributions to global climate change. At least seven other states including New York, Massachusetts, New Jersey, Vermont, Connecticut, Rhode Island and Maine, as well as the nation of Canada, are considering adopting the regulation for their use. If all of those states and Canada adopt the rule, the number of cars required to meet the rule will triple.[38]

On June 1, 2005, California Governor Schwarzenegger announced greenhouse gas emission targets for the State. These are by 2010 to reduce emissions to 2000 levels, by 2020 to reduce emissions to 1990 levels, and by 2050 to reduce emissions by 80 percent below 1990 levels.[39] Also on June 1, 2005, the California Senate passed SB1, the nation's largest solar bill, known as the Million Solar Roofs bill. Governor Schwarzenegger endorses this bill.[40]

Other state initiatives

Twenty-eight states have completed Climate Action Plans as of May 2004.[41] With these plans, states identify and evaluate feasible and effective policies to reduce their GHG emissions through a combination of public and private sector policies and programs.

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[36] California Climate Change Portal, http://www.climatechange.ca.gov/

[37] Executive Summary of The Commission Final Report: Integrated Energy Policy Report 2004 Update, http://www.energy.ca.gov/2004_policy_update/index.html

[38] "Automobile greenhouse gas emissions – California," New Rules Project, http://www.newrules.org/environment/climateca.html

[39] Governor's Executive Order: # S-3-05, June 1, 2005, http://www.climatechange.ca.gov/

[40] "Build it with solar," Environment California, http://environmentcalifornia.org/envirocaliftoxics.asp?id2=13122

[41] U.S. Environmental Protection Agency. Global Warming State Climate Action Plans, http://yosemite.epa.gov/OAR/globalwarming.nsf/content/ActionsStateActionPlans.html

Highlights of states' plans include:

- Rhode Island's Greenhouse Gas Action Plan showed a $700 million dollar savings over 15 years by reducing GHG emissions.[42]
- New York's Greenhouse Gas Action Plan showed a $511 million per year savings for electricity consumers who participate in their energy efficiency program. New York Governor George Pataki is developing a multi-state regional "cap-and-trade" initiative aimed at reducing carbon dioxide emissions from power plants.[43]
- The Massachusetts Climate Protection Plan is comprised of 74 total actions in 10 categories focusing on achieving the state's climate goals. Policy actions focus on highly warming gases from commercial air-conditioning and refrigeration systems and on residential oil heating system efficiency.[44]

Pennsylvania, New York, Rhode Island, Hawaii, New Mexico, Maryland, and Colorado have renewable portfolio standards. Colorado voters passed a ballot initiative requiring renewables.

Multi-state initiatives

In September 2003, the Governors of Washington, Oregon, and California committed to regional GHG reduction effort, called the Western Governors Global Warming Initiative. The Governors concluded that global warming will have serious adverse consequences on the economy, health and environment of the west coast states and that the states must act individually and regionally to reduce greenhouse gas emissions and to achieve a variety of economic benefits from lower dependence on fossil fuels. As an initial step, the Governors directed their staffs to develop joint policy recommendations on reduction strategies that require regional cooperation and action.[45]

The Western Governors convened multi-state working groups for the following areas:

- Hybrid Vehicle Procurement: Use the states' combined purchasing power to obtain fuel-efficient vehicles and low-rolling resistance tires for motor pool fleets.
- Ports and Highway Diesel Emissions: Reduce emissions from diesel fuel in transportation through reductions in the use of diesel generators in ships at west coast ports, and in the use of diesel engines in trucks by creating a system of emission-free truck stops along the Interstate 5 corridor that stretches from Mexico to Canada.
- Renewable Energy: Remove barriers to and encourage the development of renewable electricity generation resources and technologies.
- Energy Efficiency: Improve efficiency standards with the potential to reduce greenhouse gas emissions. Specifically, the states could work together to upgrade appliance efficiency standards and seek waivers of federal limitations where necessary.
- Measurement: Develop consistent and coordinated greenhouse gas emission inventories, protocols for standard reporting, and accounting methods for greenhouse gas emissions; and collaborate on improved scientific tools to more precisely measure the impact of climate change.

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[42] Rhode Island's Greenhouse Gas Action Plan, http://www.state.ri.us/dem/programs/bpoladm/stratpp/greenhos.htm

[43] Center for Clean Air Policy, in collaboration with the New York Greenhouse Gas Task Force; "Recommendations to Governor Pataki to Reduce New York's Greenhouse Gas Emissions," http://www.pscleanair.org/specprog/globclim/cpsp/pdf/nyplan.pdf

[44] Massachusetts Climate Protection Plan, http://www.mass.gov/ocd/docs/MAClimateProtectionPlan.pdf

[45] Energy Foundation. Western Governors Global Warming Initiative, http://www.ef.org/westcoastclimate/

In the Northeast, nine states have coordinated a Regional Greenhouse Gas Initiative to develop GHG inventories and plans. The New England Climate Change Action Plan calls for each Northeast Governor and Eastern Canadian Premier to develop a plan to reduce statewide GHG emissions to 1990 levels by 2010, and 10 percent below 1990 levels by 2020. The Initiative is developing a model rule to cap and trade carbon dioxide emissions from power plants, slated for release in spring of 2005.[46]

Air District Initiatives

Air districts around the country have undertaken efforts to "harmonize" and integrate climate protection and air quality management.

As an example, the Puget Sound Clean Air Agency Board directed the Agency to convene a stakeholder process to assist in developing a Climate Protection Program. The purpose of the stakeholder process is to provide direction to the Clean Air Agency, the Puget Sound region and Washington State on climate protection strategies. Goals of the process are to:

- Develop a set of stakeholder-endorsed recommendations to reduce GHG emissions in the region. Strategies will focus on energy supply, energy demand, transportation, forestry, and solid waste.
- Provide stakeholders with comprehensive, credible cost/benefit analyses to fully inform their discussions and recommendations.
- Evaluate assumptions and methods for the cost-benefit analyses with technical experts from the region.
- Identify a GHG reduction target or goal for the Puget Sound region.[47]

STAPPA/ ALAPCO

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 and ICLEI developed software to help state and local governments reduce emissions of air pollutants and greenhouse gases. According to outreach material for the software:

"States and localities are preparing to meet new air quality requirements related to 8-hour ozone, fine particulate matter ($PM_{2.5}$) and regional haze, in addition to existing air quality requirements. States and localities can use CACPS to help design emission reduction strategies that address these regulated air pollutants and reap collateral GHG benefits. Alternatively, states and localities with GHG reduction targets or action plans can use CACPS to estimate the collateral criteria pollutant reduction benefits of their GHG reduction actions."

STAPPA/ALAPCO's report, "*Reducing Greenhouse Gases and Air Pollution: A Menu of Harmonized Options*," assesses strategies that simultaneously reduce conventional air pollution and greenhouse gases, known as "harmonized strategies."

[46] The New England Climate Coalition, http://www.newenglandclimate.org/index.htm; and Regional Greenhouse Gas Initiative, http://www.rggi.org/

[47] Puget Sound Clean Air Agency. Seattle, Washington, http://www.pscleanair.org/

> "In continuing to address criteria pollutant nonattainment challenges, state and local officials have the opportunity to capture significant GHG emission reductions. The most effective path for achieving this goal is to ensure that, in obtaining emission reductions needed for criteria pollutant attainment, the applied strategies are ones that also provide GHG reduction benefits, rather than measures that are ineffective or counterproductive from a GHG perspective.
>
> "In the stationary source sector, the most attractive harmonized strategies involve switching to a lower-carbon or zero-carbon fuel, increasing the efficiency of fuel use, or both. For area sources, from large commercial buildings to small homes, the key harmonized strategies are based on increasing the efficiency of fuel and electricity use. In the mobile source sector, the opportunities lie in increasing the fuel efficiency and reducing the use of motor vehicles. In the municipal solid waste sector, there are significant GHG-reduction opportunities in landfill gas to energy projects and source reduction and recycling. In both of these sectors, there is enormous potential for reducing GHG and other air pollution emissions, sometimes at a net cost savings. Finally, in the agriculture and forestry sectors, there are considerable GHG-reduction opportunities in manure management and address is discussed below, with a focus on effective harmonized in the sequestration of carbon, the ability of soils and plants to remove carbon from the atmosphere."[48]

International climate protection

The nationwide review of policies called for in the scope of work for this study is supplemented by selected examples from Europe, Australia, and Japan to describe vanguard climate protection work. This review is not intended to be comprehensive, but rather to add context for this study.

World leadership on climate change is centered in Europe. The European Union has studied the overlap of climate and air quality issues for many years, and is using the issue to further unify its member countries. A general overview of some activities in Europe regarding climate change follows.

On the whole, European countries strongly support the Kyoto Protocol, 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 by about 5 percent from 1990 levels between 2008 and 2012. Different targets apply to different countries. The European Union's overall target is an 8 percent cut. 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.

As part of its Kyoto GHG reduction commitment, the European Union is adopting an emissions trading program. The EU scheme will be the first international trading system for carbon dioxide emissions in the world, involving 12,000 installations and plants across the EU, including power stations, steel-makers, and other energy-intensive industries. The initial phase of trading is 2005-2007. Initially, the scheme will cover only CO_2 emissions and exclude transport and the aluminum industry. The drafts of the plan allow for penalties in the introductory period to

[48] Clean Air and Climate Protection Software, http://www.4cleanair.org/members/committee/software.html

businesses that exceed their CO_2 allocation, from 2005 to 2007, of 40 euro ($40.51) per ton of CO_2 beyond the allowed limit, rising to 100 euro per ton from the start of 2008.[49]

British Prime Minister Tony Blair has given high-profile speeches calling climate change the biggest long-term threat to the planet. British energy policy aims to reduce emissions with a "Climate Change Levy" to fund energy efficiency and low-carbon technologies. Other aspects of British policy include:

- A goal of reducing carbon dioxide emissions by 60 percent by 2050
- A goal of 10 percent domestic electricity from renewable energy by 2010
- An "Emissions Trading Scheme" with government support of $375 million over five years, which aims to reduce GHG emissions by letting companies trade credits

The European Environment Agency commissioned a report addressing the integration of air quality and climate change approaches. Entitled "Air pollution and climate change policies in Europe: exploring linkages and the added value of an integrated approach," the report addresses atmospheric linkages, linkages of impacts, and possible synergies in emission reductions and emission control strategies.[50]

The United Nations Economic Commission for Europe's Center for Integrated Assessment Modeling estimates that the cost of reaching the 2010 air pollution objectives in the Convention's Gothenburg Protocol could be reduced by at least €5 billion if European countries cut CO_2 emissions in line with the Kyoto Protocol (without CO_2 trading).[51] The report's findings indicate that because the forces underlying climate change and air pollution are nearly identical, a sustainable development strategy can address both issues simultaneously. The report states this may allow an agency to achieve goals faster and/or with fewer costs, or to free resources that allow reaching more ambitious targets.

