



The Long Road to Clean Air

in the San Joaquin Valley:

Facing the Challenge of Public Engagement

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Central Valley Health Policy Institute

The Central Valley Health Policy Institute was established in 2002 at California State University, Fresno to facilitate regional research, leadership training and graduate education programs to address emerging health policy issues that influence the health status of people living in the San Joaquin Valley. The Institute was funded in July 2003 by The California Endowment, in partnership with the university, to promote health policy and planning in the region. Additional information about the Central Valley Health Policy Institute, its programs and activities (including this report), academic and community resources may be found at: www.cvhipi.org.

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The California Endowment

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Strengthening the Air Quality Policy Environment in the San Joaquin Valley: Executive Summary

Air Pollution Drivers

Valley Geophysical Environment

*Air pollution poorly dispersed, leading to high ozone and PM exposure

Rapid Regional Population Growth

*Low housing costs;
*High immigrant birth rates

Goods Movement Corridor

*Globalization of trade;
*Extremely high diesel truck shipping in Valley;
*Lack of rail/ship capacity;
*Very rapid VMT growth

Rapid Growth of Large-Scale Dairies

*Expanded milk processing plants;
*Minimal air quality regulations until 2003

Outcomes

*High (\$3.2 billion) annual health impacts;
*Strong public concern and desire for action

Regulatory Barriers

Inadequate Federal and State Mobile Source Controls

*Valley penalized for low carrying capacity;
*Creates high dependence on incentive programs

Poor Control of Land-Use

*Flat topography, powerful developers promote sprawl;
*No regional land-use agency

Historic Influence of Business on Air District

*Bias towards county/rural Board representation;
*Jobs/profit trump resource conservation in Valley;
*Business well-organized

Complex Challenge of Dairy Regulation

*Hard to measure multiple area emission sources;
*Health impacts indefinite;
*Untested control technology

Outcomes

*Region cannot regulate most emissions;
*Region must raise billions in incentive funds;
*Continued growth in dairy emissions

Public Engagement Constraints

Scientific Complexity

*Each proposed rule requires unique expertise;
*Technical and economic controversy over controls;
*Hard to establish 'smoking gun' on health impacts;
*Difficult for media to cover

Time and Resource Constraints

*Daytime policy meetings;
*Opportunity costs of time spent learning about issues;
*Dependence on scarce foundation funding;
*Reliance on state/national environmental groups

Lack of Visibility by Regulatory Agencies

*Multiple agencies with unique regulatory authority;
*Little public involvement in selection of agency boards, limiting public understanding

Outcomes

*No elections limit public knowledge of AQ issues;
*Polarization between angry participants and AQ agencies;
*Technical complexity limits participation by public and membership organizations;
*Public engagement lags far behind public concern

Recommendations

Re-Framing of Valley Air Quality Challenge

*Region must develop within carrying capacity limits;
*Public, not just business, must be challenged to make collective sacrifice;
*Unified policy approach to AQ, climate change, water security, and energy

Comprehensive Public Education Effort

*Seek new funding for public education;
*Make regional sustainability part of revised K-12 environmental education curriculum;
*Seek alternative ways for media to educate public-create synergy with K-12 education, e.g. Web-based learning/participation

Valley-Wide Engagement of Membership Organizations

*Expanding AQ representation is a key to a healthy policy environment;
*Valley conference to engage leaders of target organizations;
*Reinforce work of advocates;
*Education and/or advocacy option for organizations

Introduction

The focus of this report is on a particularly challenged region, the San Joaquin Valley, and its efforts to meet public health standards for air quality.¹ Our intent is to provide a wide audience of non-experts with a comprehensive understanding of the air quality policy landscape in the San Joaquin Valley, coupled with practical recommendations for enhancing the public's engagement with air quality policy making in the years to come.

There is an increasing recognition in California of the critical linkages between environmental change and public health. Three inter-related issues are paramount, each corresponding to a different timeframe of behavioral and public policy adaptation. In the long term, climate change is arguably the most serious public health challenge, complicated by the fact that its resolution will inherently require substantial international cooperation towards a transformation in global energy systems. The mid-term challenge is water security, as defined by our ability to protect water quality and meet growing demands. The most immediate challenge is air pollution's threat to public health. Millions of Californians are exposed to unhealthy air now, not tomorrow or in decades to come. The common denominator for all three threats is the global technostructure, as defined by our carbon-based energy system, our modes of transportation, our level of consumption, the dependence of our economic system on continued growth, and our material expectations of the good life.

The natural features of the San Joaquin Valley make it much more vulnerable to air pollution relative to other regional air basins. Surrounded by mountains that restrict air movement, concentrate air pollutants, promote thermal inversions, and efficiently produce ozone, the San Joaquin Valley is confronting one of the most severe air pollution management challenges in the nation. According to opinion research, this vulnerability to air pollution is reflected in the strong concern expressed by Valley residents about the threat of air pollution.²

Yet, as will be shown, only a very small fraction of

residents are engaged with the issue. The generation of knowledge and related strategies to resolve the contradiction between high public concern and low public engagement is a primary motivation for this report. Three elements compose our definition of public engagement: knowledge, participation, and democratic representation. In respect to knowledge, the public does not have a clear understanding of the air pollution management process and the government agencies in charge. In turn, only a tiny fraction of the Valley public directly participates in the making of air quality policy at the regional, state, and federal levels. Nor do most of the organizations to which Valley residents belong have a voice in air quality policy making.

Integral to our emphasis on public engagement is a key assumption relevant to Valley air quality and other serious environmental health issues: Public health problems arising from fundamental contradictions between the natural environment and society cannot be solved without painful public policy decisions at all levels of government. Leadership from above can take us only so far in this context—decision makers are unlikely to make those decisions without broad support from an informed public. This is particularly true when the legal framework and technological means for meeting air quality standards fall short in the face of a unique regional environment.

The report is written from an interdisciplinary academic perspective that integrates key elements of environmental geography, political science, and economics in assessing this important public health issue.^{3 4 5} From this perspective, the health impact from Valley air pollution is a socially constructed outcome of incompatibility between the distinct environment of the region and the “one size fits all” air quality policy model established under the federal Clean Air Act (CAA). Tension around this contradiction is magnified by the rapid growth of emission sources in the region. As currently implemented, this federal legislation arguably fails to provide “equal protection of the air” to residents of the San Joaquin Valley. These conditions also drive and perpetuate market failure, defined as the incapacity of market transactions to fully capture the environmental impacts of producing goods and services. The report also borrows a page from Michael Shellenberger and Ted

Nordhaus in setting forward a constructive critique of the strategies and tactics adopted by public interest advocates.⁶

The challenge of sustainable development on a regional scale provides an important context for the report. Meeting this standard entails the difficult task of resolving the tensions between the “Three E’s” - equity, economy, and environment. In short, how to restore Valley air quality without creating an unfair distribution of costs to certain communities, while at the same time expanding economic opportunity in the Valley? While the report does not attempt a comprehensive treatment of this issue, the reader is encouraged to use this framework in their evaluation of air quality policy options.

The report is organized into five sections: First, it identifies the environmental, social, and economic factors that are driving air pollution in the region. Second, it analyzes constraints on public involvement in air quality policymaking. Next, a case context for this analysis is a recent policy struggle between the San Joaquin Valley Air Pollution Control District (Air District) and the Central Valley Air Quality Coalition (CVAQ) regarding the region’s ozone attainment plan. Fourth, we present the results of six focus groups conducted by the Central Valley Health Policy Institute (CVHPI) with 52 Valley residents. These findings complement recent Valley public opinion survey research, providing richer insights into how the general public views the region’s air pollution problem and how it should be addressed. And finally, the report concludes with recommendations regarding strategies for (1) a more comprehensive re-framing of the Valley’s air quality quandary as a catalyst for public participation, (2) increasing the public’s understanding of key air quality issues through new public education investments, and (3) expanding organizational representation in air quality policymaking in the Valley.

The Valley Air Quality Quandary: Balancing Public Concern with Policy Reform

Of all regions in the nation the San Joaquin Valley faces one of the most marked combinations of environmental degradation and poverty. The fertile irrigated soils of the Valley have made it, acre for acre, one of the most productive agricultural regions in the world. Well over 50% of the nation’s healthiest food—fruits, nuts, and vegetables—is produced here.⁷ The high demand for seasonal, low-wage farm labor and proximity to the grinding poverty of rural Mexico have contributed to one of the highest regional rates of undocumented immigration, poverty, and underemployment in the nation.⁸ Not surprisingly, poverty has historically served as a justification for unfettered economic development in the region. The region’s amazing farm productivity and the affordable food it creates, provide substantial public health benefits to the nation while the negative social and environmental costs of production are borne by the region, not the least of which is polluted air.

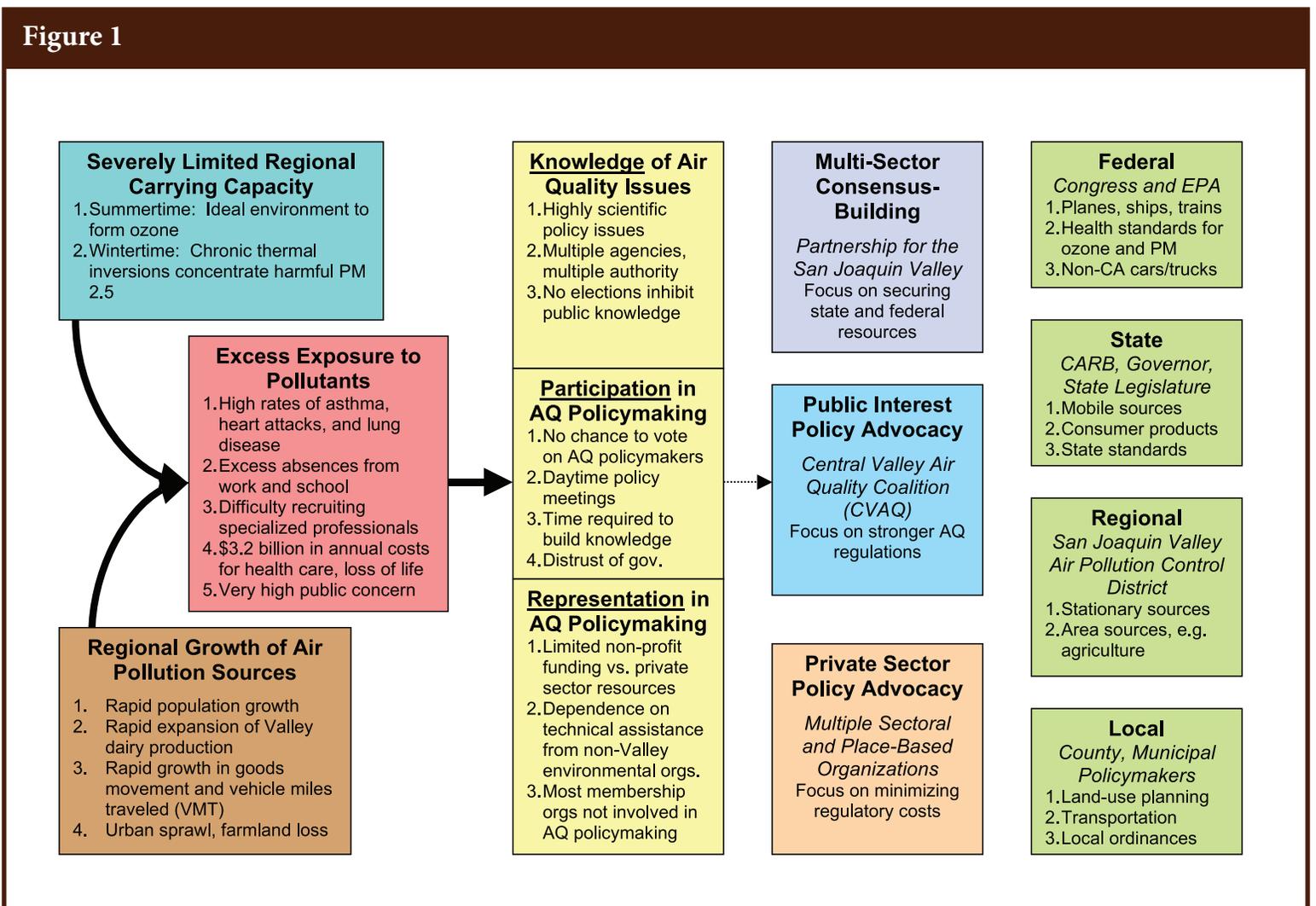
But agriculture is just one element of the region’s air quality challenge. A host of growing pollution sources is contributing to a proportional growth in public anxiety about air pollution. The remainder of this section is devoted to an assessment of that concern and the multiple factors that form a complex public health challenge for the region. Figure 1 on page 3 provides the reader with a synoptic view of the primary components discussed below that constitute the Valley’s air quality policy landscape.

