



Proceedings of Border Institute VII: Binational Air Quality Management

Executive Summary

The Southwest Consortium for Environmental Research and Policy (SCERP) held its seventh annual Border Institute conference in Rio Rico, Arizona in April 2005. The topic of Border Institute VII was air quality management in the U.S.-Mexican border region. The conference brought together members of the government, academia, and the private sector. Leaders of the Border 2012 Environmental Program, a binational collaborative effort of the U.S. Environmental Protection Agency (EPA), U.S. Department of Health and Human Services (HHS), the Mexican Secretaría de Medio Ambiente y Recursos Naturales (SEMARNAT), and the Mexican Secretaría de Salud (Salud), helped guide and coordinate the conference in order to provide U.S.-Mexican border program partners and participants with advice and recommendations.

With the assistance of papers that had been drafted and distributed prior to the conference, participants identified several primary air quality issues in the region, discussed challenges that exist with respect to addressing those issues, and then made recommendations.

Recommendations related to transportation and vehicles included the following:

- Identify and remove from the road the relatively small percentage of passenger vehicles that generate the bulk of automotive emissions, the “high emitters”;
- Expand existing U.S. diesel retrofit programs to Mexico;
- Motivate American *and* Mexican refineries to produce ultra-low sulfur fuels;
- Electrify truck stops in order to significantly reduce idling;
- Implement a school bus retrofit program for children at risk;
- Speed up the handling of commercial and other traffic through ports of entry;
- Continue and expand vehicle inspection and maintenance programs;
- Prevent the import of vehicles into Mexico without smog inspection;
- Plan and provide multiple-modality, mass mobility across the border;
- Conduct pre- and post-road paving air quality and health surveys; and
- Upgrade the short-haul, heavy-duty cross-border drayage (back and forth) fleet.

Recommendations related to electricity production included the following:

- Bundle energy efficiency and renewable energy projects for funding;
- Use U.S. funds to develop renewable energy sources in Mexico for export to U.S.;

- Create a binational clean air and energy infrastructure trust fund; and
- Enable cross-border trading of pollutants, emission reductions, and mitigation funds.

Other recommendations included the following:

- Develop a permit and notification system for agricultural waste-burning events;
- Standardize the air quality index and other data across the border;
- Establish a border-wide air quality database;
- Set fine particulate matter standards in Mexico;
- Expand the Border 2012 Program to include an Energy Task Force;
- Move toward official designation of common airsheds;
- Institutionalize a formal binational air study group;
- Notify and consult across the borders on significant new emission sources;
- Develop and share an annual air quality progress report; and
- Move toward a binational air quality agreement.

Introduction

A recent National Academy of Science/National Research Council study of air quality management (AQM) cited significant progress in decreasing air pollution on nearly all fronts—except on transboundary and inter-jurisdictional matters. The challenge of managing air quality in border zones remains largely unmet. In April 2005, the Southwest Consortium for Environmental Research and Policy (SCERP), a collaboration of U.S. and Mexican universities that focuses on improving environmental conditions in the U.S.-Mexican border region, held its annual Border Institute policy conference to discuss transboundary AQM.

The 1983 Agreement between the United States of America and the United Mexican States on Cooperation for the Protection and Improvement of the Environment in the Border Area (known as the La Paz Agreement) initiated a process that has become a global model for addressing complex international environmental, ecological, and human health issues. Under that agreement, the U.S. and Mexican federal governments have negotiated successive binational environmental programs. The third and current such program, Border 2012, is a 10-year program that began in 2002. The Program has goals and objectives related to air quality, water quality, land contamination, compliance, enforcement, and pollution prevention, environmental health, and emergency response. With regard to air quality, it aims to “reduce air emissions and harmful exposure as much as possible in order to attain all respective national ambient air quality standards”.

SCERP organized Border Institute VII in cooperation with the Border 2012 Program and that Program’s border-wide Air Policy Forum, with the objective of tapping expertise and ideas from a broad range of sources in order to provide advice to Border 2012 participants at all levels. Held in Rio Rico, Arizona in April 2005, Border Institute VII participants analyzed the most cost-effective and long-term transboundary AQM strategies for all or parts of the border region. Border Institute VII not only addressed the

challenges of today but discussed difficulties expected to emerge over the next generation. The recommendations of the workshop, included herein, provide a roadmap to cleaner, healthier air in the border region for the next 25 years.