The European Commission's Directorate-General for Energy and Transport has detailed how European activities relate to climate protection.[52] The European Commission's Clean Air for Europe (CAFE) program provides the framework within which new air quality standards will be presented during 2005.[53]

Over 130 local authorities in Europe have joined the ICLEI CCP network, and 76 are active in the CCP-Europe campaign.[54] One example of a city program is Berlin's energy plan that outlines measures by which Berlin will reduce its CO_2 emissions 25 percent from 1990 levels by 2010.[55]

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[49] "Kyoto Protocol: EU Plan for Carbon Trading clears Key Hurdle," European Commission, http://europa.eu.int/comm/environment/climat/emission.htm; http://www.eubusiness.com/afp/040707144046.h68x1ue4

[50] European Environment Agency. "Air pollution and climate change policies in Europe: exploring linkages and the added value of an integrated approach," http://reports.eea.eu.int/technical_report_2004_5/en

[51] "Air pollution and climate change – tackling both problems in tandem," press release from the United Nations Economic Commission for Europe, http://www.unece.org/env/emep/pr03_env02e_h.pdf

[52] European Commission on Transport and Energy, http://www.managenergy.net/products/R335.htm

[53] European Commission, http://europa-eu-un.org/articles/de/article_125_de.htm.

[54] ICLEI- Local Governments for Sustainability- Europe, www.iclei-europe.org

[55] City of Berlin, Germany, Environment Department website (in German) http://www.stadtentwicklung.berlin.de/umwelt/klimaschutz/

Europe seeks partnership from American states sympathetic to GHG reduction, as noted in "Maverick States Prove Popular at Climate Talks," an article about the Buenos Aires Climate Change Summit.[56]

Australia

As of September 2003, 194 local governments, representing over 75 percent of Australia's population were participating in CCP-Australia. The Australian Government, through the Australian Greenhouse Office, provides grants to help councils advance on the CCP five milestones. The grant provides a minimum of $4000 to complete a GHG emissions inventory of both corporate (municipal) and community emissions. 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. [57]

Japan

As the host of the conference where the Kyoto Protocol was created, Japan ratified the treaty in 2002. On the local level, many cities, including Tokyo and Kyoto, have passed resolutions to reduce their GHG emissions.[58] Such local action is tracked by the Japan Center for Climate Change Actions, a nonprofit clearinghouse. Saitama Prefecture, for example, has purchased for its municipal fleet 119 electric, 28 methanol, and 17 natural gas vehicles.[59]

[56] "Maverick US States Prove Popular at Climate Talks," http://www.planetark.com/dailynewsstory.cfm/newsid/28642/story.htm

[57] ICLEI- Local Governments for Sustainability- Australia, http://www3.iclei.org/ccp-au/

[58] ICLEI- Local Governments for Sustainability- Japan, Powerpoint presentation by Michie Kishigami, http://www.ap-net.org/docs/BKK2002/41.ICLEI_Michie_Kishigami.pdf

[59] "Kankyou Prefecture Local Government Leaders Declaration on Climate Change: Saitama Declaration, " http://www.kankyou.pref.saitama.jp:9500/ED/ED02/ED0201/EDSR00401.wbt ; http://www.kankyou.pref.saitama.jp/ED/ED01/ED0101/ED010100001012.htm

C. Relation between air quality plans and climate protection

Overview of District Air Quality Plans
The BAAQMD has two main plans for managing Bay Area air quality. The first is the Clean Air Plan (CAP) and the second is the Ozone Strategy, formerly called the Ozone Attainment Plan (OAP).

The CAP assesses the status of air quality in the District primarily as it relates to ozone and its precursors, and to particulate matter. It also assesses the District's pollution control strategy. The CAP serves as the blueprint for new District regulations. It is revised every 3 years and is submitted to the California Air Resources Board.

The Ozone Strategy is a maintenance plan for the national one-hour ozone standard and a revision to the Bay Area strategy to attain the California State one-hour ozone standard. Previously, an Ozone Attainment Plan was required by the U.S. Environmental Protection Agency when the District failed to attain the federal one-hour ozone standard in 1999. When the U.S. EPA made a final finding in April 2004 that the Bay Area attained the national one-hour ozone standard, the 2001 Ozone Attainment Plan was no longer required.

Because much of this report's analysis was done in late 2004 when the Ozone Strategy was still being developed, this Report refers to the 2001 Ozone Attainment Plan (OAP), not the Ozone Strategy. The Ozone Strategy may incorporate additional items not addressed in this report, including some which relate directly to climate change activities. For the purposes of analyzing adopted measures in previous Air Quality Plans, this report analyzes the 2001 OAP. The OAP describes the status of air quality as it relates to the ozone standard, assesses the reasons for non-attainment, and describes a plan to gain attainment according to a given timetable.

Both the CAP and OAP contain emissions inventories for the District. The CAP's inventory focuses on Reactive Organic Gases (ROG) and Oxides of Nitrogen (NOX), but also includes a section on Particulate Matter (PM). The OAP only focuses on ROG and NOX.

Climate Protection
Local governments participating in ICLEI's Cities for Climate Protection Program calculate the GHG emissions they produce by converting energy and fuel use and solid waste generation into equivalent tons of carbon dioxide. Categories used include buildings, street and traffic lighting, fleets, water and wastewater, solid waste, and employee commutes. Subsequently, municipalities set a GHG emissions reduction target, and create a Climate Action Plan for meeting their target. A good example of a Climate Action Plan is one from the City of Los Angeles.[60] Local governments have the option of focusing on emissions generated from internal municipal operations, community-wide, or both.

[60] City of Los Angeles, Climate Action Plan, http://www.lacity.org/ead/EADWeb-AQD/laclimateplan.htm

Comparison of air quality and climate protection inventories
CAP and OAP are basin-wide inventories that cover the District's jurisdiction. Climate inventories follow the boundaries of the jurisdiction surveyed, primarily either a city or a county.

For all three inventories - CAP, OAP, and GHG - vehicle miles traveled (VMT) is a major emissions contributor. Motor vehicles account for 44 to 49 percent of summer ozone precursors, the largest single source. Transportation, based on converting VMTs, accounted for 50 percent of Marin County's total GHG emissions. In Sonoma County, transportation accounted for 37 percent of its GHG emissions.

Methane, a major greenhouse gas, is addressed in climate protection inventories primarily by calculating the amount of methane generated by landfilled solid waste and by livestock. The OAP does not factor in methane because it is not photochemically reactive. For ozone planning, methane is subtracted from the total VOC measurement.[61]

Greenhouse gas accounting protocol assigns responsibility for emissions to the consumer rather than to the producer. Therefore, the actual greenhouse gas entering the atmosphere may have been emitted hundreds or thousands of miles away from the jurisdiction to which they are assigned. Such is the case with electricity that is produced at a plant far from the place where the power is used.

By contrast, air quality management accounts for pollution in the air basin. This represents a major difference between air quality management and climate protection. However, for mobile source emissions the accounting is similar for CAP, OAP, and climate protection. This point is discussed in more detail in the model frameworks section.

The following table summarizes emissions accounting for CAP, OAP, and climate protection.

Type of Plan	**CAP**	**OAP**	**Climate Protection**
Type of Emissions Inventoried	ROG, NOx, PM	ROG, NOx	CO2 equivalent (includes other GHGs)
Submitted to whom	CARB	EPA when out of compliance	Voluntary - part of the CCP and California Climate Action Registry programs
Sectors	1) Mobile Source	1) Mobile Source	1) Transportation
	2) Stationary Source	2) Stationary Source	2) Energy/ Buildings
	3) Transportation Control Measures	3) Transportation Control Measures	3) Landfills
			4) Agriculture

The Air District's role in local jurisdictions falls into two categories: 1) regulatory, and 2) voluntary/funding. The regulatory role describes the oversight the Air District has in regulating stationary sources of criteria pollutants. The voluntary/funding role describes the Air District's involvement in Spare the Air activities, and distributing TFCA grants to local agencies. Despite

[61] Bay Area Air Quality Management District, 2001 Ozone Attainment Plan (OAP), p. 23, http://www.baaqmd.gov/pln/plans/index.asp

the name, sometimes the Air District's "voluntary" initiatives carry with them specific duties which local agencies or participants must carry out.

The Air District's Board is comprised of elected officials from the counties. County and local agencies (especially transit agencies) are often the entities that implement the transportation control measures contained in the Air District Clean Air Plans.

Types of measures in the CAP and OAP
Measures are actions that can be taken to reduce air pollution. The CAP and OAP describe three types of measures: Mobile Source, Stationary Source, and Transportation Control Measures. Mobile Source measures relate to automobile engines, lawnmowers, and other mobile sources of air pollution. Stationary sources refer to power plants, generators, and other stationary emitters. Transportation Control Measures refer to actions that cause people to drive less, ride their bikes more, or take mass transit more, etc.

In general, the Air District makes rules regarding stationary sources. The California Air Resources Board (CARB) deals with mobile sources. CARB is the agency responsible for implementation of AB1493, the State law regarding greenhouse gases from mobile sources. The Metropolitan Transportation Commission (MTC), the Bay Area regional transportation planning agency, is responsible for implementation of Transportation Control Measures.

Climate Protection
Climate Protection measures focus on reduction of energy use, fuel use, solid waste generation, and, to a lesser degree, carbon sequestration. For cities focusing on internal municipal operations, measures customarily focus on energy efficiency in city buildings, traffic and streetlights, employee commute incentives, greening city fleets, and landfill improvements.

Comparisons of selected air pollution and climate protection measures

The chart below compares and contrasts selected air quality and climate protection measures from the 2000 Clean Air Plan (CAP) and the 2001 Ozone Attainment Plan (OAP) to measures in cities' Climate Action Plans.[62] The chart identifies measures that are "harmonized," i.e., found in both plans, or specifically addressing both air quality and climate protection, as providing "co-benefits."