A Concerned Public

The Valley’s air pollution problem is reflected in recent public opinion research. A Public Policy Institute of California (PPIC) survey of California residents released in July 2007 found a Valley public that is very concerned about air pollution.⁹ The results included the following:

1. In the San Joaquin Valley, 56% stated that air pollution was a “big problem” in their region vs. a statewide figure of 35%.
2. In the San Joaquin Valley, 64% stated that the air quality was worse than it was 10 years ago, compared to the statewide average of 48%.¹⁰
3. Thirty-five per cent of San Joaquin Valley residents stated that air pollution was a very serious health threat to themselves or their families, compared with 25% statewide.
4. Fifty-five per cent of San Joaquin Valley residents reported that either they or a family member had asthma or a comparable respiratory ailment, compared to 40% of Californians statewide.¹¹

Figure 1



Clearly the public is concerned, reflecting both real and perceived impacts from Valley air pollution. A recent California State University, Fullerton study estimated the annual economic impact of excess exposure to ozone and PM 2.5 to exceed \$3.2 billion (see further discussion below).¹² In accordance with the theory and practice of democracy, the high level of concern about the threats of air pollution should be reflected in the public's (or its representatives') ability to provide informed and persuasive input to policymakers. Yet as discussed below, only a very small fraction of residents in the San Joaquin Valley provides any direct input into air quality policymaking.

To its credit, California does provide indirect public representation through air agency boards composed of appointed and/or elected officials.¹³ The unique status of the California Air Resources Board (CARB)¹⁴ and comparable regional boards in California reflects the state's history of severe air pollution, beginning with the Los Angeles air basin in the 1950s.¹⁵ By the late 1980s, the San Joaquin Valley's growth had led to a deterioration of air quality that was comparable to that of the Los Angeles region, leading to the formation of the San Joaquin Valley Air Pollution Control District in 1992.

In the case of the San Joaquin Valley, the combination of growth and low carrying capacity will require a level of public policy intervention far beyond most regions. Under these circumstances, policymakers face tough choices and need to clearly hear the public's call for clean air.

Air Pollution Drivers

Our analysis of the Valley's air quality landscape begins with an overview of the primary air pollution drivers for Valley air pollution. In essence, the rapid growth of new pollution sources has collided with the constraints imposed by the natural environment.

The Carrying Capacity Quandary

Just as ecosystems vary in their capacity to support a given population of organisms, regional air basins differ considerably in their capacity to dissipate air pollution in the ambient environment to levels that are considered safe to breathe. The air pollution carrying capacity for the San Joaquin Valley is in fact one of the lowest in the nation, considerably lower than the South Coast or San Francisco Bay air basins. The Valley's climate and geography lie at the heart of this low carrying capacity and the corresponding public health impacts.

Characterized by low wind speeds, high temperatures, and ample sunlight within a bowl-like region, the Valley is an extremely efficient environment for photochemical smog (ozone) formation in summer months. Caused by the chemical reaction between nitrogen oxides (NO_x) and reactive organic gases (ROG) in the presence of heat and sunlight, ozone (O₃) is a highly reactive gas that has been found to cause, promote, or aggravate a range of pulmonary diseases because of its ability to trigger chemical reactions with lung tissue.¹⁶ Under the federal Clean Air Act, ozone is considered one of six criteria pollutants that must meet a National Ambient Air Quality Standard.¹⁷ The current federal ozone standard is 0.08 parts per million (ppm) averaged over eight hours.¹⁸

From 2003 through 2007, air quality monitors in the region, especially in the southern counties of Fresno, Kern, and Tulare, recorded an annual average of 93 daily violations of the federal 8-hour ozone standard.¹⁹ This frequency of violations is comparable to the level of violations in the South Coast Air Quality Management District (Los Angeles, Orange, Riverside, and San Bernardino counties). However, an analysis of regional emissions inventories shows that the per square mile emissions of ROG and NO_x (i.e., emissions density) in the South Coast is about seven times higher than in the Valley (see Figure 2).²⁰

Figure 2

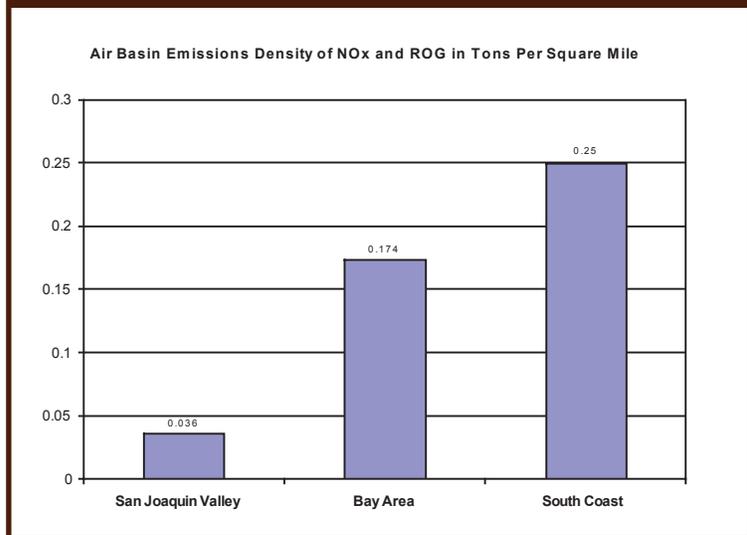


Figure 2. Regional Comparison of Emission Density for Ozone Precursors. Source: San Joaquin Air Pollution Control District

Roughly speaking, each ton of ROG and NOx in the Valley creates seven times the ozone when compared to the South Coast. The Valley’s limited carrying capacity for ozone is further limited by a natural background ozone level of 0.04 ppm.²¹ On a national scale, Figure 3 further illustrates the anomalous

Figure 3



Figure 3. 8-Hour Ozone Violations in the United States. Source: US EPA

outcome in which the Valley’s ozone violations dwarf those recorded by much more heavily populated metro regions of the East and Midwest. Table 1 (see

page 6), provides a summary of major sources of NOx and ROG in the San Joaquin Valley.

Even more serious is the concentration of fine particulate matter (PM 2.5) during the Valley winter months, resulting in frequent violations of the federal standard of 35 micrograms per cubic meter. Beyond disrupting lung function, particles of this size (less than 2.5 microns) are capable of entering the bloodstream and weakening heart tissue, leading to a range of cardio-pulmonary damages not the least of which is premature death. A recent study placed the annual societal costs of excessive PM 2.5 pollution at nearly \$3.2 billion for the San Joaquin Valley, about 100 times the economic value ascribed to ozone violations.²² Wintertime PM 2.5 is concentrated by chronic thermal inversions created by cold air masses migrating off the surrounding mountain slopes to the Valley floor when the sun sets. This dense, cold air is then trapped beneath the warmer daytime air. The net effect is to severely limit the vertical and horizontal dispersion of life-threatening PM 2.5. As illustrated in Figure 4, these inversions are responsible for the Valley’s infamous tule fog.

Figure 4



Figure 4. Satellite Image of Wintertime Fog in the San Joaquin Valley. Source: San Joaquin Air Pollution Control District

Table 1. Major Sources of Ozone Precursors in the San Joaquin Valley.
Source: San Joaquin Valley Air Pollution Control District.

Top 25 Emission Inventory Categories for NOx (in tons per day, based on preliminary estimates)			Top 25 Emission Inventory Categories for VOC (in tons per day, based on preliminary estimates)		
Source Category	2005	2015	Source Category	2005	2015
Heavy duty diesel trucks	225.3	116.7	Livestock waste (dairy cattle)	39.4	52.4
Manufacturing and industrial (boilers, IC engines)	32.2	37.7	Light duty passenger cars	69.4	38.1
Light duty passenger cars	65.0	30.8	Consumer products	23.3	27.1
Farm equipment (tractors)	50.6	28.1	Oil and gas production (evaporative losses)	27.9	25.2
Trains	23.6	20.8	Pesticides	24.0	22.3
Off-road equipment (construction and mining)	36.5	16.1	Prescribed burning	20.7	20.0
Off-road equipment (other)	18.9	12.3	Off-road recreational vehicles	15.9	16.2
Agricultural irrigation pumps	16.6	12.3	Coatings (paints and thinners – non architectural)	12.1	16.0
Oil and gas production (combustion)	11.2	9.7	Recreational boats	16.1	12.7
Glass and related products	9.4	9.3	Petroleum Marketing (gasoline evaporative losses)	10.8	12.6
Food and agriculture (crop processing and wineries)	9.2	8.9	Food and agriculture (crop processing and wineries)	11.4	12.3
Service and commercial (boilers, IC engines)	7.7	8.1	Architectural coatings (paints and thinners)	9.4	10.3
Heavy duty gas trucks	10.0	7.8	Livestock waste (broilers)	8.4	8.4
Cogeneration (electricity generation and heat recovery)	10.0	7.5	Heavy duty trucks	12.7	8.2
Residential fuel combustion	6.3	5.8	Ag burning	8.4	8.2
Ag burning	4.0	3.9	Heavy duty diesel trucks	13.5	8.0
Recreational boats	3.9	3.4	Livestock waste (range cattle)	7.3	7.3
Electric utilities	3.3	3.2	Aircraft	6.4	6.7
Mineral processes (mining, cement manufacturing)	2.3	2.8	Livestock waste (feedlot cattle)	5.0	5.0
Air craft	2.3	2.4	Other (cleaning and surface coatings)	3.4	4.5
Heavy duty urban buses	2.4	2.3	Motorcycles	5.5	4.4
School buses	2.1	2.2	Residential Fuel Combustion	5.9	4.2
Prescribed burning	1.8	1.8	Off-road equipment (lawn and garden)	5.9	4.1
Ships and commercial boats	1.2	1.3	Adhesives and Sealants	3.2	3.8
Motorcycles	1.3	1.3	Farm equipment (tractors)	6.9	3.3
Total	557.1	356.5	Total	372.9	341.3

The Demographic Freight Train

Natural limits to air pollution are colliding with demographic trends in the San Joaquin Valley. Despite very high levels of poverty and chronic high unemployment, the region is one of the most rapidly growing in the nation. The 2007 estimated population of 3.8 million is projected to rise to over 6.8 million in 2040. The growth is primarily being driven by high birth rates among the region's large immigrant population and in-migration of Californians from the coastal regions of the state seeking affordable housing. For example, from 2000 to 2005, Kern and San Joaquin counties, both proximate to coastal labor markets, grew by 12.6 and 15.1%, respectively.²³ The region as a whole grew 12.8%.

As the population grows, so does the challenge of reducing vehicular pollution. Approximately 80% of the region's NOx arise from mobile sources. The population in the Valley increased 56% from 1981 to

2000, while vehicle miles traveled (VMT) increased by 136%. Counterbalancing this increase is the gradual replacement of older, more polluting vehicles with newer, lower emission vehicles, reflecting new engine and fuel standards set by the California Air Resources Board (CARB) and the federal government. Based on the trend line of seven year averages depicted in (Figure 5), Valley ozone concentration violations have resumed their long-term decline in recent years. Year-to-year variations in meteorological conditions clearly play an important role in determining the number of annual ozone violations.