Nobel Laureate Dr. Mario Molina, who was asked by the Mexican government in 1999 to lead a team that addressed air quality problems in Mexico City, provided the keynote address at the conference. He emphasized the importance of understanding how public policy is designed and implemented, and explained the decision to focus Mexico City's air quality work on the need to remove the heaviest-polluting vehicles, establish high standards for air quality, improve mass transit, and introduce ultra-low-sulfur fuels. He was optimistic that Mexico would be able to use the global carbon credit system that had been stimulated by the Kyoto Protocol in order to fund AQM initiatives in Mexico.

This document outlines the complex factors of air quality in the border region, provides guidelines for action, and presents scenarios and strategies that may be used to overcome air pollution challenges.

The Problem

This section presents and connects issues of limited resources, demographic and economic growth, agriculture and climate, health consequences, and related factors in the region.

AIR QUALITY: A GROWING PROBLEM AT THE U.S-MEXICAN BORDER

The principal challenges in confronting air quality problems are to identify the specific pollutants that are posing the greatest health risks, their consequences (mortality, morbidity, and productivity costs), their sources (electricity generation, industrial production, motor vehicles, agriculture, or other activities), as well as workable mitigation strategies.

In the border region, air pollution is affected by, among other factors, dramatic population growth, economic activities (including agriculture in some parts of the region), and relative poverty. The population in the border region is expected to double in the next 25 to 30 years twice as fast as the Mexican national average and three times faster than in the U.S. (Figure 1). Economic growth is itself a source of pollution, and at the same time has attracted workers and their families who in engage in, or require, numerous other activities potentially generating pollution.

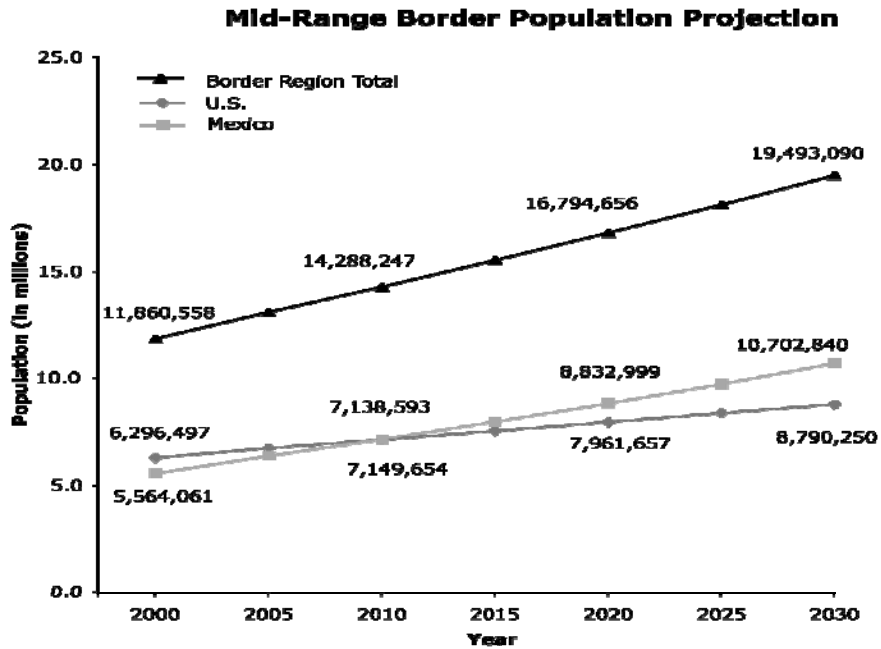


Figure 1. Growth in the border region is faster in cities and on the Mexican side.

Limited resources affect the technologies that are chosen by individuals (low-cost, old, and polluting cars) and to the governments. Many people drive low-cost, older, and therefore more polluting cars for example and governments may only be able to operate outdated automotive inspection and maintenance procedures. Moreover, a lack of resources can also prohibit any response to air quality problems by individuals (with civil lawsuits or better health care) and governments (with energy conservation programs or expanded mass transit). In the U.S. portion of the border region, wages, employment, and tax revenues all tend to be lower than in the rest of the United States and although wages tend to be higher than the Mexican national average on that side of the border, they are still lower than on the U.S. side.