CAP Measures	OAP Measures	Climate Protection Measures	Harmonized measure-co-benefits?
Category: Stationary and Area Source		**Category: Energy/buildings**	
F3: Promotion of Energy Efficiency. F9: High albedo roofing and road surfacing material.		City building energy efficient retrofits	YES
		Energy efficient street lighting	
		Green power purchasing/ Community Choice Aggregation	
		Water conservation	
	• Improved storage of organic liquids rule • Petroleum refinery flare monitoring • Low-emission refinery valves • Improved process vessel depressurization rule - Midterm consumer products (measure CP-2)		
A16-20: Surface coating and solvents	Improved architectural coatings rule; aqueous (water-based) solvents; surface preparation and cleanup standards for metal parts coating (SS11-SS17); aerosol coatings (measure CP-3)		

[62] This chart, created for this report, aims to develop the taxonomy of air quality management and climate protection measures, as well as their attendant co-benefits and harmonization. In addition to the CAP and OAP, the Bay Area Air Quality Management District has two other programs worth noting. These are the programs that regulate open burning, http://www.baaqmd.gov/dst/regulations/rg0500.pdf , and refinery flaring http://www.baaqmd.gov/pio/news/2005/flare_050720.pdf

Category: Transportation		**Category: Transportation**	
M4: Low emission vehicle fleet operations		Greening city fleets	YES
TCMs: 1-20.	Regional express bus program (TCM-A), on-road heavy-duty diesel engines (M-5, M-6, transit bus regulations, and school bus program), heavy-duty off-road diesel engines (M-9 and M-10)	Buses/ mass transit	YES
Vehicle buy-back			YES
Smoking vehicles program			
Carl Moyer program: Converting diesel engines to low-emission			
M2: Airport ground support equipment		City of LA: Airport purchase of "green" electricity.	
	Pleasure craft emission standards (M-16; additional emission reductions for marine pleasure craft)		
	• Transit access to airports (TCM-E)		YES
	Bicycle / Pedestrian Program; Transportation for Livable Communities (TCM-B and C)	Pedestrian, Bicycle-friendly programs and transit friendly development	YES
		Ridesharing (SF CAP)	
		Category: Solid waste	
		Recycling programs	
		Landfill gas-to-energy	
		Category: Agriculture	
		Cow-power: Anaerobic digesters which run off of methane from manure	
	• Portable fuel container regulations • Enhanced vapor recovery regulations		

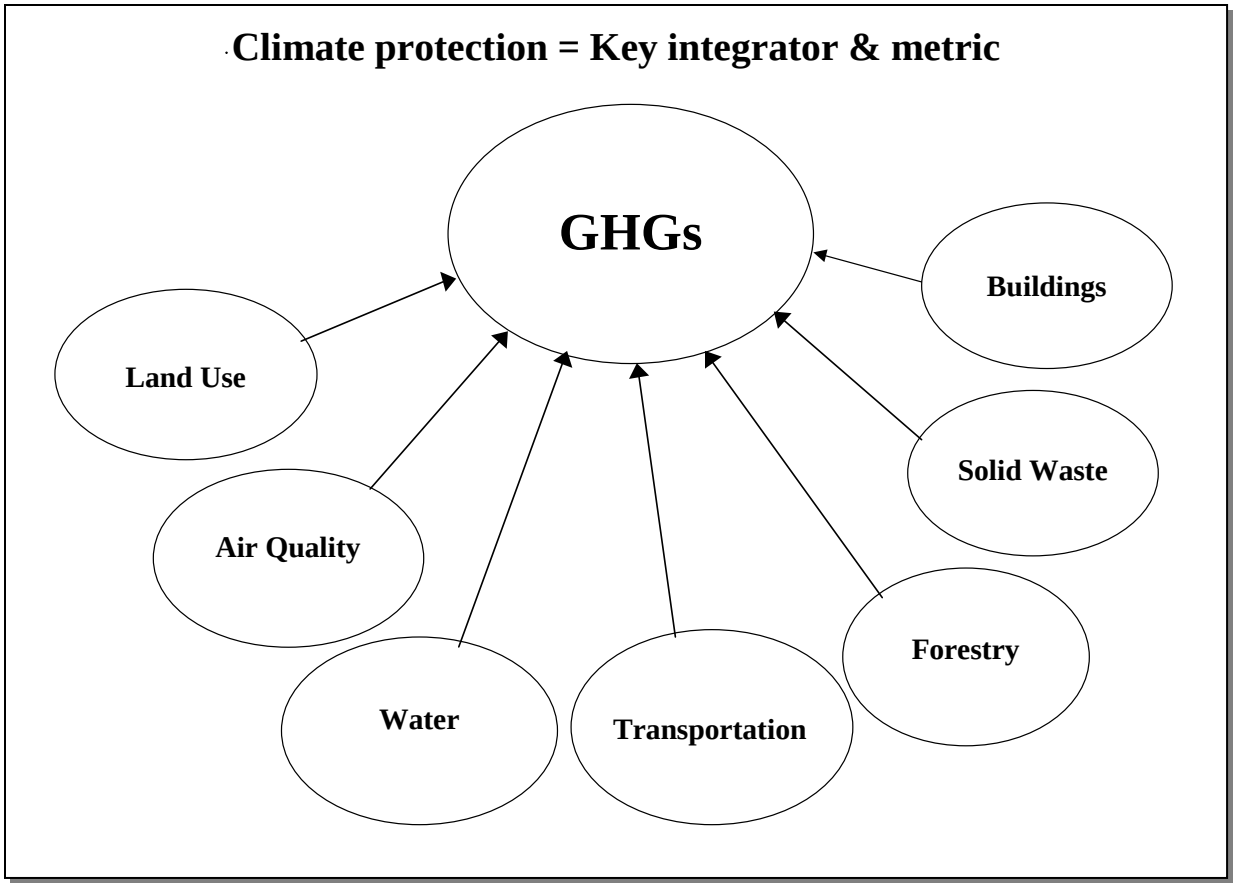
Air District Voluntary Initiatives	**Lowers GHG emissions?**	**Comments**
Spare the Air	YES	Could include GHGs more specifically[63]
Transportation Fund for Clean Air (TFCA)[64]	YES	Some projects could have GHGs as a larger component
Vehicle Buy Back	YES	GHG benefits are implied
Low emission School Bus	YES	GHG benefits are implied
Vehicle Incentive Program	YES	GHG benefits could be promoted in outreach materials

[63] Spare the Air is the Air District's most recognizable public outreach campaign. It is episodic and voluntary where climate protection is ongoing and may need to be regulated to be effective.

[64] Of BAAQMD's nine current TFCA programs, seven clearly reduce GHG emissions, and two may reduce them, as per conversation with BAAQMD staff member Joe Steinberger, June 17, 2005.

D. Model ordinances, programs, and initiatives

Air quality and climate change are impacted by a broad spectrum of activities in areas such as housing, transportation, land use, water, sewage, electricity and natural gas usage. Energy is the connection among all these activities, and greenhouse gas provides the best metric for integrating them, as illustrated by the following illustration.



Campaigns to reduce GHG emissions can glean lessons from successful campaigns in other areas such as air quality, cigarette smoking, and drunk driving. These endeavors have employed multiple approaches simultaneously to achieve their goals, i.e., raising public awareness, passing legislation to regulate behavior, using price incentives, and penalties for undesirable behavior.

The descriptions of ordinances, programs, and initiatives provide models for integrating air quality management and climate protection.

Cities for Climate Protection
Although no single ordinance, program, or initiative encompasses the whole range of activities that impact air quality and climate change, an excellent starting point for local government is ICLEI's Cities for Climate Protection program.

Local governments in the Cities for Climate Protection Campaign pledge to reduce greenhouse gas emissions from their local government operations and from the communities they govern. Each local government sets its own emissions reduction target and develops a plan outlining actions that it will pursue to meet the target. To participate in the campaign, local governments generally begin by passing a resolution with the following commitments:

1. Take a leadership role in promoting public awareness about the causes and impacts of climate change,
2. Undertake the Cities for Climate Protection milestone program to reduce both greenhouse gas and air pollution emissions throughout the community, specifically:
    - Conduct a greenhouse gas emissions inventory and forecast to determine the source and quantity of greenhouse gas emissions in the jurisdiction;
    - Establish a greenhouse gas emissions reduction target;
    - Develop an action plan with both existing and future actions which when implemented will meet the local greenhouse gas reduction target; and
    - Implement the action plan, and monitor progress.

Other programs and initiatives that offer elements for crafting harmonized air quality management and climate protection measures are described below.

Wood Smoke Ordinance

In 1998 the Bay Area Air Quality Management District, with stakeholder input, developed a model Wood Smoke Ordinance for fireplaces and woodstoves. This ordinance guides cities and counties that wish to regulate sources of particulate matter in their communities. The ordinance does not ban wood burning in fireplaces but seeks to take advantage of new, cleaner technologies that have been developed to effectively reduce wood smoke pollution. Since the ordinance was promulgated, Air District staff have worked with health agencies and interested residents in the Bay Area to advocate for the adoption of the ordinance. As of 2005, thirty-five cities and seven counties have adopted the ordinance.[65]

Green fleets

Starting in 2000, the American Lung Association succeeded in having many local governments adopt a Clean City Fleets policy including San Francisco, Contra Costa, Fresno, Petaluma, Sonoma, Mill Valley, Sebastopol, Rohnert Park, San Anselmo, Sausalito, and Cotati. Jurisdictions pass a resolution using the following template:

> "THEREFORE, BE IT RESOLVED that the [name of city] shall identify and give preference in its vehicle procurement to the acquisition of the lowest emission vehicles available, practical and reasonably cost competitive with other vehicles appropriate for that application or where funding is available to assure that such vehicles are reasonably cost competitive. Public safety and emergency vehicles shall be exempt from this policy."

The Green Fleets Program from Cities for Climate Protection encourages local governments to reduce greenhouse gas pollution, improve air quality, and save money. The program consists of

[65] Model Wood Smoke Ordinance, Bay Area Air Quality Management District, http://www.baaqmd.gov/pio/wood_burning/ordinance_background.asp

conducting a fleet analysis, setting emission goals, and determining and implementing actions to meet those goals. Examples of measures to take for fleets include:

- Right-sizing fleets by downsizing and eliminating vehicles
- Optimizing vehicle travel, operation, and maintenance
- Substituting other travel modes, or reducing the need to travel
- Purchasing fuel efficient, alternatively fueled, and electric vehicles.[66]

Green contracting

In late 2002 Sacramento Metropolitan Air Quality Management District, Yolo/Solano Air Quality Management District, Placer County Air Pollution Control District, the City of Woodland Public Works Department, Placer Hills School District, and Teichert Aggregates developed a green contracting ordinance. The ordinance encourages contractors to procure and operate low-emission vehicles, and to obtain low-emission fleet status for their off-road equipment and heavy-duty on-road fleets.[67]

Green business

The Association of Bay Area Government's Green Business Program encourages businesses to comply with environmental regulations. Through the program, businesses conserve natural resources and prevent pollution. Examples of actions are using more efficient lighting, purchasing in bulk, watering landscapes efficiently, recycling cardboard, and using less toxic products. The program is available to businesses and governments in Alameda, Contra Costa, Marin, Napa, Santa Clara, and Sonoma counties. Targeted industries include auto repair, hotels, landscaping, printers, restaurants, and wineries. Many best practices espoused by the Green Business Program reduce greenhouse gas emissions. The program could incorporate climate protection and include metrics to monitor progress like those of the Climate Action Registry.[68]

Green purchasing

By purchasing certain goods and services and avoiding others, local governments help promote better products, including those that are environmentally friendly. ABAG assists municipalities in aggregating and leveraging their purchasing power, for example, with electricity and natural gas. The City of San Francisco has an environmentally preferable purchasing program that has recently been updated.[69]Another example comes from the City of Santa Monica where bids from product vendors must include environmental and health specifications as well as performance and cost criteria.[70] ICLEI also has a green procurement program to encourage local governments worldwide to purchase supplies and materials that are more environmentally friendly, contain fewer toxic ingredients, are recyclable, and that utilize recycled materials.