It should also be noted that ROG emissions from dairies in the region have risen more rapidly than any other source and are projected to continue growing (see Table 1 on page 6). Over the past 30 years, the number of milk cows in California has doubled (to over 1.7 million), with most of this growth occurring in the San Joaquin Valley. According to California

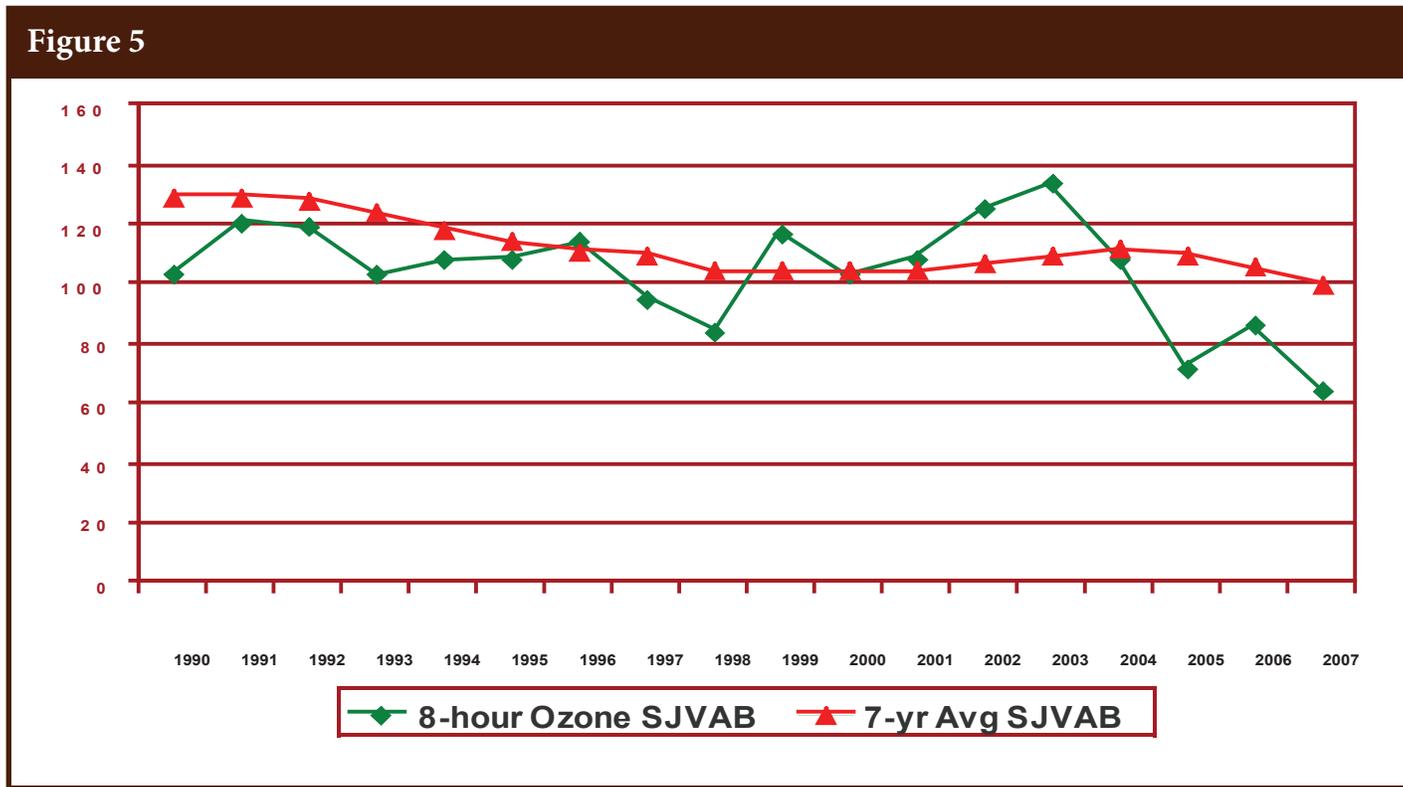


Figure 5. Annual Days above the Federal 8-hour Ozone Standard in the San Joaquin Valley. Source: California Air Resources Board (<http://www.arb.ca.gov/aqd/aqdp.htm>).

Department of Food and Agriculture figures, dairy herd totals have increased on an average of 3% to 4% every year in recent years. Currently about 80% of the state's dairy cows are in the San Joaquin Valley.²⁴

The Public Policy Challenge

In the face of rapid regional growth, the challenge facing regulatory agencies and other policymakers is the imperative to go above and beyond air pollution control measures that are sufficient in less constrained regions. The very low regional carrying capacity means that emission densities that do not create public health risks in high dispersion air basins, e.g., the San Francisco Bay, often end up exceeding criteria air pollution standards in the San Joaquin Valley.²⁵ As a result, the Valley Air District, CARB, and the U.S. Environmental Protection Agency must institute some of the most strict regulatory controls on stationary, area, and mobile pollution sources in the nation. Legislative bodies at all levels face a comparable necessity to establish funding sources and related incentives that complement regulatory actions. Compounding this situation is the fact that the region already has high per capita rates of emissions for NO_x and ROG when compared to the Bay and South Coast air basins. These high per capita rates reflect the pollution impacts of rapid population growth, dairy expansion, the high popularity of SUVs and pickups, and the growing volume of diesel trucks on the West Coast goods movement corridor of SH-99 and I-5 (see Figure 6).

Valley trucking firms, growers, dairies, and other business sectors facing out-of-state or international competition are naturally motivated to resist the imposition of tighter regulations. The net result of the Valley's low carrying capacity has been intensified regulatory conflict in recent years between private sector stakeholders facing new regulatory costs and public interest advocates, particularly in respect to agriculture.

Figure 6

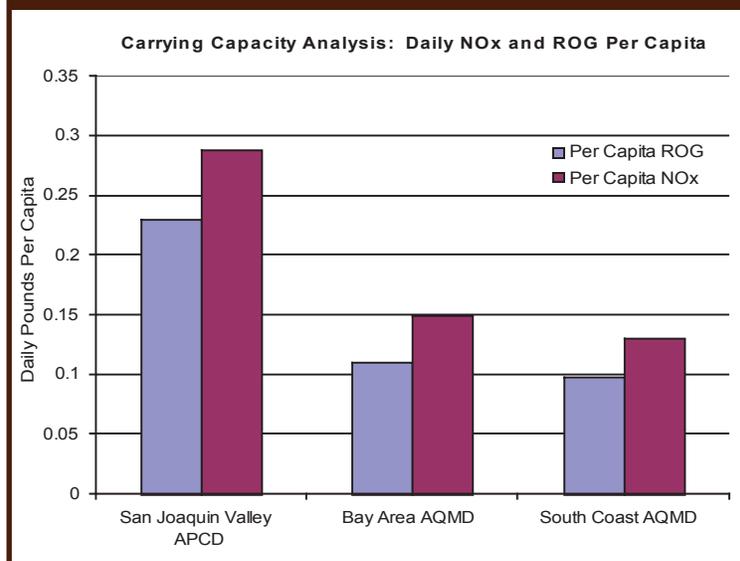


Figure 6. Regional Comparison of Per Capita NO_x and ROG Emissions

Softening the blow of these new regulatory costs are incentive program subsidies. For example, while CARB is currently developing new control measures for the state's diesel truck fleet, additional incentive funds ranging from \$100 million to \$275 million annually are being sought from federal, state, and regional sources to help subsidize the cleanup or retirement of diesel trucks and other pollution sources in the Valley in advance of regulatory requirements.²⁶

Valley Air District's recently submitted State Implementation Plan (SIP) for ozone compliance has adopted a designation of Extreme Non-Attainment, resetting the compliance deadline back to 2024.²⁷ As discussed below, this decision was strongly opposed by CVAQ advocacy organizations but was supported by CARB. Ongoing federal, state, and regional control measures are predicted to gradually reduce Valley ozone levels despite continued growth in emission sources.

Because of its authority over the mobile sources that comprise such a large part of the ozone problem, CARB's regulatory decisions have a disproportionate influence on when and under what circumstances the San Joaquin Valley will meet the 8-hour ozone standard.

Atmospheric chemistry modeling conducted by CARB indicates that controls of NO_x from mobile sources will be relatively more important than ROG controls, particularly in the most ozone-prone areas like northwest Fresno and Arvin. For example, through a combination of regional controls and California's mobile source control program, NO_x reductions on the order of 348 tons per day (tpd) are expected in the San Joaquin Valley by 2017, leaving a shortfall of 49 tpd needed for attainment.²⁸ Under the current plan, reductions of 376 tpd by 2023 are projected, leaving an 21 tpd shortfall.

Closing this gap will require a combination of regulations on unregulated pollution sources such as the Valley's ubiquitous lawn care industry, cooperation from local governments and land-use planning agencies, additional incentive funds, new goods movement models such as short sea shipping,²⁹ and new technologies that reduce per unit emissions from stationary, area, and mobile sources. These are the central policy tools in a "dual path" strategy adopted in mid-2007 by the Air District and CARB intended to aggressively seek additional emission reductions in order to close the gap in the current ozone plan (SIP) and accelerate the attainment date to 2020 or sooner.

Limits to Public Participation Under the Federal and California Clean Air Acts

Success in closing the projected 21 tpd shortfall in NO_x reductions necessary for 2024 attainment and, moreover, accelerating the attainment date to 2020 or sooner will depend on broad public support for tough and effective solutions that require across-the-board sacrifices. Raising public awareness regarding the depth of the policy challenge and the options for reducing air pollution are key elements for building that support.

On a national level, however, research has shown that relatively small fractions of the public are engaged with air quality policymaking.³⁰ This is corroborated

by our Valley focus group research discussed below and the PPIC survey cited above. Simply put, most of the public is not aware of how air quality policy is made and who makes it, nor are they personally involved.

Multiple Agencies, Multiple Responsibilities

Part of the public's disconnection stems from the regulatory complexity of the federal and state Clean Air Acts. At the federal level the EPA has responsibility in California for non-vehicular mobile sources such as trains, airplanes, and ships. It also sets national health standards for ambient (outdoor) levels of criteria pollutants, of which ozone and PM 2.5 pose the largest public health challenge.³¹ CARB is responsible for other on-and off-road mobile sources as well as consumer products such as lawn care equipment. California also has currently unenforced ambient health standards that are generally more protective than federal standards. The Valley Air District regulates area sources, primarily agriculture, and stationary sources such as refineries and food processing plants.³² Reflecting the public's dim understanding of this regulatory system, 67% of Central Valley residents polled in 2007 said they did not have enough knowledge to approve or disapprove of the work of their regional air district, despite the agency's important role in protecting public health.³³

Scientific Complexity and Uncertainty

One of the signature characteristics of air quality policy debates in the United States is pervasive scientific uncertainty about the causes and effects of air pollution and the social distribution of risk from air pollution. For example, how concerned should parents be when their child is playing outside when the predicted air quality index (AQI) falls in the 100 to 150 range (Unhealthy for Sensitive Groups), very near the 0.08 ppm 8-hour ozone standard?³⁴ Given the mind-boggling interplay between multiple air pollution sources (indoor and outdoor), differences in vulnerability from one person to the next, and

highly variable meteorological conditions that affect exposure, straightforward answers about the health effects of air pollution are often not available from regulatory agencies. For example, despite the growing prevalence of childhood asthma, there is still uncertainty in the scientific community about the respective contribution of air pollutants and biological allergens to the disease. Reflecting this scientific complexity and uncertainty, disagreements over control measures are commonplace. The staff of agencies such as the Valley Air District and CARB must wrestle with competing scientific narratives from industry and environmental advocates. At the same time, each set of stakeholders will also press their case directly to governing board members. Under these conditions of uncertainty and conflicting interests, accusations of political bias in air quality decision making are inevitable.

Assessing the public health risks from agricultural (area) sources with multiple and diffuse emission sources is particularly difficult. For example, large dairies with 1,000 cows and larger have received permits from county authorities for over two decades. Only in the past several years have their ROG emissions been regulated for ozone control. Other dairy air pollutants such as ammonia pose potential health risks that are currently being evaluated by regulatory agencies. As part of this ongoing regulatory process, scientists are engaging in a complex, multi-year process of measuring baseline emissions from the multiple emission sources in dairies, including exercise yards, milking parlors, stored feed, wastewater lagoons, manure on croplands, and the enteric emissions of the cows themselves. And finally, new dairy production and emission control technologies have to be evaluated for their ability to reduce emissions relative to conventional technologies.

Case-By-Case Regulation

A related aspect of air quality regulation that

constrains public knowledge and involvement is the case-by-case nature of air quality regulation. Regulatory agencies create specific rules for controlling a very large number of source categories such as industrial boilers, composting facilities, and off-road construction equipment. In doing so, they incorporate cost-effectiveness criteria in examining the tradeoffs between the public health benefits of a control measure with its impact on economic activity, jobs in particular. A typical outcome of this analysis is an estimated cost for reducing a ton of a given pollutant such as NO_x. For example, CARB has recommended that costs for vehicular emission controls should not exceed \$20,000 per ton of NO_x or ROG reduced.³⁵ Cost-effectiveness standards are relatively easy to meet in the early phase of a sector's regulation, as is currently the case with dairies, and become harder to meet in successive regulatory cycles. Inevitably, decisions about where to draw the line between improving air quality and excessive economic costs will generate disagreements between public interest advocates and the regulated sector.

Typically, only private sector stakeholders and a handful of salaried advocates have the time and motivation to absorb the scientific issues and participate in this time-consuming rulemaking process. In addition to the time away from work required to participate in workshops and hearings, citizens face the daunting task of mastering the scientific, economic, and technological points of disagreement that pertain to a given rule. As a result, the general public is almost always out of the policymaking picture even though they may very well have a stake in the outcome.