The increased economic activities have not generated tax revenues commensurate with the needs that must be addressed. Rather, economic growth has produced increased traffic, congestion at ports of entry, and “energy maquiladoras,” or power plants in Mexico that import natural gas from the U.S. and export electricity back, skirting U.S. enforcement of ambient pollution standards. Along the same lines, a number of liquid natural gas (LNG) sites have been proposed, permitted, or are already under construction, with the purpose of providing fuel to the burgeoning border zone and the rest of the U.S.

In addition to limited resources and increased economic activity, climate and agricultural factors also diminish air quality in the region. The border region is characterized by arid or semi-arid conditions, but irrigation allows an active agricultural sector featuring crops and livestock. The production of both crops and livestock create dust and other aerosol pollutants through agricultural waste-burning and concentrated animal feeding operations for example. Finally, portions of the region experience atmospheric temperature

inversions and reverse flow events that capture and concentrate the mix of diurnal and evening pollutants into large and episodic mostly nocturnal peaks.

The human lung, with a surface area roughly the size of a tennis court, effectively filters 70,000 liters, or 50 pounds, of air every day. Polluted air has several serious human health consequences:

- Immediate effects of oxidative stress and inflammation;
- Acute effects such as asthma and respiratory illnesses;
- Delayed effects such as heart attacks and strokes; and
- Chronic effects such as reduced lung capacity, cancer, tuberculosis, emphysema, and fibrosis.

Recently, air pollution has been associated with *in utero* effects, including birth defects, low birth weight, developmental retardation, and even leukemia. All effects are more pronounced in children's developing lungs, as well as in elderly and ill individuals.

Additional and aggravating factors that complicate air quality include:

- A genetic predisposition of Hispanic persons to be more susceptible to some air pollutants than other groups;
- The mobility of populations which frustrates attempts to assess long-term effects of air pollution sources, and
- Practices such as open burning.

Guidelines for Action

COORDINATE POLICY ON BOTH SIDES OF THE BORDER

In the past and even today, authorities on one side of the border often take air pollution reduction action that is not met with a similar effort on the other side. Such unilateral AQM may not produce emission reductions sufficient to meet air quality objectives. Section 179B of the U.S. Clean Air Act recognizes this problem and exempts a border air district from federal consequences if it has taken significant steps to clean its air but cannot reach attainment due to the pollutants generated from another nation. An example of delayed but ultimately successful coordination occurred in El Paso and Ciudad Juárez. To reduce carbon monoxide (CO), Texas in the late 1990s required that only oxygenated fuels be sold in El Paso during the months of October through March, but Mexico at first did not make similar fuel available in Ciudad Juárez. A few years later, a request from the air basin's cross-border air quality committee persuaded Mexico to take action, and CO concentrations subsequently decreased to the extent that El Paso now appears eligible to be redesignated as an attainment area under the U.S. standard.

Road paving and vehicle maintenance are two areas in which cross-border coordination is important to improve air quality. The investment of time, effort, and funding in a cooperative initiative is justified by the significant benefits that residents on both sides of the border receive.

EXPLOIT COMPLEMENTARY BENEFITS

When the reduction of one or more criteria pollutants is attained by either increases in conservation, efficiency, or shifts to other fuels, there is almost always a complementary reduction in emissions of carbon dioxide. As a result of the Kyoto Accord's goals for carbon reduction and the agreement's Clean Development Mechanism, international carbon markets have been established that provide a source of financing for projects that will cut or sequester carbon emissions. It follows therefore that such funding is also available for projects that simultaneously reduce criteria pollutants. Because Mexico is a Kyoto signatory, projects there can take advantage of this emerging market. Of the 35 strategies developed by the binational Air Policy Forum under Border 2012, 17 address carbon issues. Carbon market experts estimate that worldwide carbon credits will be worth \$10 billion by 2012. According to a 2000 RAND report, there is ample opportunity for developing nations like Mexico to reduce greenhouse gas emissions over the next twenty years without sacrificing economic development. Mexico's gross domestic product can continue to grow at a healthy rate while carbon credits provide the incremental revenues necessary to influence new electric power plants to move toward less-polluting technologies and fuels. The North American Development Bank (NADB), the World Bank, and the Inter-American Development Bank all recognize the benefits of reducing greenhouse gases, criteria pollutants, and hazardous toxic air pollutants through investments in renewable fuels and in efficiency on both the supply and demand sides.