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[66] "Model Ordinance For Establishing a Green Fleets Program," ICLEI- Local Governments for Sustainability, http://www.greenfleets.org/ModelOrdinance.html

[67] Green Contracting Ordinance, Sacramento Metropolitan Air Quality Management District, http://airquality.org/modelord/EpisodicModelGreenContractingV13.pdf

[68] Bay Area Green Business Program, www.greenbiz.abag.ca.gov, also Ceil Scandone (510) 464-7961

[69] San Francisco Environmentally Preferable Purchasing Program: http://www.sfgov.org/site/sfenvironment_page.asp?id=15791

[70] GreenBiz.com, Green Procurement, http://www.greenbiz.com/toolbox/essentials_third.cfm?LinkAdvID=32453

Community Choice Aggregation
California Assembly Bill 117 enabled Community Choice Aggregation, legislation that allows local governments to aggregate electricity customers within their jurisdiction. Governments can then create contracts that invest in renewable energy, conservation, and energy efficiency. They can also use the funding stream to create a bonding mechanism for investing in more efficiency and renewable energy generation. Community Choice Aggregation allows cities to choose to exceed the Renewable Portfolio Standard called for by state law.[71]

Recently, numerous local governments participated in a Community Choice Aggregation feasibility study.[72] The in-depth study included the County of Marin, and projected that if Marin became a CCA entity it would:

- Achieve nominal electricity cost savings averaging $6.8 million per year, equivalent to approximately 3 percent of total electricity bills
- Obtain control over electric generation costs to provide a higher level of rate stability for local residents and businesses
- Increase renewable energy utilization to 51 percent by 2017 or sooner, more than doubling the renewable energy content that PG&E would provide over the same time period.[73]

Converting electric supplies from fossil fuels to renewables is key to reducing greenhouse gas emissions and criteria air pollutants.

San Francisco, one of the first local governments in California to start the process of becoming a CCA entity, passed a law in May 2004 to switch customers in its jurisdiction to a new electricity supplier, and to finance renewable energy and energy conservation projects. Their Energy Independence ordinance directs City departments to prepare an Implementation Plan and Request for Proposals for the Board of Supervisors to solicit new Electric Service Providers interested in supplying power to San Franciscans as soon as 2005, and building 360 megawatts of new solar photovoltaic installations, distributed generation such as fuel cells, wind turbines, hydrogen, energy efficiency, and conservation technologies as standard components of the City's electricity service.[74]

Solar bonds
In November 2001, San Francisco voters approved a $100 million revenue bond for renewable energy and energy efficiency that pays for itself from the savings and costs taxpayers nothing. The bond pays for solar panels, wind turbines, and energy efficiency measures for public buildings. The money that would have gone to buy electricity from power plants instead goes to pay down the bond. The measure had 73 percent voter approval, extraordinarily high support. Implementation of the bond will be handled by the city's Public Utilities Commission and will be

[71] Paul Fenn, founder of Local Power, a non-profit based in Oakland, CA, authored the Community Choice law and San Francisco's Energy Independence Ordinance. Fenn is one of the state's foremost authorities on Community Choice, http://www.local.org/tcfaqs.html
[72] Local Government Commission, Community Choice Aggregation Pilot Program, http://www.lgc.org/cca/pilot_program.html
[73] Community Choice Aggregation: Base Case Feasibility Evaluation, Navigant Consulting, Inc., March 2005, http://www.co.marin.ca.us/depts/CD/main/pdf/BEST_pdf/CCA/Final_%20Base_Case_Feasibilty_Report_Marin_40405.pdf
[74] City of San Francisco's Energy Independence Ordinance, Community Choice authorization, http://ist-socrates.berkeley.edu/~rael/ordinance.ammiano.pdf , and "San Francisco eyes electricity purchase plan," Forbes, April 17, 2002, http://www.forbes.com/business/energy/newswire/2004/02/17/rtr1264276.html

phased in over four years. The first project to be implemented is a 675 kilowatt system on the roof of the Moscone Convention Center.[75]

Green building

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings. Members of the U.S. Green Building Council representing all segments of the building industry developed LEED.[76] Based on scientific standards, LEED offers a complete framework for assessing building performance and meeting sustainability goals. It emphasizes state of the art strategies for sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.

Many local governments have green building ordinances such as the County of San Mateo[77] and San Francisco.[78] In Marin County, the Board of Supervisors adopted a Single Family Dwelling Energy Efficiency Ordinance to ensure extra energy efficiency and renewable energy use in large homes. The Marin ordinance caps the energy consumed in new large homes, requiring that they not exceed that of a home of 3,500 square feet designed according to Title 24 standards.[79]

General plans

Another route to improve air quality and reduce GHG emissions is through local governments' general plans, the blueprint for development required by California law. Local governments periodically update and amend their general plans. When they do, they can incorporate air quality[80], energy, and climate protection. The overall goal would be to create plans that help communities minimize their production of greenhouse gas emissions and other air pollutants, conserve and restore as thick a cover of biomass – forests, woodlands, and other vegetation – as possible to sequester carbon, and to support a high quality of life. The County of Marin, currently in the final stages of revising its general plan, has drafted air quality and energy sections that exemplify how a local government's general plan can integrate energy and climate change issues.[81]

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[75] Vote Solar formed in 2001 in San Francisco formed to promote the Solar Bond initiative. The organization currently consults with cities around the country interested in passing similar measures. Web page contains actual language in the revenue bond measure, http://votesolar.org/tools_propB.html

[76] U.S. Green Building Council. LEED (Leadership in Energy and Environmental Design), http://www.usgbc.org/DisplayPage.aspx?CategoryID=19 , http://www.usgbc.org/leed/leed_main.asp

[77] County of San Mateo Sustainable Building Policy, http://www.recycleworks.org/greenbuilding/sus_building_policy.html

[78] San Francisco Resource-Efficient City Buildings, http://www.sfgov.org/sfenvironment/aboutus/policy/legislation/efficient.htm

[79] Marin County Single Family Dwelling Energy Efficiency Ordinance. http://www.co.marin.ca.us/depts/CD/main/pdf/BEST_pdf/Ordinance_3356.pdf

[80] Air quality is not a mandatory element in general plans. The case for including it is made in "City Air Quality Policies: The Missing Link, David M. Jinkins, 3 CEB Land Use and Environment Forum 15, Winter 1994. Another reference, "Improving Air Quality Through Local Plans and Programs, A Guidebook for City and County Governments," 1994, available through the Association of Bay Area Governments www.abag.gov, identifies air quality issues and opportunities relevant to local jurisdictions, and suggests practical strategies for incorporating land use and other policies that benefit air quality into local planning and decision making.

[81] County of Marin Draft Countywide Plan, February 2005, http://www.co.marin.ca.us/depts/CD/main/fm/TOC.cfm

Transportation and land use plans
In addition to general plans, a wide variety of transportation and land use organizations, plans, and ordinances support air quality improvements and climate protection through "smart growth," urban growth boundaries, and related strategies that foster city-centered growth and curb sprawl.[82] In general, the closer residences are to the urban core, the fewer miles traveled and the fewer pollutants emitted.[83]

California Environmental Quality Act (CEQA)
A public agency must prepare an Environmental Impact Report for both public and private projects that may have a significant environmental effect, according to California law.[84] Public agencies responsible for CEQA implementation and enforcement currently include impacts on air quality and traffic congestion as part of their review.

Solid waste
Cities in Alameda County have adopted a Construction and Demolition Recycling Ordinance requiring a Waste Management Plan as part of the permit process for construction, demolition, and renovation. The plan must include a way to divert at least 50 percent of the debris generated by the project from landfill, and must be filed for any project with a total value of $100,000 or greater. The ordinance is based on a model prepared by the Alameda County Waste Management Authority.[85]

Converting landfill gas to energy has both financial and emission benefits. For the County of Sonoma, conversion of landfill gas to energy was the most cost-effective climate protection strategy. In 2001, the Sonoma County landfill reduced 103,046 tons of GHG emissions, and generated 51,045 MWh of power. This reduced an additional 28,000 tons of GHG emissions which otherwise would have been emitted to produce that electricity. Because the landfill gas generates electricity, it has a negative annual cost, while also reducing GHG emissions. Only 57 of the State's 172 active landfills operate power plants.[86]

Agriculture
Manure generated in dairy and livestock operations constitutes a major source of methane. A single cow can emit 100 to 200 liters of methane per day, not including the methane that continues to be generated as bacteria break down the mounds of manure. Governments use manure management ordinances to regulate manure.[87] Typical reasons for this type of ordinance are to control odor and water quality, but climate protection could be an additional benefit.

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[82] Examples: Smart Communities Network http://www.sustainable.doe.gov/landuse/lucodtoc.shtml , Smart Growth Network www.smartgrowth.org , City of Davis Transportation management plan ordinance http://www.sustainable.doe.gov/codes/ord1655.shtml , Oakland-based Transportation and Land Use Coalition http://www.transcoalition.org/about.html , and San Francisco-based Transportation for a Livable City, http://www.livablecity.org/.
[83] "Greenhouse Gas Emission Inventory for all sectors of Sonoma County, California," 2005, p.21, www.climateprotectioncampaign.org
[84] "Curtin's California Land Use and Planning Law," Daniel J. Curtain, Jr., 2000.
[85] Alameda County Waste Model Ordinance http://www.stopwaste.org/model.html
[86] "Greenhouse gas emissions Analysis for County of Sonoma," Edwin Orrett, 2002, www.recyclenow.org
[87] For an example, see "Wisconsin Land and Water Conservation Annual Progress Report: Summarizing Wisconsin's achievements in reducing polluted runoff and conserving land and water resources," 2003, http://www.dnr.state.wi.us/org/water/wm/nps/pdf/2003_joint_annual_report_e.pdf

Methane can be captured and burned as natural gas to create electricity. For example, the Straus Dairy, located in northern Marin County, has a covered-lagoon with a generator powered by methane from decomposing bovine waste. This power source is expected to save the operation between $5,000 and $6,000 per month in energy costs. Additionally, the methane digester will eliminate tons of naturally occurring greenhouse gases and strip 80 to 99 percent of organic pollutants from the wastewater. Heat from the generator warms thousands of gallons of water that may be used to clean farm facilities and to heat the manure lagoon.[88]

[88] "270 Cows Generating Electricity for Farm Methane Digester also Breaks down Waste," Guara, Maria, San Francisco Chronicle, May 14, 2004, http://www.strausmilk.com/feature/chronicle.html .