Barriers to Media Coverage, Public Education and Public Participation

Media coverage of air quality policy issues makes a critical contribution to public awareness. As industry and air quality advocates face off in the regulatory arena, the media faces the difficult task of cogently presenting the essence of the debate, typically within

an abbreviated allotment of air time or column inches. And while landmark policy efforts like the Valley 8-hour ozone plan (SIP) will be the focus of coverage over an extended number of news cycles, a more typical type of coverage is for individual, source-by-source regulatory battles. Air quality stories tend to include quotes from industry rebutting environmentalists or vice versa, but time and space are rarely available to fully unpack the issues. As in many other air quality issues, media coverage of disagreements about air quality trends may have the unintended consequence of confusing the public given the complexity of the issue and coverage limitations. A notable exception to this tendency was The Fresno Bee's award winning, in-depth investigation of Valley air quality issues, published in 2002 under the title "Last Gasp."³⁶

CARB and the Valley Air District also serve as important sources of public information about Valley air pollution. The web sites of regulatory agencies contain considerable information about local and regional air quality. In addition to daily air quality predictions in the form of an air quality index (AQI), agencies seek to educate and encourage best practices for reducing emissions from households and employers. An example is the Air District's *Spare the Air* program. The public is notified via various media channels on days when summer ozone levels are predicted to exceed health standards for everyone (AQI over 150). Voluntary actions such as car-pooling are encouraged. A comparable program exists to inform the public about winter days when wood burning is either discouraged or banned due to fine particulate pollution (PM 2.5). This public communication model—using high pollution days as an opportunity to educate the public and leverage voluntary behavioral change—is also employed by the Air Quality Management Districts of the Bay Area and South Coast.

Several questions emerge: First, are these programs effective in educating the public? Second, do they result in meaningful reductions in pollution due to

voluntary behavior? The fact that 67% of Valley residents were essentially uninformed about the work of the regional Air District over the course of 15 years suggests that the agency's public education efforts have fallen short.³⁷ Insights to these issues can be drawn from an independent survey of 600 Valley residents that was commissioned by the Air District in 2005.³⁸ The survey posed a number of questions probing the public's air quality awareness and their participation in the *Spare the Air* program. Key findings include:

1. Residents were generally aware of the Valley's air pollution problem but they were less cognizant of why the problem occurs and how they could help solve it (p. 7);
2. Just 17% were aware that the day of the phone interview was a *Spare the Air* day, although 43% did recall being exposed to media messages about poor air quality in the preceding two days (p. 9);³⁹
3. Five percent of drivers stated that they had reduced at least one trip in response to the *Spare the Air* program, suggesting a marginal impact of the program on air pollution levels (p. 8);
4. When asked if residents believe their actions can significantly reduce air pollution, 69% said yes, ranging from a high of 80% in Stanislaus County to 54% in Kern County (pp. 30-31).

In response to these poll findings and input from its Ozone Attainment Fast Track Task Force established in 2007, the Air District is now planning major changes in its *Spare the Air* model. In 2008, a *Healthy Air Living* program will be launched that will employ an intensified program of media messaging and community involvement during a one- or two- week segment of the peak summer ozone season. A key change will be a coordinated effort to enlist the participation of businesses, community groups, faith-based organizations, and local governments in voluntary pollution reduction strategies. The

extended time window of the new program, coupled with its reliance on communication networks that exist within and across organizations, are strategies for increasing “face time” with the public relative to the episodic *Spare the Air* program. This new approach has the potential to increase public awareness of Valley air quality issues. Whether it can stimulate sustainable and measurable reductions in emissions will be a greater challenge.

CVAQ advocates believe that educational outreach by the Air District to residents and community groups often appears to be more oriented towards self-promotion and reassuring the public that air quality is improving.⁴⁰ They would also like to see the Air District play a more active role in encouraging the public to participate in the policy development process, especially in light of the barriers cited above.

Elections and Public Engagement

One contributing factor for the public’s relative ignorance about air quality policymaking is the absence of direct elections for agency executive boards. In other public policy arenas such as education, elections serve as educational catalysts for the public through media coverage of elections and paid advertising, coupled with the incentive that each voter has to make an informed choice in the voting booth. For example, elections of county supervisors serve as a means for airing contrasting public policy options for land use, public safety, and the delivery of social services. In subsequent elections, voters also have the opportunity to hold elected officials directly accountable for their votes. Our central point is not to advocate direct elections per se, but to underscore the educational role played by elections and the accountability nexus they create with voters.

Public Interest Representation by CVAQ

Nationally and in California, air quality advocacy organizations have sought to counterbalance the

constraints on public engagement by serving as public interest representatives in air quality policy development. Compared to Southern California and the San Francisco Bay regions, the 1990s witnessed very limited organized air quality advocacy in the Valley. With initial funding from the Steven and Michelle Kirsch Foundation and leadership from Fresno Metro Ministry and the Sierra Club’s Tehipite Chapter, Valley advocates formed the Central Valley Air Quality Coalition (CVAQ) in 2003.⁴¹ The net result has been a substantial increase in the voice of environmental, environmental justice, and public health advocates in the Valley. A critical part of this success has been technical and legal assistance from national and state organizations including the Center for Race, Poverty and the Environment, the Coalition for Clean Air, Earthjustice, Environmental Defense, the Natural Resources Defense Council, the Planning and Conservation League, the Sierra Club, and the Union of Concerned Scientists.^{42 43}

As stated on its web site, CVAQ’s mission is as follows: “To work toward awareness, act as a watchdog, advocate for policy, and mobilize communities to create clean air in the San Joaquin Valley. To ensure that all communities, of all races, cultures, class or creed, have the opportunity to be involved in the policy development and regulatory processes improving regional health.” While this mission spans the three elements of public engagement, CVAQ’s principal success has been in representing the public interest in policymaking, relative to public education and public participation. Several of CVAQ’s more than 70 organizations have recently shifted their focus towards community mobilization as well. As a coalition, CVAQ functions primarily as a forum for policy prioritization and a means of coordinating the policy advocacy of like-minded members. The CVAQ listserve is an active, effective educational tool for advocates, serving as a mechanism for issue communication, dissemination of technical assistance, and the coordination of legislative or rulemaking advocacy. The collective efforts of CVAQ organizations have

shifted the terms of the Valley's public policy debate, resulting in more explicit discourse about the health costs of air pollution in policymaking venues and the media.

With respect to representation of the public, CVAQ organizations have tended to fall into three categories:

1. State or national environmental organizations with high scientific/policy capacity and paid staff focusing on Valley air quality issues, e.g., the Coalition for Clean Air and Environmental Defense;
2. Organizations that combine a gender-, ethnic- or place-based identity with a public health policy agenda, e.g., Latino Issues Forum and Fresno Metro Ministry;
3. Organizations with a Valley-wide membership base and public health/environmental mission, e.g., the Sierra Club chapters and the various county Asthma Coalitions.

Working together, these organizations combine the policy expertise of the large environmental organizations with the legitimacy and local knowledge of Valley organizations. However, in spite of their health-related missions, they have a very small or limited Valley membership base.

An important trend in the past several years has been the involvement of new Valley professional, faith-based, and labor organizations with a high advocacy potential. Specifically, the Fresno-Madera Medical Society, the Catholic Diocese of Stockton, and the SEIU-UHW health care worker union all have a Valley membership base. They also have well-established relationships with local, regional, and/or state policymakers that were established prior to their involvement with air quality advocacy efforts. Their engagement with air quality policy stems from the values and health concerns of their members,

rather than an environmental mission per se. In addition to their staff representing the interests of their members in the policy arena, the organizations are in an excellent position to educate their members about air quality policy issues in order for them to participate directly in policymaking.

These new organizations recently helped CVAQ achieve a long-standing policy goal of restructuring the San Joaquin Valley Air District Board. CVAQ members have argued from its inception that (1) the interest of the Valley's urban majority is not reflected by the numerical dominance of eight county supervisors on an 11-person Valley Air District Board and (2) public health expertise is lacking on the Board. Following four years of legislative effort, CVAQ helped engineer the enactment of SB 719 in 2007. The bill restructures the composition of the Air District Board, adding two public members with medical and scientific expertise and providing two additional seats for cities with over 100,000 residents.⁴⁴

The public education efforts of CVAQ have primarily been directed towards the education of grassroots leaders about key issues and advocacy strategies. This leadership development work is a prerequisite for public participation, such as testifying at monthly Air District meetings when votes on specific rules or attainment plans are scheduled. Unfortunately, these meetings are usually held during working hours, a key constraint on grassroots public participation. CVAQ advocacy groups also encourage concerned citizens to write letters to editors and/or place calls to Air District staff, Board members, and legislators. Through its engagement of Valley editorial boards, CVAQ has contributed to public education about air quality issues as it pursues its advocacy agenda. However, reflecting the constraints raised earlier, spurring public participation has been a more difficult challenge for CVAQ. As discussed in the case study to follow, only a very small percentage of the public has provided input into air quality policymaking, despite a high level of public concern about air pollution in the Valley.

A “Third Way” Policy Model: The California Partnership for the San Joaquin Valley

The Air Quality Work Group (AQWG) of the California Partnership for the San Joaquin Valley has also emerged as an important actor in Valley air quality policy development.⁴⁵ The Partnership was created by Governor Schwarzenegger in late 2005, with a broad mission to address the deep-rooted challenges of the region via a collaborative effort of private and public stakeholders in coordination with key agencies of the administration. Organized into various work groups, the Partnership is charged with making recommendations to the Governor regarding changes that would improve the economic well-being of the Valley and the quality of life of its residents. A unique aspect of the Partnership is its dual status as a non-partisan, Valley-based initiative and its close association with the Schwarzenegger administration. The commitment of the governor’s office has helped insure the active involvement of the respective cabinet heads and access to government officials by Partnership leaders. Support for the Partnership was bolstered by a 2006 allocation of \$5 million by the California Legislature.

Through the use of a 70% super majority rule for decision making, the AQWG has achieved multi-sector consensus on a number of air quality policy issues under consideration by the federal and state governments, as well as the Valley Air District and CARB. Of particular significance is the AQWG’s policy coordination with California’s senatorial and Valley congressional delegations to maximize the Valley’s share of federal funding for incentive programs. It has also played a key role in helping ensure that the Valley receives an appropriate share of the \$1.2 billion of state Proposition 1B funds that are earmarked for reducing air pollution from goods movement.

Policy Case Study: The Valley Ozone Plan

The purpose of the following case study of the recent policy battle over the Valley ozone state implementation plan (SIP) is to provide a finer-grained understanding of how policy advocates are shaping the air quality policy landscape of the Valley. It also provides a window on the role of citizen participation in Valley air quality policy making.

The development of the ozone plan came in response to a new federal standard for allowable exposure to ozone (0.08 ppm averaged over any 8-hour period). As a result, the Valley Air District and other regional air districts in California were required by the EPA to develop control measures for stationary and area pollution sources under their jurisdiction. CARB has responsibility for evaluating the individual regional plans for effectiveness and acceptability to the EPA.⁴⁶ It also has the considerable task of creating new control measures for mobile sources and consumer products.

Developed in 2006 and released in early 2007 for public review pending Board approval, the Air District draft plan stated that under EPA rules, full ozone compliance in the Valley could not be achieved prior to 2024 under the Extreme Non-Compliance standard. In order to gain an independent perspective on the Valley’s pathway to ozone compliance, the William and Flora Hewlett Foundation funded the International Sustainable Systems Research Center (ISSRC) to prepare an alternative to the Air District’s ozone control plan.⁴⁷ Released to the press on February 7, 2007, the ISSRC alternative plan argued that ozone compliance was possible in the Valley by 2013 under the Serious Non-Attainment timeframe.⁴⁸ Subsequent examination revealed that CARB emissions inventory of Valley pollution sources had been revised

substantially.⁴⁹ As a result, the feasibility of attainment by 2013 was cast in doubt, with further criticisms of the ISSRC plan expressed by Air District staff. CARB was drawn into the debate following protracted disagreement between ISSRC and the Valley Air District. The airing of these disagreements played out in the media as well as a public hearing convened by state Senator Dean Florez on February 20, 2007.

To the disappointment of air quality advocates, after meetings with ISSRC analysts and Air District staff, CARB lent support to the Air District's claim that the Extreme Non-Compliance clock (2024) was inevitable under EPA rules. On April 30, 2007 by a nine to two vote, the Valley Air District Board voted to support the ozone control plan developed by district staff.⁵⁰ CVAQ advocates' efforts to convince the Air District Board to adopt tougher control measures and an earlier attainment date had failed despite a good measure of editorial support by Valley newspapers. A post-mortem analysis of the ozone battle reveals several factors that contributed to this outcome.