Participants in Border Institute VII suggested using these various sources of financing in several specific ways that would reduce air pollution. One example is to promote increased use of solar water heaters on roofs - either commercial or residential - as they are a cost-effective technology that is already available. Participants also suggested exploiting renewable resources in northern Mexico, such as solar and wind, to build new renewable fueled electricity generation plants that would sell to U.S. utilities and qualify to meet state Renewable Portfolio Standards (state-mandated target levels of power from renewable sources). Replacing old and inefficient automobiles and appliances such as air conditioners and refrigerators is another strategy.

A recent SCERP project modeled the projected electricity load in the border region and the reductions in air pollution (as well as water use) that could be obtained by building renewable-fueled power plants to replace old plants and also to meet growing demand. The result suggested that future demand can be met by such a scheme. Figure 2 shows the results of several models that plot how to get more energy and better air quality. The region already uses significant geothermal power and has large solar and wind potential, but has tapped almost none of the biomass potential despite the agricultural sector's significant role in many parts of the region.

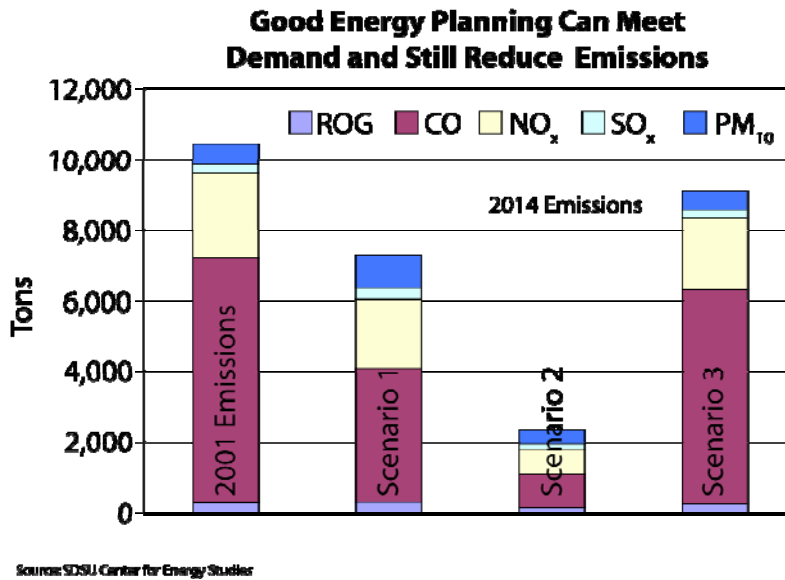


Figure 2. Future emissions of reactive organic compounds (ROG) and other pollutants can be reduced through various hypothetical scenarios of renewable sources use, efficiency, conservation, and distributed generation.

NURTURE BINATIONAL SOCIAL INFRASTRUCTURE

Much success in reducing air pollution is attributable to binational social infrastructure and human capital—a network of stakeholders and institutions that work within their jurisdiction but cooperate across local, state, and international borders toward a common goal. Social infrastructure, once developed for one objective, can be leveraged for other objectives.

Excellent examples of binational social capital exist in the border region. In Douglas, Arizona and Agua Prieta, Sonora, a history of cross-border cooperation including work by the Arizona-Mexico commission helped bring a road-paving proposal to fruition. In Ambos Nogales (the sister cities in Arizona and Sonora) a new social infrastructure, based initially on the Border liaison Mechanism was successfully developed to promote and implement revegetation efforts. A true test of the strength of this binational social infrastructure is playing out over the Tijuana River, as conservationists fight to restore the riverway while fighting attempts to extend the border fence through the Tijuana Estuary, to the Pacific coast.

A somewhat more formal example of binational social infrastructure was created in the air basin that includes El Paso (Texas), Doña Ana County (New Mexico), and Ciudad Juárez (Chihuahua). During the 1990s the air basin was in violation of both U.S. and Mexican standards for ozone, particulate matter, and carbon monoxide. The Joint Advisory Committee (JAC) was established in the mid-1990s under the framework of the La Paz Agreement and includes representatives of U.S. and Mexican federal, state, and local government, as well as representatives from academia, non-governmental organizations, industry, and private citizens. It was loosely modeled after the Los Angeles air basin's South Coast Air Quality Management District (which similarly

overlaps several local governmental jurisdictions). The JAC promotes cooperation, strategic planning, and advocacy among and by its members.