E. Model frameworks

To facilitate systematic examination of the overlap of air quality management and climate protection programs, frameworks are useful because they help us perceive distinctions and similarities.

For this section, we apply four frameworks, each of which categorizes sub-areas. The first framework lists the three categories used by the Air District for its various measures. The second lists the four categories used by Cities for Climate Protection for the GHG-producing community sectors. The third lists three categories of demand-side users, and the fourth three supply-side sources of criteria pollutants and GHG emissions. The following table shows the four frameworks and their respective categories.

Frameworks	**Categories**			
1. Air District	Stationary sources	Mobile sources	Transportation control	
2. Climate Protection	Energy/ buildings	Transportation	Solid waste	Agricultural
3. Demand-side users	Residential	Commercial	Industrial	
4. Supply-side contributors	Energy companies	Fuel/petroleum companies	Other sources (livestock, landfills, aerosols, etc.)	

Frameworks 1 and 2: Air District Measures and Climate Protection
Similarities in categories are greatest for transportation; the Air District's Mobile Source and Transportation Control overlap with Climate Protection's Transportation. Energy/ buildings can be seen as Stationary sources from a demand side perspective. However, a major difference is the focus on supply versus demand, discussed below. We presented a more specific analysis of measures in those categories earlier in this report where we compared the Clean Air Plan, Ozone Attainment Plan, and Climate Protection Plans.

Frameworks 3 and 4: Supply and Demand
An inherent difference between air quality management and climate protection is that for stationary sources, air quality management focuses on **supply** such as power plants, oil refineries, and other emitters, whereas climate protection focuses on **demand**, i.e., on the institutional, business, and residential customers that use electricity. Following the Cities for Climate Protection GHG accounting protocol, emissions are assigned to the user, not to the supplier.

CARB has jurisdiction to create regulations affecting the supplier. AB1493 also affects automakers, the supplier in this case. However, Spare the Air-type programs focus on demand. In general, programs that address the demand side also should address climate protection goals, since the area of great overlap is fossil use consumption.

Demand-side pertains to consumers, while supply-side pertains to producers such as electricity power plants and oil refineries. Supply-side and demand-side is sometimes referred to as "upstream" and "downstream." Fossil fuel is introduced into the economy upstream with the oil companies, and finds its way downstream to consumers where it is combusted, producing GHG emissions. This distinction is important as policy makers and economists consider allocating carbon credits and emissions rights. It also is important in determining who bears the costs and where revenue is derived when considering investments to reduce the energy and GHG intensity of our technology and infrastructure.

When planning for energy efficiency measures, it is important to differentiate among residential, commercial, and industrial users. Each has particular needs; best practices for one may not be appropriate for the other. A single project in a big industry can create a large change at once, heightening the appeal to energy efficiency service providers. Residential users are smaller scale, but more plentiful. When broadly adopted by the residential population, a modest energy saving innovation such as the fluorescent light bulb can bring about large overall reductions.

Benefits multiply by combining demand with supply

Benefits of demand-side actions multiply when combined with supply-side actions. The Alliance to Save Energy's Watergy program – water plus energy – provides a good example. Watergy demand-side measures to lower water use include horizontal axis washing machines, low-flow showerheads, faucet aerators, ultra-low flush toilets, as well as pricing structures to encourage water conservation. Watergy's supply-side measures include pump optimization, retrofits at water delivery facilities, and load-shifting to avoid peak energy prices, improve the efficiency of the water system, and make each unit of water delivered less energy intensive. By combining demand-side with supply-side, communities not only save energy when less water moves through the system, but also use smaller, less expensive pumps when pumping demand is reduced.

Policy and framework

Policy can be divided into four categories. The first, **voluntary or good citizen**, represents an approach that many agencies have incorporated over many decades. The Air District's Spare the Air Program is an example of promoting voluntary practices and cooperative relationships. The second, **compliance**, refers to the command-and-control approach of traditional regulatory agencies. The third, **market transformation,** denotes a permanent change in the operation of the market, or at least one that lasts beyond the life of market interventions. It has been defined as "a reduction in market barriers resulting from market intervention, as evidenced by a set of market effects, that lasts after the intervention has been withdrawn, reduced or changed."[89] The fourth, **changing the rules**, refers to new institutions that create new property rights and their own incentives. An example is the Sky Trust, invented by Peter Barnes, and described in his book "Who Owns the Sky?"[90]

[89] Eto, Prahl, and Schlegel 1998, cited in "A Framework for Planning and Assessing Publicly Funded Energy Efficiency" by Chris Ann Dickerson, et al, PG&E, Study ID PG&E-SW040, March 1, 2001.
[90] Sky Trust and "Who Owns the Sky?" www.skyowners.org

Policy	Example
Voluntary or good citizen	Spare the Air, Climate Registry
Compliance or regulatory	AB1493
Market transformation	Renewable Portfolio Standard
Changing the rules	Kyoto Protocol, Sky Trust

Currently, climate change policy such as Cities for Climate Protection and the California Climate Registry, resides mainly within the voluntary category. AB1493 is one of the first instances for California and the U.S. that climate change policy is in the compliance category.

The State of California's Renewable Portfolio Standard (RPS) mandate of 20 percent renewables is an example of "market transformation." The goal of market transformation is to have government intervention set the rules of trade, but then, after price signals have altered, to let private sector actors lead. The RPS is not traditional regulation, but a set of rules that guide the private sector in creating a new market.

The difference between RPS and the Kyoto-type approaches is subtle. The Kyoto Protocol has many market-based mechanisms, where carbon credits would be allocated and traded across national borders. A major difference, though, is that carbon credits do not yet exist, and must be created in order for a market to develop. In the case of the RPS, there is an existing energy generation market in which rules are altered. The Kyoto Protocol, on the other hand, would go in the "Changing the Rules" category. Carbon credit allocation and carbon trading regimes also fall into this category.

Creating a framework to develop solutions commensurate with the problem

Protecting our air and climate is, many scientists assert, the largest problem humankind has ever faced. We must develop strategies and solutions that are commensurate with the scale of the problem. We need critical thinking and thoughtful analysis, and we need a framework that supports such thinking and analysis.

Developing such a framework is beyond the scope of this project, although we offer the following example to illustrate the type of framework we are recommending. We also offer references to two articles and discuss them briefly to underscore the importance of and to suggest possible elements for such a framework.

Example of Framework for Analyzing Possible Actions

Criteria	Rating from 1-10 (10 is highest)
# tons of criteria pollutants potentially reduced	
# tons of GHGs potentially reduced	
Subtotal: Effectiveness	
Integrates with existing programs	
# side benefits beyond air pollution/climate change	
Sub total: Harmonization	
Amount of new organization/institution building needed	
# of participants needed to implement	
Scale of geographic area covered by program	
Length of time needed to implement/ begin to see results	
Sub total: Complexity	
Political feasibility	
Budget for implementation is there, or will be there	
Cost to implementing agency	
Payback (recoup costs?)	
Sub total: Feasibility/ Practicality	
Ratio of Complexity to Practicality	
Ratio of Effectiveness to Practicality	
Ratio of Complexity to Effectiveness	
Subtotal: Ratios	
Grand Total: Sum of subtotals (range = 5-50)	

"Lessons Learned: How the Clean Air Act Can Inform Smarter Global Climate Change Programs," reviews over 30 years of experience with the Clean Air Act, gleans lessons, and postulates how they translate to climate protection. The author concludes, "...it is much more complicated to succeed than one might think...to succeed in pursuing effective program institutions, legislators must attend to a handful of specific lessons. In doing so, future global climate change legislation may be able to be even more effective and efficient, and perhaps avoid some of the controversies associated with implementation of the CAA."[91]

An even more compelling example of critical thinking and thoughtful analysis is found in "Global Local: Responding to Climate Change Concerns from the Ground Up."
Authors of this article analyze the range of actions that impact the production of GHG emissions. The article is based on three years of research funded by NASA. A detailed table in the article organizes and evaluates actions. The table's format is summarized below to suggest the authors' analysis. (Each of the categories shown in the first row has at least three sub-categories in the actual table.)

[91] "Lessons Learned: How the Clean Air Act Can Inform Smarter Global Climate Change Programs," Gerald Andrews Emison, EM Magazine, Air and Waste Management Association, February 2005.

Scale domains of climate change and consequences

Level	Driving forces	Emissions/ Sink Changes	Radiative Forcing	Climate Change	Impacts	Responses
Global						
Regional						
Large Area						
Local						

Later in the article, the authors display their findings from their study of four communities to show opportunities for GHG emissions reductions. Opportunities are rated as large (L), moderate (M), small (S), negligible (N), not estimated (N/A), or are shown as a range.

Opportunities for GHG emissions reductions

Sector	IPCC (Global)	DOE (National)	ICLEI (Local)	GCLP* (Local)
Buildings	L	M-S	L	S
Industry	M-L	M	M-L	S-L
Transportation	M	M	M-L	M
Agriculture	M	N/A	N/A	L-N
Waste	S	N/A	S-L	N/A
Energy	M	L-M	N/A	L

* Global Change in Local Places

The authors find that,

> "...the beguiling slogan 'Think globally and act locally' is insufficient to deal with climate change and its causes and consequences. Climate change is a global phenomenon, but global or even national 'thinking' averages together too many distinctive local trajectories of greenhouse gas emissions and their driving forces, missing opportunities to reduce emissions and making local action less specific. But local 'thinking' is also insufficient for action because, for the most part, decision about major emissions-reducing actions are made far from the local community."

The authors list three imperatives for success, summarized as make the global local, look beyond the local, and act globally to act locally. They conclude that local action to combat climate change will remain "...a tantalizing dream unless government and business leaders at national and global scales are willing to give local communities more control over their activities, to develop more persuasive rewards for emission reduction initiatives, and to give communities technology options and other tools suited for local conditions."[92]

Provocative as the content of these two articles might be, the more germane message for this discussion is to convey the importance of this type of thinking and analysis for the development of effective solutions.

[92] "Global Local: Responding to Climate Change Concerns from the Ground Up," Robert W. Kates and Thomas J. Wilbanks, Environment, April 2003.

F. Recommendations for the Bay Area Air Quality Management District

1. Become the leader and institutional home for climate protection in the Bay Area

The Bay Area Air Quality Management District is uniquely qualified to be the leader for climate protection in the Bay Area. The District's staff has the technical knowledge to participate in and/or conduct GHG emissions inventories, and the planning capabilities to create emission reduction targets and plans. The District also works closely with MTC and ABAG, and can coordinate regional climate protection activities across jurisdictions. The District may benefit from and help generate increased interest and resources for climate protection, as the issue becomes a higher priority in the future.