CARB Left Out of the Picture

Approximately 78% of the Valley's nitrogen oxides (NOx) and 42% of its reactive organic gases (ROG) come from mobile sources that are under CARB's regulatory authority.⁵¹ Compounding the importance of mobile source controls, CARB's modeling of projected ozone concentrations at monitoring sites in the highly impacted southern San Joaquin Valley indicated a disproportionate need to reduce NOx rather than ROG, even though they both combine to form ozone in the atmosphere. NOx control measures largely fall under the purview of CARB, a point repeatedly made by Air District staff. Mobile source controls put in place by CARB would therefore have a considerably larger influence on Valley ozone compliance than area or stationary source controls adopted by Valley Air District.

Despite this, ISSRC focused its alternative SIP analysis on the Air District's ozone plan alone and did not integrate the CARB ozone plan. The result was a strong dependence in the ISSRC plan on Air District-imposed episodic controls of mobile sources during high ozone days (aka Clean Air Days). While ISSRC staff argued that this regulatory option was available to the Air District, the prospect of certain vehicles or commercial equipment being temporarily idled by regulators provoked a strong negative response from the agricultural sector that was firmly communicated to policymakers and the press.

Covering the High Cost of Cleanup

Without a dramatic intensification of mobile source regulation by CARB, ozone compliance in the Valley by 2013 would require a very heavy reliance on incentive funds to subsidize the retrofitting or replacement of older, higher polluting trucks, cars, and off-road equipment prior to regulatory requirements. The EPA also requires that credit for incentive-based reductions within a SIP cannot be granted unless there is an established funding source. The unlikelihood of draconian mobile source controls by CARB and the limited sources of incentive funds were factors that influenced the Air District's decision to adopt an Extreme (2024) strategy.⁵² The ISSRC report asserted that needed NOx reductions could be met by spending approximately \$257 million per year from 2008 to 2013 on retrofitting diesel trucks with NOx control devices but did not identify potential funding sources. CVAQ advocates and the Partnership Air Quality Work Group did, however, support legislation by Senator Florez that would authorize the Air District to raise annual vehicle license fees in the Valley by up to \$30 (SB 240). These groups also worked to ensure that the Valley would receive its fair share of Proposition 1B funding for incentive programs. But because incentive funding sources were not established, the Air District and CARB concluded that the ISSRC ozone control strategy would not be acceptable to the EPA.

The Challenge to Citizen Participation in a Scientific Debate

Air quality advocates face a difficult challenge: How to effectively bring the voice and concerns of the public into the policymaking process? Most would agree that air quality policy should not be limited only to those who have scientific expertise in the field. Many Valley residents have subjectively experienced negative health impacts from air pollution. And while at the individual level these experiences may be difficult to scientifically verify, their collective validity on the regional scale is indisputable.

In the months preceding the April 30, 2007 vote, a number of CVAQ organizations adopted a strategy of channeling public pressure on the Board to reject the plan put forward by staff. Supported by a number of Valley editorial boards, advocates' core assertion was that the vote on the plan should be delayed by four to six months in order to achieve consensus among scientific experts regarding the feasibility of an intermediate goal-compliance by 2017 or 2019 under a Severe Non-Compliance designation.⁵³

In a crystallization of its strategy to mobilize the public against the ozone plan, several leading CVAQ organizations ran an evocative ad in several Valley newspapers prior to the April 30, 2007 including *The Modesto Bee*. The ad depicted a newborn child in a mother's arms, with a written assertion that if the Air District Board votes the wrong way on April 30, the child will not breathe clean air until she graduates from high school. It encouraged readers to call local Board members to reject the 2024 ozone plan. The intent of the powerful imagery and message of the ad was apparently to stimulate a strong phone-in response to selected Board members.

Readers can draw their own conclusions but evidence suggests that Board members, particularly those listed in the ads, felt it was inflammatory and misleading. According to Bill Houk, Field Representative for District Board Member and Stanislaus County Supervisor William O'Brien, their office received only three calls in response to the ad.⁵⁴ Board Member and Ceres Councilmember Chris Vierra stated that he received two calls.⁵⁵ Just prior to his vote in support of the ozone plan, Supervisor O'Brien stated how offended he was by the ad, feeling that he had been unfairly targeted by environmentalists in his first major vote on the Board. Councilmember Vierra reported a similar response in a later interview.

As witnessed by the lead author on April 30, 2007, approximately 100 residents of the Valley testified in favor of a stronger ozone control plan from District offices in Bakersfield, Fresno, and Modesto. This was regarded by advocates as a record number of comments in support of stronger action and came after several months of effort by several CVAQ organizations to mobilize Valley communities against the Air District's plan. Notable was CVAQ's success in facilitating public testimony from low-income residents from some of the region's unincorporated communities. In turn, the Valley Air District has hired bilingual staff in order to insure that the testimony of these residents is clearly understood by Board members.

Viewed in the context of such an important vote over a long-term plan, 100 testimonials from a region of 3.8 million people does not reflect the strong concern about air pollution registered in public opinion polling. This contradiction underscores how difficult it is to stimulate public participation in Board meetings that are held during working hours. As discussed above, this limited public participation suggests a need for the Valley Air District to make a more concerted effort to publicize such a meeting and its significance. It also points to the logic of expanding public representation by Valley

membership organizations in lieu of direct citizen participation.

The testimony was often characterized by a tendency to cast the vote in moral rather than scientific or technical terms. In an extreme case, one individual said the Board would “have blood on their hands” if they voted for the proposed plan. There was a palpable subtext of indignation, if not anger, on the part of many speakers, reflecting an understandable unwillingness to wait 17 more years to achieve ozone compliance. No testimony was provided by third-party scientific experts in support of ISSRC’s alternative control strategies.

Lessons from the Ozone Plan

The ozone plan case study underscores just how difficult it is for the public to broadly and effectively participate in Valley air quality policymaking. Recognizing the limits of generalization in such a complex situation, several conclusions are worth noting.

First, the co-mingling of science and politics is a hallmark of environmental policymaking and Valley air quality is no exception. In particular, it illustrates the impossibility of an objective debate about the science of ozone control when environmental stakeholders do not trust the analyses of regulatory agencies, and vice versa. Lack of trust provided the logic for ISSRC to conduct a confidential alternative ozone control analysis. However, this limited ISSRC’s ability to receive technical assistance from CARB or the Air District in respect to emission inventories and ozone modeling. This contributed to several errors in ISSRC’s initial alternative plan, opening the door for what many felt was unfair or excessive criticism by Air District and CARB staff. The net result was a highly polarized policy debate over a set of extremely complex issues. This scientific disagreement led to further polarization and diminished respect among all parties. By the April 30, 2007 vote, each side was convinced that the other

side was on the wrong side of the truth. At the urging of Senator Florez, subsequent meetings between Air District and ISSRC staff helped resolve some but not all of the technical disagreements.

Second, advocates and the Air District missed an opportunity to engage policymakers and the public in a debate about funding options for incentive programs designed to accelerate progress to clean air. As noted, a major challenge facing advocates as well as the Air District is EPA’s requirement that incentive program funding sources must be established prior to inclusion in an attainment plan. The strength of ISSRC’s attainment plan was its demonstration that ozone compliance was technically possible before 2024. However, the question of incentive funding sources was not a formal component of their research.

Third, effective public testimony by Valley residents in the midst of such a complex policy debate is very difficult to achieve in practice. In the April 30, 2007 Board hearing, many speakers communicated their sincere concerns about the negative health impacts of air pollution, often based on personal experience. A noticeable fraction of this testimony was critical of actions taken by either the Air District staff or Board. With a public vote on the ozone plan following directly from the public testimony, judgmental or indignant testimony was unlikely to sway the opinions of Board members (assuming that this was the goal of those speaking). Again we emphasize the inherent barriers to effective public participation in a policy environment that is so technically and scientifically complex, particularly when the form of participation is public testimony. It is a double challenge to public interest advocates, who must master the subject matter themselves prior to sharing that knowledge with grassroots leaders.

Fourth, while advocates were not successful in persuading the Valley Air District Board and the California Air Resources Board to adopt an alternative Valley ozone plan, their diligence did spur

each agency to appoint a stakeholder task force with agency staff support. The Air District and CARB task forces share a common mission of developing emission reduction strategies that go beyond those included in the official ozone plan for submission to the EPA.⁵⁶ The District task force is a long-term effort spanning the non-attainment period and is required to provide periodic updates to the Air District Board. The task forces complement a parallel effort by the Air Quality Working Group of the California Partnership for the San Joaquin Valley.

Finally, examining the outcome in a historical context, ISSRC and CVAQ advocates undertook a strikingly ambitious challenge to the scientific authority of the regulatory agencies. In the process, they effectively harnessed earned TV and print media coverage as a means of defining the ozone plan as a Valley public health issue. The extent to which advocates influenced the terms of debate and the underlying science of the plan adopted by the Air District Board is remarkable. Such an undertaking would have been unimaginable several years earlier, signaling rapid growth in the coalition's capacity for public interest advocacy. From our perspective, this intensified contestation over how best to reduce excessive ozone concentrations is encouraging in spite of the attendant acrimony. In short, the imbalance between high public concern and low public engagement over this regional issue is shrinking, despite the continued constraints on democratic participation.

Air Quality Focus Groups: Unpacking the How and Why

Because of its severely limited carrying capacity in the face of rapid growth, the Valley faces considerable short- and long-term challenges to policy makers and the public alike. The ozone plan case study

demonstrates how difficult it will be to achieve ozone compliance, and similar obstacles face Valley-wide compliance for fine particulates (PM 2.5). While stronger air quality regulations on businesses is a central part of the solution, the depth of the problem dictates that Valley residents and their communities will be challenged to accept economic sacrifices and greater regulatory restrictions on their behavior.

As discussed above, a 2007 California environmental poll revealed that a majority of Central Valley residents felt that air quality was a serious problem that was getting worse.⁵⁷ Yet a comparable majority was largely unaware of the region's primary regulatory agency for air quality. This apparent gap between concern and knowledge in the face of such a striking regional challenge was a primary stimulus for six focus groups conducted by the Central Valley Health Policy Institute in 2007. The central objectives of these discussions were to (1) gain deeper, qualitative insights into participants' general perception of the Valley air pollution issue, (2) identify their policy preferences, and (3) gauge their relative willingness to get personally involved in air quality policy making. Following a brief overview of the sampling strategy and key topics of discussion, the key findings are summarized and analyzed in concert.

Selection of Participants

Being able to listen, record, and compare participants' explanations for their perceptions and behaviors is a primary benefit of focus groups. This type of explanatory knowledge is extremely difficult to gain from extensive phone surveys. On the other hand, with a sample size that is at least 10 times smaller than a regional phone survey, researchers need to properly contextualize their findings and avoid over-generalization.

While ethnically diverse, the sample was largely composed of Valley residents who were English speakers, U.S. citizens, high school or college

graduates, middle income, and regular voters.⁵⁸ The groups selected to be sampled were nurses, active Catholic parish members, parents, and business leaders—52 in all. They represented a wide range of occupations with ages typically ranging from 30 to 70 years. With several exceptions, they did not self-identify as environmentalists but all shared a concern about Valley air quality and a willingness to share their thoughts in a focus group.⁵⁹ Here is a brief description of the groups and how they were recruited:

1. Merced families: Moms' Clean Air Network, an air quality advocacy group based in Merced, assisted in recruiting 11 participants, primarily adult women but including one adult male and two teenage females.
2. Fresno mothers: Six mothers with school-age children were recruited with assistance from a mother who has expressed interest in air quality policy.
3. Modesto Catholics: Three men and seven women were recruited with assistance from the Diocese of Stockton. All were members of the same parish in Modesto.
4. Stockton Catholics: Three men and five women were recruited with assistance from the Diocese of Stockton. All were members of the same parish in Stockton.
5. California State University, Fresno nurses: Nine nurses (eight female, one male) were recruited from a Licensed Nurse Practitioner degree program at Fresno State.
6. Fresno Business Council members: Eight Valley business leaders (one female, seven male) were recruited with assistance from the council.

Preferred Issue Frames

As explored by George Lakoff, Susan Nall Bales, and other social scientists, issue frames are explanatory frameworks or mental models that individuals have internalized as a way of understanding social issues.⁶⁰ Individuals' views on public policies are, more often than not, influenced as much by values and related emotional subjectivity as they are by empirical reality. As a result, the public is often highly resistant to communication about public issues that are not grounded in their preferred frame, no matter how well based in fact. The frame research by Lakoff, et al. is intended to help policy advocates influence public opinion through communication strategies that move minds by building on pre-existing frames rather than contradicting them.