As the regional leader for climate protection efforts, the Air District could initiate activities such as:

- Help set Bay Area GHG emission reduction targets[93], and track progress toward achievement of those targets
- Make CO_2 numbers from TFCA projects available to the public to encourage reductions
- Develop and maintain a Bay Area climate protection website
- Sponsor climate protection conferences
- Establish a fund for GHG emission reduction projects to offer on a competitive basis
- Make GHG emission reduction a criterion for mobile source grant programs
- Support GHG sequestration projects

Through leadership and bold action, the Air District will inspire air districts nationwide.

2. Develop Bay Area partnerships, starting with ABAG and MTC, for climate protection policy, programs, and funding to ensure significant GHG emission reductions

The Air District should identify and recruit key Bay Area partners, and encourage these partners to pledge to reduce greenhouse gas emissions, and develop targets and plans for doing so. Working with these partners, the Air District could:

- Encourage the MTC to include reduction of GHG emissions as part of its mission and criteria for evaluating projects for funding
- Encourage ABAG to include climate protection in its Green Business program
- Encourage PG&E to make available and publicize GHG emissions figures. Currently, the process of accessing and analyzing electricity and natural gas information for other than fiscal management exceeds the capacity of most local jurisdictions. PG&E could experiment by making emissions information – both criterion air pollutants and GHG - available online and in as close to real time as possible to help local energy managers track and lower their energy usage and emissions.

[93] The Air District could, for example, adopt the California targets set by Governor Schwarzenegger on June 1, 2005, described on page 18.

- Encourage the Bay Area Council to lead Bay Area businesses on climate protection following the example of Silicon Valley Leadership Group that aims to reduce GHG emissions in Silicon Valley 20 percent from 1990 levels by 2010.
- Advocate for climate protection legislation at the State and federal levels

3. Encourage and provide support for Bay Area local governments to join and follow the Cities for Climate Protection (CCP) program[94]

Having local jurisdictions significantly reduce criteria air pollutants and GHG emissions would solidify the Bay Area as a national leader and produce significant air quality benefits as well. The Air District should encourage local governments to join CCP. Now 20 out of 109 cities and counties in the Bay Area participate in CCP.[95] The Air District should provide information, support, and coordination for harmonized air quality and climate protection programs. The Air District has sophisticated modeling software, emission information, and staff expertise in emissions inventories. If the Air District were to conduct GHG inventories for local jurisdictions, they would be able to put more resources into implementation for greater emission reductions. Following the successful Australian example (see page 23), the Air District could offer incentives to cities to join CCP and make progress on emission reductions. In its support capacity, the Air District could:

- Develop guidelines for including air quality and climate protection in general plans
- Develop guidelines for including climate protection as part of CEQA review
- Hold Bay Area climate change teleconferences for local jurisdictions to share information
- Promote Community Choice Aggregation
- Help leverage funding for local programs, e.g., public goods funds administered by the California Public Utility Commission

Applying lessons from research and examples on working with local governments can strengthen and accelerate the District's effectiveness in pursuing this recommendation.[96]

** Please note that it is helpful to distinguish recommendations 1 – 3 from 4 – 7. The former pertain more to substance (what) while the latter pertain more to methodology (how).*

[94] Although we found no other local program as effective as Cities for Climate Protection, our recommendation regarding CCP does not, of course, restrict the Air District in supporting other programs that are effective in reducing both criteria pollutants and GHG emissions.

[95] Seventeen are in the Bay Area Air Quality Management District, and three in the Northern Sonoma Air District. Half of the twenty Bay Area governments participating in CCP are in Sonoma County. The Sonoma-based Climate Protection Campaign has developed a comprehensive, collaborative strategy for enlisting an entire community in climate protection. www.climateprotectioncampaign.org

[96] The California Energy Efficiency Program, with funding from California ratepayers through the Public Utility Commission, is completing a project in 2005 that describes best practices for helping local governments embrace energy efficiency programs: www.caleep.com

4. Develop a framework that fosters rigorous critical thinking and analysis to identify, promote, and implement solutions that are commensurate with the scale of the problem

Climate protection is the largest problem humankind has ever faced, many scientists assert. Time is short, and funding, attention, and other resources are limited. We must be extraordinarily strategic to succeed in developing and implementing solutions that are commensurate with the scale of the problem – solutions that produce the greatest emission reduction for the least cost in the shortest time. This is a meta-recommendation, meaning that we must employ rigorous critical thinking and analysis when evaluating recommendations for action, including those on this list.

We recommend that the Air District find or develop and then use a framework to analyze strategies and solutions. The framework could include such elements as policy emphasis, metrics, time frames, anticipated costs, anticipated impact, complexity, authority level, key participants, and Air District role. (An example of such a framework is shown in the preceding section.) Examples of potential partners for developing such a framework are CAPCOA, the California Energy Commission, the U.S. Environmental Protection Agency, and the Energy Foundation.

5. Implement market-based measures

The Air District should identify, through exploration, research, and collaboration, ways it can encourage implementation of market-based measures in the Bay Area. Economic solutions for environmental and social problems have repeatedly proven effective. Such measures are powerful, underutilized strategies available to governments, and can be very effective and often less expensive than traditional regulatory approaches. Economic instruments can also generate substantial revenues for government. By rewarding desired practices using funds levied on undesired practices, price signals can help shift our energy use towards efficiency and renewables. Intelligently applied, price signals can help reverse the incentives that now encourage relatively unfettered fossil fuel consumption.

Examples:

- In 2003 London initiated a scheme to reduce traffic congestion with extraordinary results. Drivers pay tolls to drive in the center of town. Traffic fell by 20 percent; delays are expected to fall by 20 percent to 30 percent, saving drivers 2 million to 3 million hours of frustration every year. Fines and tolls are expected to generate about $2.2 billion in 10 years, all earmarked for public transportation.
- During California's energy crisis in 2001 electricity use declined by about 10 percent, in part because Governor Davis and the State legislature implemented a price structure that rewarded those who conserved.
- Europeans tax fossil fuels to help subsidize mass transit.
- California could increase the license fee for vehicles that get poor gas mileage and use these funds for climate protection.
- Federal subsidies could be shifted gradually from fossil fuels to renewables.

"Changing the Price Signal: How local governments can use economic instruments to cut traffic and pollution," provides excellent examples of local market-based measures.[97]

6. Build public support for climate protection

The Air District should develop and conduct a Bay Area public outreach and education program on climate change, starting by including climate protection in Spare the Air messages. Adding GHG benefits into Spare the Air communications will reinforce the messages of that program, while raising awareness of the problem of climate change, and the way every day decisions impact the climate. As part of this effort, the Air District should use recent research that describes how to communicate effectively about global climate change.[98]

7. Prepare for GHG emissions regulation

Air Districts have no authority to regulate GHG emissions currently in this country. However, the Kyoto Protocol timeline of 2008-2012, other countries' policy changes, pressure from multi-national corporations, and the growing body of scientific evidence will influence U.S. policy. Most observers believe that within the next five years GHG emissions will be regulated in the United States, and mandatory emissions reductions will replace voluntary initiatives. Therefore, it is recommended that the Air District position itself for this eventuality. In particular, a market in carbon credits would need governmental coordination. The Air District is uniquely situated to fulfill this role in the Bay Area.

[97] Available through ICLEI's online store, http://krushinator.iclei.org/merchant/merchant4.cfm?pid=292&cid=7
[98] "Talking Global Warming," Frameworks Institute, http://www.climateprotectioncampaign.org/talking-global-warming/talkingglobalwarming.php. See also, "Making Climate Hot: Communicating the Urgency and Challenge of Global Climate Change," Susanne C. Moser and Lisa Dilling, Environment, December 2004.

G. Funding sources

California Public Utility Commission funds
The California Public Utilities Commission distributes hundreds of millions of dollars per year in energy efficiency funds. Most of this money goes to state-regulated utilities. One of the funds is a ratepayer-funded public benefits charge fund, which is worth $250-$300 million per year. The Air District could consider accessing these funds to enhance its programs, for example, Spare the Air to reduce energy use and air pollution during peak summer usage.

Gas taxes
Gas taxes are often dismissed because they are considered politically unfeasible. However, economists often promote them because they provide pricing incentives to influence behavior on a large scale, as well as generate funds for programs to promote desired objectives. Gas prices have skyrocketed over the past year, and are expected to remain high. A common argument is that consumers will not oppose a small additional tax on fuel when gas prices are escalating dramatically anyway. Obstacles include California laws that require a super majority in voter approval to enact new taxes, and the fact that in order to provoke behavior changes (choosing transit over driving), the tax would have to very high. Studies show that increased gas taxes on the order of $0.25-0.50 per gallon would be necessary to substantially affect travel behavior. However, the tax would not need to be as high if the purpose of the gas tax were simply to fund programs to reduce greenhouse gas emissions. California legislation has authorized the Metropolitan Transportation Commission to place a regional gas tax on the ballot, according to the Transportation and Land Use Coalition.[99]

Vehicle license fees
Another funding approach is raising Vehicle License Fees in inverse proportion to fuel efficiency; fuel efficient vehicles pay less, fuel inefficient vehicles pay more. Monies raised would fund GHG emission reduction programs. Given the large portion of GHG emissions resulting from vehicles, this is a logical funding source, and implements the "polluter pays" concept. Like the gas tax, it penalizes "bad" behavior, while rewarding good behavior, and incorporates a price mechanism to internalize costs. The gas tax more specifically targets the actual driving, while the VLF puts the (dis)incentive with the vehicle purchase, rather than day-to-day actions.[100]

Energy Foundation
The Energy Foundation is a non-profit partnership of major foundations interested in sustainable energy. Based in San Francisco, their Climate Program's mission is to develop and promote U.S. state and regional policies to reduce global warming pollution to build models for and

[99] Cited in "Transportation and Land Use Coalition Platform," Spring 1999, http://www.transcoalition.org/about/about_platform.html See also "Changing Regional Gas Tax to Road User fee," Metropolitan Transportation Commission 2005 Legislative Program, http://www.mtc.ca.gov/legislation/2005_leg_program.htm

[100] As mentioned previously, "Changing the Price Signal," describes many how to utilize price signals, generate funds, and influence consumer behavior. Available through ICLEI's online store, http://krushinator.iclei.org/merchant/merchant4.cfm?pid=292&cid=7

momentum toward federal climate policy.[101] Foundation focus areas that correspond to the Air District's possible climate work include:

- State and regional carbon cap-and-trade programs
- State and regional greenhouse gas plans and targets
- GHG reporting and reduction initiatives
- Financial mechanisms, like incentives or carbon taxes

U.S. Environmental Protection Agency

The EPA's Office of Transportation and Air Quality offers grants. For example, they recently offered funding for "Clean Air Transportation Communities: Innovative Projects to Improve Air Quality and Reduce Greenhouse Gases."[102]

Carbon Credit Market

A regional framework for carbon credit trading could generate revenue for climate protection through the sale of carbon emission rights.[103]

Community Choice Aggregation

The County of Marin's Community Choice Aggregation Feasibility study, performed by Navigant Consulting, Inc., projects a potential savings of more than $100 million in electricity costs over the next 20 years.[104] The savings occurs while the renewable content of electricity in the County increases to 50% (above the state mandated 20%) over the next 20 years.[105] The study contains certain assumptions about energy markets, but seems to merit further investigation by jurisdictions looking to fund local programs, increase the amount of renewable energy, and reduce greenhouse gas emissions. Several other California jurisdictions took part in the Community Choice Aggregation feasibility study.[106]

[101] Energy Foundation's Climate Program, http://www.ef.org/programs.climate.cfm

[102] EPA's Office of Transportation and Air Quality, Clean Air Transportation Communities: Innovative Projects to Improve Air Quality and Reduce Greenhouse Gases, http://www.epa.gov/otaq/rfp.htm

[103] Foundation for the Economics of Sustainability. This group of economists based in Ireland is on the forefront of constructing innovative carbon markets. Economist Richard Douthwaite has proposed emissions rights allocation schemes that could potentially raise capital for specific purposes (such as air quality protection). http://www.feasta.org/events/debtconf/sleepwalking.htm

[104] "Marin seeks cheaper electricity," Brenner, Kari, Marin Independent Journal, April 11, 2005, http://www.marinij.com/Stories/0,1413,234%257E24407%257E2793309,00.html

[105] County of Marin, http://www.co.marin.ca.us/depts/CD/main/comdev/advance/BEST/CCA/CCA.cfm

[106] Local Government Commission, Community Choice Aggregation Pilot Program, http://www.lgc.org/cca/pilot_program.html

H. Resources

Selected local government resources

San Francisco
"Climate Action Plan for San Francisco: Local Actions to Reduce Greenhouse Gas Emissions, September 2004, http://sfwater.org/detail.cfm/C_ID/2137

Marin
"County of Marin Greenhouse Gas Emissions Analysis Report," June 2003
http://www.co.marin.ca.us/depts/CD/Main/pdf/CCP_FinalReport.pdf

Sonoma
"Greenhouse Gas Emission Analysis for the County of Sonoma," Edwin Orrett, P.E., August 2002. http://www.recyclenow.org/FINAL_RE.PDF

"Santa Rosa Milestone One," Greenhouse gas emissions inventory, 2002, http://ci.santa-rosa.ca.us/City_Hall/City_Manager/CCPFinalReport.pdf

"Standing together for the Future: Greenhouse gas emission inventories for eight cities in Sonoma County, California," September 2003, http://www.skymetrics.us/standing-together/standing-together.php#summaryreports

Sonoma County Waste Management Agency: Administrator for municipalities' climate protection collaboration. Site also offers green building resources. www.recyclenow.org

Climate Protection Campaign: Community-based organization that advances practical, science-based solutions for significant greenhouse gas reductions to create a positive future for our children. www.climateprotectioncampaign.org

Community Clean Water Institute: Information on water and climate. www.ccwi.org

Regional Resources

Bay Area Air Quality Management District: Aims for clean air to protect the public's health and the environment in the San Francisco Bay region. http://www.baaqmd.gov/

Association of Bay Area Governments: A regional planning agency that helps solve problems in areas such as land use, housing, environmental quality, and economic development. http://www.abag.ca.gov/ Includes the Bay Area Green Business Program http://www.abag.ca.gov/bayarea/enviro/gbus/

Metropolitan Transportation Commission: The Bay Area's transportation, planning, financing, and coordinating agency. http://www.mtc.ca.gov/

California Resources

California Air Resources Board: Works to protect the public's health, the economy, and the state's ecological resources through the most cost-effective reduction of air pollution. http://www.arb.ca.gov/homepage.htm

California Climate Registry: State institution for businesses to register their GHG reductions. www.climateregistry.org

California Energy Commission: Climate Change and California. http://www.energy.ca.gov/global_climate_change/index.html

Energy Aware Planning Guide from the California Energy Commission, a 350-page community-development planning tool for local governments. Contains a wealth of ideas, opportunities and information for understanding the complex linkages between energy, land-use planning, air quality, transportation, and economics. http://www.energy.ca.gov/reports/energy_aware_guide.html

"Climate Change Overview: Technical support document for staff proposal regarding reduction of greenhouse gas emissions from motor vehicles," California Environmental Protection Agency, Air Resources Board, August 6, 2004, http://www.arb.ca.gov/cc/factsheets/august_tsd/overview_august.pdf

Energy efficiency resources from the Local Government Commission http://www.lgc.org/freepub/energy/casefacts.html

U.S., international, and other resources

Cities for Climate Protection, a program of ICLEI – Local Governments for Sustainability: Premier resource for local governments involved in climate protection. See especially "Changing the Price Signal," www.iclei.org/us

Clean Air and Climate Protection Software Tool to help state and local governments harmonize greenhouse gas and air pollution emission reductions. www.cacpsoftware.org

U.S. Environmental Protection Agency Global warming resources http://yosemite.epa.gov/oar/globalwarming.nsf/content/index.html

Intergovernmental Panel on Climate Change: www.ipcc.ch

Summary for Policymakers, Climate Change 2001-Impacts, Adaptation and Vulnerability Intergovernmental Panel on Climate Change (IPCC), Third Assessment Report (TAR), "Climate Change 2001" http://ipcc-ddc.cru.uea.ac.uk/

The Pacific Institute, an Oakland-based organization, offers two tools for quantifying the energy, air quality, and greenhouse gas dimensions of water management decisions. One model is for urban water districts and the other for agricultural districts. "Water to Air" model tools available free at http://www.pacinst.org/resources/water_to_air_models/index.htm

I. Highlights of stakeholder meetings

Stakeholders: Representatives of Bay Area regional organizations

Date: March 10, 2004

Interview conducted by: Mike Sandler and Ann Hancock

Names, Titles, Organizations, Contact information
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Green Business Program, Bay Area Alliance for Sustainable Communities
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Harold Brazil, Planning, Metropolitan Transportation Commission
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Harold is also a member of the BAAQMD Technical Advisory Committee.

Connection to this project
ABAG and MTC are metropolitan planning organizations that, along with the Bay Area Air Quality Management District, work on regional programs involving air quality. The three organizations have begun working more closely together on smart growth, land use, and air quality planning.

Summary of key points
Much of the policies and initiatives that ABAG and MTC promote, e.g., smart growth, help protect the climate and air quality, but impacts of these aren't measured. More concerted efforts to measure the GHG and air pollution impacts of policies and initiatives would bring attention to this pollution and accelerate the drive to reduce it.

Discussion Summary

ABAG is promoting smarter growth, infill, compact development, and have done that for many years. It has developed guidebooks for local government on the land use connection to air and water quality, livable communities, preservation of open space, provision of needed housing linked to transportation and other infrastructure as well as employment centers. It promotes energy conservation through Jerry's program and the Green Business Program, as do other entities. It exposes its members to programs like ICLEI. Reducing the use of cars, conserving energy, and preserving open space have air and water quality benefits and help address climate change.

ICLEI did a presentation to ABAG's Executive Committee about two years ago; there was no clear result from this presentation. The Alameda County Waste Management Agency has funded four cities to do their GHG inventories, and may fund more cities in the future.

ABAG Power is a separate JPA from ABAG.

MTC conducts mobile source emission inventories. Also it creates a Regional Transportation Plan with a 25 year time horizon; models and forecasts are part of this plan. A Transportation Implementation Plan (TIP) is done every two years to determine priorities for funding projects; it includes a conformity analysis to the Regional Transportation Plan. Although cars are getting cleaner and transportation improvements are being made, air quality and congestion worsen. Improvements are trumped by the increase in vehicle miles traveled.

Examples of local – regional collaboration

- City fleet ordinance
- Smart growth incentives
- Green business program
- Spare the Air
- Wood smoke ordinance
- Lawn mower buyback
- Vehicle buyback

Recommendations

- Create a priority list of ten items that local government could do to improve air quality and protect the climate. Provide clear job recommendations and benefits.
- Give examples of partnerships.
- Combine forces with clean vehicle technology.
- Determine ways to involve the Green Business community.
- Incentivize smart growth initiatives (CARB incentives?).
- Under the auspices of MTC/ABAG/BAAQMD, survey managers about their cities' air quality and climate protection efforts and their ideas and recommendations; check with Joe and run by some city managers in Sonoma for their feedback on this idea.
- Harold can replicate ICLEI's U.S. graphs that contrast trends in criterion pollutants with GHG trends for the Bay Area.

- Ask Jerry about Sonoma County's possible involvement in ABAG's PUC-funded energy efficiency program.
- Ask Craig Goldblatt about MTC's program section and liaisons.

Resources, references, referrals
- CEC's document to help local governments – "Energy Aware" Planning Guide, 1993, P700-93-001, Energy Facilities Siting and Environmental Protection Division
- USEPA's Green Communities – online resources
- Acronyms: MPO = Metropolitan Planning Organization; RACC = Regional Agency Coordinating Committee

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Stakeholders: Representatives of non-governmental organizations

Meeting date: March 11, 2004

Interview conducted by: Mike Sandler and Ann Hancock

Names, Titles, Organizations, Contact information
See roster on following page.

Location: Common Assets Defense Fund office, Alabama St., San Francisco

Connection to this project
These NGOs worked on AB1493, the statewide legislation to reduce greenhouse gas emissions from vehicles. Many of them work with Air District also. They are working on both clean air and climate protection programs.

Summary of key points
The overlap of criteria pollutants and GHGs is a good place to start the discussion. Until the Air District gets regulatory authority to do new regulations specifically for GHGs, the tie-in to criteria pollutants can justify their involvement. These NGOs have numerous resources to contribute in assisting the Air District become more involved in harmonizing air quality and climate protection.