The first objective of the focus groups, therefore, was to investigate how participants' framed the Valley air quality issue. Five statements, listed below, were presented to each group at the beginning of the discussions, prior to any topical discussion among the group. The intent was to provide a broad continuum of theoretical perspectives that would correspond to a range of participant viewpoints. For descriptive purposes, each frame is labeled and footnoted in reference to major theoretical models that have emerged from environmental research and practice. Each participant had a worksheet which provided the text, which was also read to them. They were then asked to record their most and least preferred frames, and were allowed to revise their choices at the end of the focus group. There was no general discussion of the frames during the focus group. Note that the frames contain elements of both cause and solution.

1. Environmental Determinism: "Because we cannot change the way the mountains trap air pollution, the Valley will always have an air pollution problem. It is the cost of living and doing business here. Making the air perfectly clean would mean

the population would have to shrink along with the loss of many jobs, leading to even worse poverty and unemployment.”⁶¹

2. **Tragedy of the Commons:** “In the 1960s we had no problem seeing the mountains and nobody complained about bad air. Since then more and more people and businesses have moved in. Each of us ends up adding pollution to the air through our lifestyles and work. We think that our little bit won’t hurt but everybody else is doing the same. It all adds up to the problem we have today. It is hard to see the problem being solved if the Valley keeps growing as it has, unless everybody is willing to pitch in and make sacrifices.”⁶²
3. **Technological Optimism:** “Contrary to what many people think, the Valley’s air has been steadily improving over the past 15 years. This is due to the simple fact that the technologies that are causing the pollution are getting cleaner and cleaner as time goes on. Environmentalists and air quality agencies get a lot of credit for making this process happen faster than it otherwise would.”⁶³
4. **Political Economy:** “The Valley has always been a pro-business region and the environment has always taken a back seat to economic development. The air pollution problem we have is largely due to the unwillingness of public officials and government agencies to make the industry and individuals that are creating most of the pollution pay for cleaning up their act.”⁶⁴
5. **Market Failure:** “Unfortunately, when we buy something—a leaf blower, fill up our gas tank, or even a carton of milk—we are not paying the full price. What we’re not paying for are the public health costs of air pollution such as asthma and heart disease. So a big part of the solution lies in developing policies that make everyone pay the full cost. This will reward sellers who figure out ways to eliminate the air pollution impacts and sell for less.”⁶⁵

The distribution of participant’s most preferred issue frames is shown in Figure 7. Several generalizations emerge: First, two frames predominated, Tragedy of the Commons and Market Failure. One theme integral to each of these frames is the acknowledgement of collective responsibility for air pollution, both in terms of cause and solutions. This inclination to embrace collective responsibility for Valley air pollution surfaced in subsequent discussions of policy preferences as well. Noteworthy is the lack of support for the Political Economy frame because it most closely mirrors the viewpoint of public interest advocates. In contrast to the preferred frames, this frame casts the air pollution problem as political in nature and that collusion between industry and government is a primary cause for polluted air. And this blame bears a moral judgment: Lives are being lost because regulatory agencies will not stand up against private sector polluters. This interpretation surfaced during the ozone plan controversy, either directly or as subtext, via CVAQ’s public discourse and in citizen testimony to the Air District hearing on April 30,

Figure 7

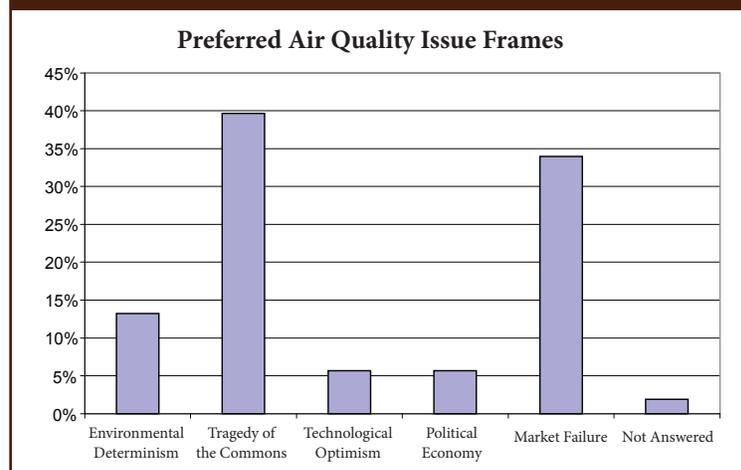


Figure 7. Most Preferred Air Quality Issue Frame among Focus Group Participants.

2007. Returning to the key finding of frame theorists, attempts to change minds begin by understanding the target audiences’ pre-existing issue frame and tailoring communication strategies to build on, rather than confront, the issue frame. Combining the core

elements of the two most preferred frames, participants saw the Valley air pollution problem as a collective expression of more people, more growth, and more vehicles acting in combination with an economic system that fails to make everyone pay the full cost of their air pollution. In particular, participants repeatedly cited driving as their primary contribution to Valley air pollution, and driving was the focus of their efforts to reduce pollution.

Lack of Knowledge about Air Quality Policymaking

One of the primary challenges in conducting the air quality focus groups was the general lack of knowledge about how air quality policy is made and by whom. As a result, a fair amount of time was devoted to providing participants with background information on the regulatory agencies, public health issues, and policy options before posing a policy-related topic of discussion. However, participants did have a big-picture understanding of the impact of the Valley's geography on concentrating pollutants and the tension between a growing Valley and air quality.

Policy Preferences

Participants were taken through three sets of discussions corresponding to three different policy models for reducing air pollution: (1) regulatory rules established, implemented, and enforced by regulatory agencies, (2) incentive programs that provide partial subsidies to accelerate the cleanup of pollution sources prior to regulatory requirements, and (3) voluntary actions to reduce pollution taken by residents, communities, organizations, and businesses. While space does not allow for a full discussion of results, key findings are listed below.

Regulatory vs. Voluntary Policy Models

In three of the focus groups, participants were directly asked if they felt that more air pollution regulations were needed. On average, 64% felt that some new regulations were needed, while 15% felt that current laws needed better enforcement. Old cars, trucks, leaf blowers, dairies, and SUVs were commonly cited examples of sources that needed new or additional controls. A countervailing theme that surfaced in several discussions was distrust in the ability of government agencies to apply the rules fairly. Virtually all agreed, however, that regulations were the primary means of protecting air quality. Regarding the regulation of households, in 2003 the Valley Air District put in place restrictions on household wood burning during days when the predicted Air Quality Index (AQI) exceeds 150 (unhealthy for everyone).⁶⁶ As discussed in five of the six focus groups, over 85% supported similar restrictions when the AQI exceeds 100 (unhealthy for sensitive groups). This was justified by the need to protect community residents with pre-existing pulmonary diseases.

The voluntary model discussion focused on the *Spare the Air* program used by the Valley Air District to encourage emission reductions on high ozone days in summer. Sixty-nine percent of participants stated that they were aware of the program. Among these, over half said that they tried to make some effort to cut back their pollution on *Spare the Air* days primarily by minimizing driving. These actions were viewed as a means of taking personal responsibility more than as a means of making significant cutbacks in pollution. The free rider problem, i.e., the unwillingness of many residents to voluntarily make sacrifices, was repeatedly cited as a core limitation of the voluntary policy model and why regulations were indispensable.

Incentive Program Preferences

The Valley faces the substantial financial burden of incentive programs designed to accelerate the cleanup of mobile pollution sources. It does this by providing cost-share funds to businesses that voluntarily purchase cleaner technology prior to facing a regulatory requirement. Given the importance of incentive funds and the high price tag, gaining insights into participants' incentive funding preferences was a key objective.

Each group was presented an overview of the situation: State and federal mobile source regulations will reduce ozone at a very slow rate, especially in light of the steady rise in vehicle miles traveled. To avoid waiting until 2024 or beyond, the Valley must find sources of funding to subsidize (1) the purchase of new vehicles to retire older, more-polluting vehicles (scrap option), (2) installing pollution control devices (retrofit option), or (3) purchasing new, cleaner engines (re-power option). The amount of incentive funding needed to make an appreciable acceleration of ozone reduction is considerable, ranging from \$100 million to \$275 million per year over 10 years. A primary target is heavy duty diesel trucks, given that they contribute about 38% of the total NOx load in the Valley.⁶⁷

Participants were presented with the following options and asked to rank order their preferences.

1. Use tax revenues from the general fund of the state of California and from the eight counties of the San Joaquin Valley.
2. Place pollution fees or larger registration fees on the sources of the pollution, like diesel trucks and high polluting cars, then use those funds to help the owners buy cleaner vehicles or other clean technologies.

3. Raise the money through a one-half cent increase in the sales tax or a two cent gas tax in the eight counties of the San Joaquin Valley.
4. Use a ballot proposition for a major bond authorization for Valley air pollution cleanup.

A summary of their most preferred option is presented in Figure 8. The most striking result is the absence of support for using public bonds, coupled with clear support for use of polluter fees to subsidize the purchase of cleaner vehicles. Ironically, one of the first major sources of incentive funding for the Valley will be from a \$1 billion air pollution mitigation fund generated by state Proposition 1B. The imposition of new polluter fees was also supported as a general public policy principle—82% agreed with the following statement: “As a public policy principle, businesses and households should be asked to assume most of the burden for cleaning up their pollution.” While discussing this statement, a similar majority of participants made it clear that they saw themselves as polluters, with a corresponding emphasis on taking personal responsibility. High support for the polluter pays policy principle is consistent with participants' high preference expressed for the Market Failure and Tragedy of the Commons issue frames (see Figure 7 on page 20).

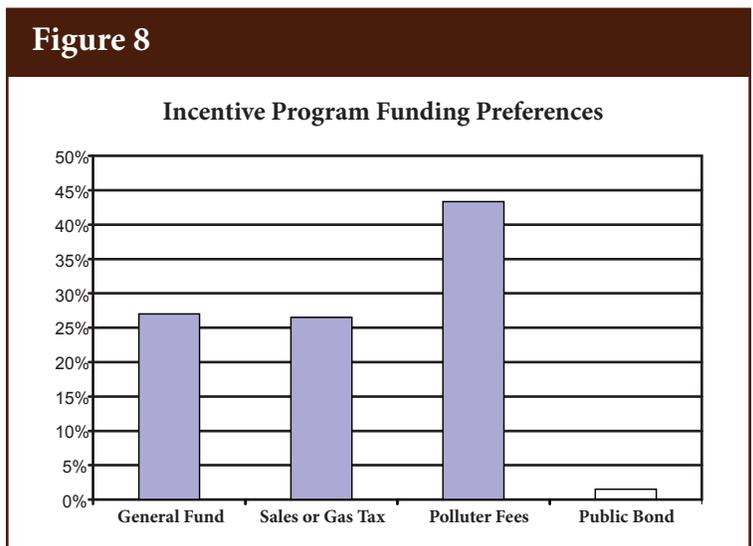


Figure 8. Preferred Funding Sources for Mobile Source Incentive Programs.

Further discussion generated additional insights into how participants felt this principle should be applied in practice. In each focus group, at least one polluter fee policy scenario was discussed for either diesel trucks or dairies. In the case of trucks, participants voiced general support for placing fees on the transport of goods, to be paid by trucking firms or those who received shipment of the goods.⁶⁸ These fees would then be channeled back into incentive programs in order to subsidize the early cleanup of the diesel truck fleet. Concern was expressed about protecting the viability of Valley trucking firms and the importance of similar regulations being applied to out-of-state and Mexican trucks. In the case of dairies, a clear majority of participants voiced support for a modest fee placed on sales of dairy products if these fees helped accelerate the reduction in air pollution from dairies and if the dairy industry also contributed.

Getting Involved in Air Quality Policymaking

Each group was presented with a set of behavioral questions regarding their willingness to take personal action in the policy arena. Options included (1) joining an air quality listserv, (2) speaking about air quality to fellow members of an organization, (3) calling or emailing policymakers, and (4) attending a Valley Air District meeting. As seen in Figure 9, a substantial fraction was willing to get involved in one way or another—an encouraging result.

Translating hypothetical support into concrete action is the challenge. As discussed in the ozone plan case study, a primary challenge is learning enough about air quality policy to participate effectively. The second challenge is the pace of learning. For example, the high volume of technical information exchanged on the CVAQ listserv might intimidate Valley residents who do not have an environmental background. Yet the capacity to make compelling statements about policy, either through public

speaking, phone calls, or emails, depends on a relatively high threshold of knowledge about air quality topic X, Y, or Z. Here again, the overall lack of public knowledge about clean air laws, institutions, and key policy issues acts as a barrier to citizen participation.