ROSTER OF ATTENDEES – AIR QUALITY AND CLIMATE PROTECTION MEETING – MARCH 11, 2004

	NAME	TITLE	ORGANIZATION	EMAIL	PHONE	ADDRESS
1	Anair, Don		Union of Concerned Scientists www.ucsusa.org	danair@ucsusa.org	(510) 843-3785	2397 Shattuck Ave. Suite 203 Berkeley, CA 94704-1567
2	Bali, Vandana	Director, Clean Vehicles Program	American Lung Association	vbali@alac.org	415-775-1065	921 11th Street, Suite 700 Sacramento, CA 95814
3	Bedsworth, Louise	Senior Analyst, Clean Vehicles Program	Union of Concerned Scientists www.ucsusa.org	lbedsworth@ucsusa.org	(510) 843-3785	2397 Shattuck Ave. Suite 203 Berkeley, CA 94704-1567
4	Browning, Adam	Director of Operations	Vote Solar www.votesolar.org	adam@votesolar.org	(415) 874-7434	182 Second Ave. Suite 400 San Francisco, CA 94105
5	Caplan, Leslie	Staff Attorney and Global Warming Campaign Manager	Bluewater Network www.bluewaternetwork.org	lcaplan@bluewaternetwork.org	(415) 544-0790 x 23	311 California St., Suite 510 San Francisco, CA 94104
6	Dipaola, Todd		Kirsch Foundation	tdipaloa@kirschfoundation.org	(408) 278-2241	
7	Hancock, Ann	Coordinator	Climate Protection Campaign www.skymetrics.us	ann@skymetrics.us	(707) 829-1224	P.O. Box 558 Graton, CA 95444
8	Larsen, Kate	Policy Analyst, Energy	Environmental Defense, www.ed.org	klarsen@ed.org	(510) 658-8008	5655 College Ave. Oakland, CA
9	Lynch, Elisa	Global Warming Campaign Director	Bluewater Network www.bluewaternetwork.org	elynch@bluewaternetwork.org	(415) 544-0790 x 15	311 California St., Suite 510 San Francisco, CA 94104
10	Sandler, Mike	Coordinator	Community Clean Water Institute www.ccwi.org	mike@ccwi.org	(707) 874-3803	PO Box 1082, Occidental, CA 95465
11	Schmidt, Kira	Clean Vessels	Bluewater Network www.bluewaternetwork.org	kschmidt@bluwaternetwork.org	(415) 544-0790	311 California St., Suite 510 San Francisco, CA 94104
12	Vidargas, Nick		Union of Concerned Scientists www.ucsusa.org	nvidargas@ucsusa.org	(510) 843-3785	2397 Shattuck Ave. Suite 203 Berkeley, CA 94704-1567
13	Weiner, Linda	Director of Communications/ Air Quality Advocacy	American Lung Association	lindaw@alasfsm.org	(650) 994-1903 x 304	2171 Junipero Serra Blvd. Suite 720 Daly City, CA 94014-1999

Discussion Summary

Interaction of climate protection and air quality

- In general, the Air District deals with stationary sources. CARB at the State deals with mobile sources. AB1493 was mobile.
- South Coast Air District is looking at regulating shipping. Shipping is often overlooked; it is part of the ozone attainment plan. The Ports of San Francisco and Oakland could be more involved.
- The more the Air District hears the words "climate change" the better. It is the beginning of getting them to consider it more.
- Regarding the Climate Registry: They have still not certified anyone's emissions after 18 months. Issues with the Registry include potential conflicts between treating participants as customers or regulated entities. Also, the Registry is not currently a government agency; this could be a limitation.
- The overlap of criteria pollutants and GHGs would be a good place to start the discussion. If the Air District does not have regulatory authority to do new regulations specifically for GHGs, then the connection to criteria pollutants is needed to justify their involvement.
- Policies that harmonize criteria pollutants and GHGs will increase BAAQMD Board acceptance.
- There may be some policies that ignore GHGs, but could be just as effective on criteria pollutants, but also take GHGs into account. A good starting point would be a list of those.
- The recommendations should be presented to the Air District Technical Committee. (Louise is the chair.)

Discussion of model ordinances/ policies for climate protection

- ZEV rules at CARB, woodsmoke ordinance at BAAQMD, SF's Solar initiative
- Some cities can do more than others: Ex: San Francisco can regulate the its taxis, allow alternative fuel taxis to go to the front of the line at the airport. San Jose currently has parking incentives. Berkeley has a biodiesel fleet rule- 100% biodiesel, and is considering a tax on "excess" vehicles per household. Other cities of interest: Burlington, VT, Boulder CO, Santa Cruz, Santa Monica.
- AB 198 (Joe Nation) will eliminate a tax break on worst vehicles to fund better vehicles.
- BlueWater Network is looking at a State level per barrel tax on oil as an upstream focus.
- Regarding cap and trade systems: East Coast areas are considering them. South Coast's Reclaim program didn't work out well, and may make Air Districts in California more wary of experimentation.
- Congestion pricing, and "hot lanes"
- GHG standards for fuel are being considered now (a possible follow up to AB1493).

Recommendation: Encourage CAPCOA to write a letter of support for air districts considering climate protection.

Resources, references, referrals

- American Lung Association is working on a position paper regarding climate change.

- UCS will soon be releasing a study of Bay Area impacts of climate change on the Bay.
- Redefining Progress's environmental justice and climate change work.
- Coalition for Clean Air is also part of AB1493 Implementation Team.
- There is a strong environmental justice connection. Ex: San Francisco and the Hunter's Point powerplant.
- Silicon Valley Toxics Coalition has a project that may be of interest.
- Western Governor's Conference is working on West Coast climate initiatives.

Stakeholders: Staff from Bay Area cities engaged in climate protection

Date: March 23, 2004

Interview conducted by: Mike Sandler and Ann Hancock

Names, Titles, Organizations, Contact information

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Summary of key points

Berkeley

- City just completed an energy and abatement plan.
- City's target is to reduce its GHGs by 15% below 1990 levels by 2010.
- Matt has data on city's conversion to biodiesel.

Oakland

- City is up to Milestone 3.
- Oakland is working with Rebuild America and the CEC to develop a comprehensive city-wide energy plan.

Discussion Summary/ Recommendations

- Ask the Air District's legislative aide for the status of AB1493 and for his opinion on how this legislation will affect the Air District. Ask him for his recommendations for state enabling legislation for harmonizing climate protection and air quality management.
- Add $1 for a specific climate protection fund to the current vehicle license fee that goes toward the Transportation Fund for Clean Air; levy fees based on mileage.
- Have the Air District show the effect of rising temperatures in their air quality models.
- Involve the Air District with Art Rosenfeld who is working to reduce peaker plant production.
- Talk with Henry Hilken, BAAQMD, who is working on the Clean Air plan. Talk with him about including the effect of heat on GHG emissions in the plan. Request that he include CO2 emissions, and convert NOX into CO2. (LBL has resources for this.)
- Get BAAQMD and municipalities involved in PUC rulemaking. Also, get them involved in how public goods charges should be allocated. Note: Public goods charges sunset in 2011; they could disappear.
- Have the Air District issue a summary of what the CO_2 data it's been collecting for 5 years shows. Note: This data is probably very rough.
- Find out who STAPPA/ ALAPCO rep is at Air District.
- Ensure follow through for this project's recommendations by recruiting members of the Board to be advocates.
- Issue an annual report on GHG for the Bay Area. Involve PG&E and MTC with this. Currently the PUC has an open docket where this might fit. Speak with Loretta Lynch about this. Involve CARB. Email Randy, too.
- Include GHG in the annual TPC (Transportation Plan Conformity).
- Design a model city program.
- Change the Clean Air Act to include GHGs (long range aim).
- Show people around the bay how rising sea levels will impact them: "Your property values will literally be underwater!" Contact Phil Williams and Associates (415 262-2300) to get maps that show inundation. Activate them to support a comprehensive energy policy.
- Check out the Council of Mayors' database of best practices; suggest that monitoring GHG be part of best practices.
- Interview Neal and Carol separately about their cities' climate protection activities. Ask Neal about Taking Sustainable Cities Seriously. Get a copy of his report. Ask Carol for sustainability inventory.

Resources, references, referrals

- Pleasanton's Green Building ordinance
- International Car-free Day is September 22.
- On June 5 Kofi Annan will be in the Bay Area.
- The California Climate Action Registry and LBL did a spot check GHG inventory in Berkeley.

Stakeholder: Staff member of international air quality organization

Meeting date: December 17, 2004

Interview conducted by: Mike Sandler and Ann Hancock

Name, Title, Organization, Contact information

Amy Royden Blum
STAPPA/ ALAPCO (State and Territorial Air Pollution Program Administrators/ Association of Local Air Pollution Control Officials)
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(202) 624-7864

Connection to this project
STAPPA/ ALAPCO has written papers and developed software with ICLEI to encourage local jurisdictions and air districts to harmonize their air pollution measures with climate protection measures.

Summary of key points

- State level statutory mandates are the next thing coming.
- The Regional Governors Associations have opposed mandatory national guidelines, but action will take place at regional levels.

Discussion Summary

- Energy offices are often the lead on climate change, not air districts. Energy and air people do not interact as much as they should for climate issues. Air people want to be more involved, but the Clean Air Act is written on a pollutant basis, and until CO_2 is included, it is more on the backburner.
- Thinking in terms of integration is a major issue in the overlap of climate protection and air quality. Taking a multi-pollutant, holistic perspective. The Clean Air Act does not lend itself easily to this perspective, but we can accomplish more if we take it.
- ACEEE has sample ordinances and policies. Mainly STAPPA/ ALAPCO's software (CACP) would be a good framework for developing policies that overlap. ICLEI has provided assistance to LA and Syracuse NY.
- Two examples of air districts using the CACP software are: Massachusetts compared changing their bus fleet from diesel to natural gas. The software showed that it would benefit criteria pollutants, but cause an increase in CO2. Salt Lake City compared switching airport vehicles to biodiesel. It would be good for GHGs, but bad for NOx.
- The STAPPA/ ALAPCO Global Warming Committee has monthly conference calls. It is mainly a way for members to exchange information. We welcome additional interaction from California members, including the Air District. There is a policy letter encouraging air districts to take voluntary action on GHGs, and a multi-pollutant strategy.
- State level statutory mandates are the next thing coming. The Regional Governors Associations have opposed mandatory national guidelines, but action will take place at

regional levels. STAPPA/ ALAPCO will be working with NASEO and NARUC to encourage more use of our software in Utilities and Energy Commissions.

- STAPPA/ ALAPCO is working on a Menu of Options for PM2.5, hopefully out by February.

Recommendation: Talk with Chris James from Connecticut, 860-424-3026, and Leslie Stanton, Puget Sound, 206-343-8800

Glossary of acronyms

ABAG	Association of Bay Area Governments
ACEEE	American Council for an Energy Efficient Economy
BAAQMD	Bay Area Air Quality Management District
CAA	Clean Air Act
CACPS	Clean Air Climate Protection Software
CAP	Clean Air Plan, Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCP	Cities for Climate Protection
CEC	California Energy Commission
CO_2	Carbon Dioxide
EPA or USEPA	United States Environmental Protection Agency
EU	European Union
GHG	Greenhouse Gas
ICLEI	International Council of Local Environmental Initiatives
IPCC	International Panel on Climate Change
LBL	Lawrence Berkeley Laboratory
LEED	Leadership in Energy and Environmental Design
MTC	Metropolitan Transportation Commission
NOX	Oxides of Nitrogen
OAP	Ozone Attainment Plan
PM	Particulate Matter
CPUC or PUC	California Public Utility Commission
ROG	Reactive Organic Gases
RPS	Renewable Portfolio Standard
STAPPA /ALAPCO	State and Territorial Air Pollution Program Administrators – Association of Local Air Pollution Control Officials
TCM	Transportation Control Measure
TFCA	Transportation Fund for Clean Air
TIP	Transportation Implementation Plan
VLF	Vehicle License Fee
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

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