Figure 9

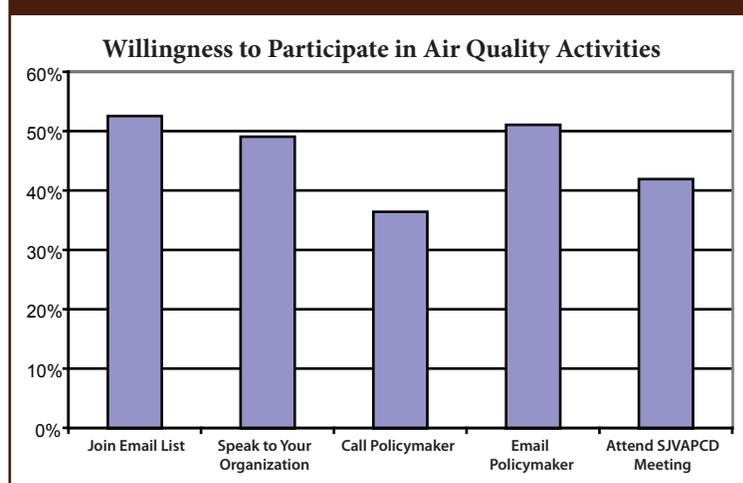


Figure 8. Willingness to Take Actions Related to Air Quality Policy.

The Strong Desire for Representation

One way of compensating for the substantial barriers to direct citizen involvement is for their membership organizations to represent their interests in air quality policymaking. In fact, participants consistently and strongly expressed a desire to be represented in the policy arena. Each group was asked whether organizations representing their identity group—parents, business leaders, Catholic parish members, etc.—should have a voice in air quality policymaking. Conversely, they were asked if this issue was too technical in nature and should be left to environmental organizations, business groups, and regulatory agencies. The vast majority spoke to the importance of having one of “their” organizations involved, ideally in some form of cooperative relationship with technical experts. Several representative quotes:

Catholic in Stockton:

“The Church gets at the intersection of the physical

environment and taking care of people because of our belief in the sanctity of life, and the two are so interwoven. It takes the either/or argument, and it's no longer either/or, it brings it to the point of intersection.”

Mother in Fresno:

“If you got a group of moms together and went down to city hall and challenged them on leaf blowers, it could make a difference; knowledge is power. I think that something like that organizational model (Moms Clean Air Network) could fly in this area. My kids are grown, this is something that I could get into.”

Business leader in Fresno:

“Nobody can sit this out, citizens and businesses. Just because I am not in the crosshairs like a dairy, doesn't mean I am not impacted. The flipside is I am impacted by the extreme (ozone) designation. The more people understand the complexity of the issue, and the possible lists of solutions, the better. Solutions will come from political pressure on those who would just as soon dodge the issue.”

Fresno State nursing student:

“Yes, I think we should have a voice. For so many years we, nurses, have been overlooked, and we are at the front line. There should be someone like us lobbying.”

Summary Comments

Overall, the focus group participants demonstrated that once provided with some background information, they possessed an encouraging capacity to make thoughtful judgments about complex air quality policy issues. If there was an overarching message, it was their inclination to view the problem as a collective expression of multiple emission sources in a rapidly growing valley where air pollutants are often concentrated. Paired with this was a corollary disinclination to blame the problem on any particular emission source or to apportion responsibility to one government agency or another.

Perhaps reflecting the longstanding poverty of the region and its conservative political culture, a number of participants expressed the need to minimize the negative impacts of tighter emission controls on employment levels. Nonetheless, a clear majority felt more regulatory controls were needed. Fiscal conservatism was also apparent, characterized by a rejection of bonds as an incentive funding source in favor of pay-as-you-go pollution fees designed to help pollution sources clean up their act. Their willingness to see themselves and their lifestyles as part of the problem should be a source of encouragement to the Valley Air District, other regulatory agencies, and legislators who face an ongoing struggle to find new means of reducing emissions. And finally, their hypothetical commitment to personal involvement in air quality policy making and their desire for organizational representation offers new opportunities for the environmental community and philanthropy.

Overall Conclusions and Recommendations

Meeting air quality standards is an enormously expensive, long-term challenge for the San Joaquin Valley. If there is an overall conclusion of this report, it is the limited effectiveness of the policymaking status quo-business as usual will not cut it. In the face of this daunting task, a handful of private foundations should be commended for their willingness to invest in air quality advocacy. The emergence of a highly organized, committed, and energized CVAQ Coalition in recent years has interjected an overdue public interest voice into Valley air quality policymaking. Expanding the public's engagement with this critical issue beyond the current cohort of advocates will have a major bearing on the Valley's ability to achieve air quality standards in the next two decades.

Final conclusions and recommendations include:

1. **The federal government must accept responsibility for “unequal protection of the air”:** Reflecting its limited carrying capacity, the San Joaquin Valley is now bearing a combined burden of concentrated air pollution, high public health costs, expensive incentive program requirements, and significant regulatory costs to its business community. At the same time, it provides the nation with a critical supply of the healthy food that is so critical to national public health, as well as being a major national transportation corridor. Much of the responsibility for the region’s air pollution albatross lies with the federal government. Congress and the EPA under various administrations have failed to sufficiently stimulate technological change in mobile sources of pollution. In turn, this has limited the mobile source control options available to CARB. The Valley is now paying the price. As a result, there is every justification for generous federal support for financial assistance and tighter national emission standards for mobile sources.
2. **Our clean air bank account is overdrawn - it’s time to take collective responsibility:** The Valley air basin is currently oversubscribed by a growing number of pollution sources. In order to meet clean air standards quickly in the face of sustained economic growth, industry, developers, dairy producers, local governments, households and others all need to acknowledge an inescapable responsibility to reduce their current rate of air pollution. As each pollution category continues to expand—houses, trucks, dairies, etc.—each individual source within these categories needs to scale back on activity or adopt cleaner technologies. In other words, all sectors should be expected to reduce their overall emissions footprint as they continue to grow.
3. **Acknowledge market failure:** The health costs of

air pollution in the region are a painful reminder of market failure. While public funding for incentive programs is a critical part of the solution, the primary responsibility for reducing the air pollution footprint falls in the laps of the pollution sources and others, such as consumers, who benefit indirectly. New fees on market transactions and licensing are logical sources of funds to subsidize the development and adoption of cleaner technologies. In many cases, these increased costs should be shared by consumers. Licensing fees should better reflect the amount of pollution released by vehicles in order to create a market incentive towards replacement, in combination with subsidies for low-income residents and Valley businesses to purchase cleaner vehicles.

4. **The barriers to direct public participation in the policy making process will be very difficult to overcome:** As witnessed in the ozone plan case study, the regulatory complexity and technical nature of air quality policymaking works against public understanding and effective participation. The absence of direct elections to state and regional Air District governing boards further diminishes the incentive and means for voters to learn about policy issues. Conducting important policy meetings during regular business hours is a major barrier to broader public participation. More intensive efforts to publicize these meetings are also needed. Rule-by-rule regulatory battles further complicate the ability of the media to educate the public.
5. **Advocates need to critically examine how they frame air quality policy issues:** In the past 12 months, CVAQ has been very successful in gaining the attention and support of Valley and statewide media. Nonetheless, results of the focus group research indicate that CVAQ’s framing of the region’s air quality issue has been somewhat uni-dimensional, emphasizing the rightful need for private sector sacrifice but saying much less

about the need for further regulations or polluter fees that require Valley residents in general to step up. The focus group participants clearly viewed their lifestyles as part of the region's air pollution problem. If advocacy organizations are unwilling to push for broader sacrifice from the public, who will? Future efforts to mobilize the public should consider an overall advocacy frame that emphasizes the importance of everyone—business, government, and the public—pitching in and taking responsibility for their contribution to the problem. This need not detract, however, from advocates continued push for tougher regulations.

6. There is an opportunity for a fresh start by the Valley Air District: The legislative battle over the board reform (SB 719) and the controversy over the 8-hour ozone plan placed the Valley Air District in the crosshairs of advocates and Valley media in 2007. In the process, 2007 witnessed the emergence of a mature advocacy community in the Valley, coupled with the infusion of board members with new perspectives and constituencies in 2008. Together these expressions of growing public demand for clean air have arguably laid the foundation for a more aggressive regulatory agenda by the agency. In particular, the agency's development of a regional control plan for PM 2.5 in 2008 will be a chance to build on successful regional control strategies. It is encouraging that the District and Valley advocates have begun to push CARB hard for the strong mobile source controls that are critical to PM 2.5 attainment in the target year of 2015. In respect to engaging the public, the Air District's *Healthy Air Living* program is a creative next step.

7. Funding of advocacy is only part of the long-term solution: Advocacy battles like the 8-hour ozone plan generate ample media coverage but they do not necessarily translate into durable public understanding. After 16 years of existence, 67% of Valley residents have little or no knowledge of the Valley Air District and its work. Private

foundations and public institutions committed to a socially just, sustainable future for California need to consider more strategic investments in educating the public—youth and adults—about the deeply rooted, technologically complex, politically painful, and expensive air quality challenge facing the San Joaquin Valley. New funders need to join the commendable efforts of those foundations that are funding CVAQ, thus avoiding a diversion of funding streams from advocacy to education.

8. Expanding representation can go hand in hand with expanded education: If there was one thing that focus group participants made clear, it was their desire to be represented at the air quality policy table by one of “their” organizations. Valley mainline organizations—professional, labor, business, community, faith-based, etc.—are notably absent in air quality policymaking, with the exceptions noted above. Leaders of Valley membership organizations must be willing to devote organizational time and resources to air quality, but must also hear voices of support from their members. A Valley-wide conference specifically designed to convene membership organizations around air quality representation would be a logical means of assessing opportunities and constraints.

9. The public K-12 educational system is ground zero for long-term public education strategies: One of the defining characteristics of environmental degradation is the transfer of external costs from the present to the future. If the youth of the Valley are facing disproportionate risks from air quality, water security, and climate change, generational justice demands that they be given the necessary knowledge to confront those challenges. Fortunately, efforts are currently underway to strengthen the environmental element within California's K-12 curriculum.⁶⁹ A strong case for a Valley-tailored environmental curriculum can also be made. As California's mainstream print and broadcast media expand

their Internet presence, there is an opportunity to create synergy with environmental education within the public schools.

- 10. Air quality is part of a larger sustainability challenge facing the Valley, California, and the nation:** As the forces of climate change and dependence on fossil fuel energy from abroad cast an inexorable shadow on the future of the Valley and the state, we have arrived at a “teachable moment” for reframing the region’s air pollution problem. Whether triggered by regulations, incentives, or individual choice, actions that reduce air pollution typically confer benefits to climatic stability and national security. While not discussed above, the 2007 PPIC environmental poll found 81% of Californians felt that the threat of climate change merited immediate actions while 84% supported government funding on renewable energy. Addressing both of these issues is regarded by many as having considerable job creation benefits.⁷⁰ Both public education and policy advocacy efforts would benefit from re-framing Valley air quality within this larger sustainability and security framework.

Footnotes

- ¹ The San Joaquin Valley lies within the jurisdiction of eight counties: Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare.
- ² (2007) Baldassare, M., et al. Californians and the Environment. Public Policy Institute of California. San Francisco, July.
- ³ For environmental (aka nature-society) geography see: (1995) Turner II, B. L. *Spirals, Bridges, and Tunnels: Engaging Human-Environment Perspectives in Geography?* Ecumene 4 (2): 196-217.
- ⁴ For political science see: (2007) Rosenbaum, Walter A. Environmental Politics and Policy. CQ Press, Washington, D.C.
- ⁵ For economics see: (1958) Bator, Francis M. *The Anatomy of Market Failure*. The Quarterly Journal of Economics 72 (3): 351-379.
- ⁶ See The Death of Environmentalism: Global Warming Politics in a Post-Environmental World. Available at <http://www.thebreakthrough.org/>.
- ⁷ The San Joaquin Valley, and in particular, Fresno County, leads the rest of the state and the nation in food production. The San Joaquin Valley includes four of the top five agricultural counties in the United States (see <http://www.ers.usda.gov/StateFacts/US.htm>).
- ⁸ (2002) Umbach, K. San Joaquin Valley: Selected Statistics on Population, Economy, and Environment. California Research Bureau, Sacramento.
- ⁹ (2007) Baldassare, M., et al. Californians and the Environment. Public Policy Institute of California. San Francisco, July.
- ¹⁰ Empirical evidence suggests that modest but measurable improvements in air quality have been achieved over this time period. The key point here is the public's perception that air quality has declined.
- ¹¹ <http://en.wikipedia.org/wiki/Asthma#History>: "Asthma is defined as a chronic illness involving the respiratory system in which the airway occasionally constricts, becomes inflamed, and is lined with excessive amounts of mucus, often in response to one or more triggers. These episodes may be triggered by such things as exposure to an environmental stimulant (or allergen), cold air, warm air, moist air, exercise or exertion, or emotional stress. In children, the most common triggers are viral illnesses such as those that cause the common cold."
- ¹² (2005) Hall, Jane V. et al. The Health and Related Economic Benefits of Attaining Healthful Air in the San Joaquin Valley. Institute for Economic and Environmental Studies. California State University, Fullerton. The authors' annual economic cost estimate of \$3,238,640,000 is based on the additional expenses or losses from disease (morbidity) and premature death (mortality) that can be attributed to excess exposure (above the federal standard) to ozone and PM 2.5. Annual ozone morbidity costs were estimated at \$32,640,000 and the PM 2.5 morbidity estimate was \$124,000,000. Excess exposure to PM 2.5 is attributed to 460 premature deaths annually of adults over 30, valued at \$6.7 million per death and totaling \$3,082,000,000 (pp. 72-73). See <http://business.fullerton.edu/centers/iees/instituteReports.htm>.
- ¹³ This conclusion is based on a multi-state review conducted by the authors.
- ¹⁴ Note that CARB refers to both the agency overall and its appointed executive board.
- ¹⁵ (1959) Goldsmith, John I. and Bruslow, Lester. *Epidemiological Aspects of Air Pollution*, Journal of Air Pollution Control Association 9: 129-132. Epidemiological evidence would show an extra 1,200 deaths in Los Angeles over a ten-day period in August of 1955.
- ¹⁶ See http://lungaction.org/reports/sota04_heffects3.html for further details on ozone's impact on health.
- ¹⁷ See <http://www.epa.gov/air/criteria.html> for more details on criteria pollutants. The Clean Air Scientific Advisory Committee of the EPA has recently recommended that the ozone standard be lowered to approximately 0.07 ppm.
- ¹⁸ See <http://www.epa.gov/air/criteria.html> for more details on ozone and other air pollutant standards.

Footnotes

¹⁹ (2007) San Joaquin Valley Unified Air Pollution Control District. 2007 Ozone Control Plan (Executive Summary, p. ES-2). Fresno. See http://www.valleyair.org/Air_Quality_Plans/Ozone_Plans.htm.

²⁰ The carrying capacity analysis is based on regional inventories of ROG and NOx compiled by the California Air Resources Board (see <http://www.arb.ca.gov/html/aqe&m.htm>).

²¹ (1990) California Air Resources Board. Guidance for Estimating Emissions Reductions Needed to Attain State Standards for Determining Area Classifications in Response to the California Clean Air Act. CARB Office of Strategic Planning, Sacramento, CA. Gaseous emissions from plants is the primary source of natural ozone.

²² (2005) Hall, Jane V. et al. The Health and Related Economic Benefits of Attaining Healthful Air in the San Joaquin Valley. Institute for Economic and Environmental Studies. California State University, Fullerton.

²³ Source: US Census, American Community Survey.

²⁴ (2005) Chang, A., et al. Managing Dairy Waste in the Central Valley of California (revised). University of California, Division of Agricultural and Natural Resources, Committee of Experts on Dairy Waste Management. Davis.

²⁵ According to the Valley Air District, approximately 26% of the ozone precursor inventory in the northern part of the San Joaquin Valley originates from the Bay air basin.

²⁶ An example of such an incentive program is the Carl Moyer program administered by CARB on a statewide level for on-road, off-road, and stationary diesel engines (see <http://www.arb.ca.gov/html/programs.htm>). Cost-share funds typically provide 50% of the needed investment to participants in the program.

²⁷ The SIP submitted by the Valley Air District represents a set of regional control measures for stationary and area sources such as agriculture which will be folded in to the statewide SIP submitted by CARB to the US EPA.

²⁸ (2007) California Air Resources Board. ARB Staff Report to the Air Resource Board: Accelerating San Joaquin Valley Air Quality Progress. Sacramento, CA. November 6.”

²⁹ Short sea shipping in California would be based on shifting a significant fraction of goods movement from trucks on I-5 and SH-99 to ocean vessels, resulting in a comparable reduction in Valley NOx emissions and ozone concentrations. See <http://www.marad.dot.gov/Programs/shortseashipping.html>.

³⁰ (2006) Lubell, M., et al. *Collective Action, Environmental Activism, and Air Quality Policy*. Political Research Quarterly 59 (1): 149-160.

³¹ Criteria pollutants have enforceable health standards under the Federal Clean Air Act. Others include carbon monoxide, lead, nitrogen dioxide, PM 10, and sulfur dioxide. See <http://www.valleyair.org/aqinfo/attainment.htm> for more details.

³² Stationary sources have a clearly defined exit point for emissions, such as a smokestack. Mobile sources have similar exit points, such as tailpipes. In contrast, area sources release emissions across highly variable surfaces, such as a dairy feedlot or asphalt highway, and are typically more difficult to control. Numerous and small sources of emissions such as household water heaters also fall into the area source category.

³³ (2007) Baldassare, M., et al. Californians and the Environment. Public Policy Institute of California. San Francisco, July. This result is based on responses from the Sacramento metro area and Sacramento Valley counties, as well as the counties of the San Joaquin Valley.

³⁴ Yes, they should be concerned. An EPA health advisory panel has recently recommended that the Federal 8-hour ozone standard be lowered again, e.g. to 0.07 ppm instead of 0.08. If this standard is adopted by the current administration or the next, the rapidly growing San Joaquin Valley may be particularly hard pressed to meet this new standard until fuel cells replace internal combustion engines in significant numbers.

³⁵ See <http://www.arb.ca.gov/planning/tsaq/mvrfp/criteria/criteria.htm> for more details.

³⁶ (2002) The Fresno Bee. *Last Gasp: A Fresno Bee Special Report on Valley Air Quality*. December 15. See <http://www.valleyairquality.com/>. A follow-up to *Last Gasp*, *Fighting for Air* was released by the Fresno Bee on December 16, 2007 (see <http://www.fresnobee.com/static/2007/flash/airproject/>).

Footnotes

- ³⁷ (2007) Baldassare, M., et al. Californians and the Environment. Public Policy Institute of California. San Francisco, July.
- ³⁸ (2005) True North Research. Public Opinion Survey and Market Research Project. Encinitas, CA. See http://www.valleyair.org/General_info/pubdocs/pubdocs.htm.
- ³⁹ This was based on responses from 356 residents of Fresno, Kern, Kings, and Tulare counties. On the day of the survey, Spare the Air was not in effect in the other four counties of the Valley.
- ⁴⁰ L. Bolanos, CVAQ Coordinator. Personal communication, October 17, 2007. See <http://www.arb.ca.gov/aqd/aqdpag.htm> for long-term Valley air quality data.
- ⁴¹ Several CVAQ organizations and CVAQ staff coordinators receive (or have received) funding from the Kirsch Foundation, The California Endowment, and the Hewlett Foundation.
- ⁴² For more details on CVAQ, see <http://www.calcleanair.org>.
- ⁴³ Co-author David Lighthall, while Research Director at the Relational Culture Institute, was funded by the Hewlett Foundation from November 2004 to November 2006 to provide technical assistance to CVAQ organizations and Valley faith-based organizations. Dr. Lighthall was also an active participant in the CVAQ SIP work group in 2006 and early 2007. He is also lead researcher on a CVHPI research project funded by the Valley Air District that is examining the health benefits of the District's episodic ban on wood burning.
- ⁴⁴ Urban Valley Air District members are nominated by city councils to fill positions representing large (three seats), medium (one seat), and small cities (one seat). The final selection of each seat is made by sub-regional assemblies of the League of California Cities. Each of the eight county supervisors who serve on the Board is nominated by their peers. Under SB 719, a Valley physician and scientist with air quality backgrounds will be nominated by the governor and confirmed by the Senate.
- ⁴⁵ Pete Weber, a retired executive from Fresno, chairs the AQWG, with the Kenneth L. Maddy Institute at CSU Fresno providing staff support.
- ⁴⁶ Somewhat confusingly, the regional plans are typically referred to as state implementation plans (SIPs).
- ⁴⁷ ISSRC is an air quality research institute directed by Dr. James Lents, a well-respected former Air Pollution Control Officer (Director) for the South Coast Air Quality Management District. See <http://www.issrc.org/>.
- ⁴⁸ (2007) Davis, N. Clearing the Air: How Clean Air is Possible and Affordable by 2013. International Sustainable Systems Research Center, Diamond Bar, CA.
- ⁴⁹ California's on-road (truck) diesel emissions inventory was determined by CARB to be underestimated by approximately 100 tons per day, which changed the Valley NOx inventory.
- ⁵⁰ The two Board members who voted against accepting the ozone plan had recently been appointed to the Board with CVAQ support by the League of California Cities.
- ⁵¹ (2007) San Joaquin Valley Unified Air Pollution Control District. 2007 Ozone Control Plan (Executive Summary, p. ES-7). Fresno.
- ⁵² Adoption of Extreme Non-Compliance status also allows for the use of the so-called Black Box, defined as a specified level of emissions reductions (tons per day of NOx in this case) that is anticipated to come as result of future, currently unknown technological advances. The SJV 2007 Ozone Control Plan calls for 56 tpd of Black Box controls (p. ES-14). See http://www.valleyair.org/Air_Quality_Plans/Ozone_Plans.htm.
- ⁵³ As a member of the Partnership AQWG, co-author David Lighthall made a similar argument in a meeting with the editorial board of the Fresno Bee on April 27, 2007.
- ⁵⁴ Mr. Houk's phone number was listed in the ad and he personally fielded calls in response to the ad.
- ⁵⁵ Personal communication, August 7, 2007.
- ⁵⁶ The CARB task force concluded its work in December, 2007 (see <http://www.arb.ca.gov/planning/sip/sip.htm> for its final report). Co-author David Lighthall was appointed to both task forces.

Footnotes

⁵⁷ (2007) Baldassare, M., et al. Californians and the Environment. Public Policy Institute of California. San Francisco, July.

⁵⁸ This statement represents the author's best judgment. Other than occupation and residence, demographic information was not collected. Procedures and questions used in the study were reviewed and approved by the Human Subjects Review Committee, College of Health and Human Services, CSU Fresno. The questions (protocol) used in the focus group are available from the authors upon request.

⁵⁹ Participants in three of the focus groups received a \$25 gift certificate to a major retailer as a reward for participation.

⁶⁰ See (2004) Lakoff, G. Don't Think of an Elephant: Know Your Values and Frame the Debate. Chelsea Green Publishing Company, White River Junction, VT. For Bales, see <http://www.frameworksinstitute.org>.

⁶¹ The roots of this model can be traced to the late 19th century work of geographer Ellen Churchill Semple. In essence, societies are shaped by and must adapt to their natural environment.

⁶² This frame is associated with the work of Stanford biologist Garrett Hardin and his more famous student, Paul Ehrlich, and is traceable to the 18th century writings of Thomas Malthus. This neo-Malthusian frame focuses on population growth as the root cause of environmental degradation.

⁶³ Economist Julian Simon popularized this perspective as a counter to Paul Ehrlich and the neo-Malthusianism of the 1960s. It is grounded in the discipline of neo-classical economics.

⁶⁴ This frame is arguably traceable to Karl Marx's seminal analysis of the relationship between capital (business) and the state (government). One could also view this frame in neo-populist terms, with the emphasis on the distortion of the democratic process by business interests. In the US context, it has surfaced in recent decades as a frame adopted by the environmental justice movement in struggles such as Love Canal, New York.

⁶⁵ This frame also has its roots in neo-classical economics via concepts of internal costs (what we pay for in the market) and external costs not included in market exchanges. As such it views the problem and solution as both grounded in getting markets to fully account for environmental (external) costs such as air pollution.

⁶⁶ The rule does not apply to areas without natural gas service and at elevations above 3,000 ft.

⁶⁷ (2007) San Joaquin Valley Unified Air Pollution Control District. 2007 Ozone Control Plan (Executive Summary, p. ES-9). Fresno. See http://www.valleyair.org/Air_Quality_Plans/Ozone_Plans.htm#8-Hour%20Ozone.

⁶⁸ A similar policy model has been adopted in a heretofore unsuccessful bill in the California legislature (SB 760, Lowenthal) that would place a \$30 fee on shipping containers moving through California ports.

⁶⁹ For more information see: <http://www.creec.org/>.

⁷⁰ See (2007) E. Robinson. Schwarzenegger Foe-Wasting Image Gives Way to Green Governor. <http://www.bloomberg.com/apps/news?pid=20601070&sid=alSqOcgjwFo&refer=home>.



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