The single most important JAC accomplishment is its explicit recognition and declaration that people living in the different governmental jurisdictions share a common air basin. This creates the understanding that the jurisdictions (cities, states, and countries) share joint responsibility for their air quality and that binational coordination is critical.

Based on the concept of the common air basin, the JAC has generated several policy and program successes, including the introduction of oxygenated fuels on both sides of the border and the hemisphere's first experiment with a cross-border, cross-pollution trade in which a company in El Paso was allowed to meet new and tougher state standards for emissions by paying for a reduction in another pollutant in Ciudad Juárez.

The JAC has stimulated or supported several other programs that merit review and consideration by other air basins in the border region:

- Congestion mitigation at border crossings through designated commuter lanes;
- Modernized brick kiln design;
- Public education about air quality, including designation of “Ozone Action Days”;
- Oxygenated and low vapor pressure fuels;
- Cooperation on identifying and calculating “area” sources for an emission inventory; and
- “Cash for Clunkers” vehicle buy-out projects.

New efforts modeled on the JAC and its success might begin by outlining the magnitude of problems, developing a clear sense of the urgency, designing a committee membership plan that assures inclusion of all stakeholder groups (as well as a sense of continuity and responsibility), sharing administrative and research functions, and achieving some small, early successes to establish credibility.

Public education on air quality must be based upon timely interpretation of relevant ambient air quality data, usually provided by government air pollution control districts and academic research scientists. Effective pollution regulations that clean the air can create respect and even demand for environmental controls. Effective outreach programs should include active education and involvement of local elected officials, medical doctors, and school teachers, all of whom should—but often do not—know the health effects of air pollution and ways to reduce exposure.

The “Molina Effect”—the influence wielded by a respected and visible spokesperson who can focus public interest on an issue—is invaluable when the subject is as technical, complicated, and politically challenging as air quality management. Such a person may be, like Molina, a highly credible scientist who has the capacity to talk in understandable terms to media and politicians about the most relevant data, risks, and mitigation policies or programs. The policies and programs should include something with a relatively short-

term tangible result as political support for AQM tends to decline unless benefits are realized quickly after investment.

USE SCENARIO PLANNING AS POLICY DEVELOPMENT TOOL

Scenario planning (envisioning of alternate future and using that picture to inform policy decisions today) can help identify and prioritize among different policy options by modeling their effects over time. Costs, benefits, and unintended but predictable consequences can be evaluated. Beneficiaries of a particular action on one or both sides of a border can be identified, motivating coordination of bilateral activities.

Scenario planning typically compares the status quo future to hypothetical scenarios in order to highlight steps to more desirable outcomes. “Business as usual” is typically the first scenario to be analyzed. The SCERP-authored challenge paper for Border Institute VII (summarized below) presents seven other scenarios and more than 30 strategies for air quality improvement.

Each scenario contained various strategies, defined as tangible, measurable activities within one or more scenarios. For example, within the mobile sources scenario, the diesel emissions reduction project is a particularly effective strategy. The effort to upgrade the diesel fleet in Mexico with clean fuels, catalytic converters, and exhaust filters addresses an identified problem, is cost-effective, and can be implemented with a known source of funds. One model is the Carl Moyer Memorial Air Quality Standards Attainment Program funds which give an incentive for the incremental cost of cleaner-than-required engines and equipment by the California Air Resources Board.

With respect to measurements of cost-effectiveness, it is important to recognize that in the border region synergisms and complementary benefits are especially important considerations. For example, although the NADB lacks evidence that the road paving it has financed reduces air pollution or negative health effects (improvements in either or both are the rationale for such spending and would show a substantial return on the investment), it does ensure that water and wastewater infrastructure and services in which it also invests are in place before paving, thus saving funds in the mid-term by ensuring the roads do not need to be ripped up later to install water infrastructure.

Several criteria are important in guiding sound policy. While some of these are the same as those used to evaluate traditional pollution control strategies—degree of mitigation, external benefits, feasibility—strategies must succeed on a number of levels. Economic progress must be as sustainable as possible; thus, pollution mitigation policies must not adversely affect labor or the overall economic health of the region. Flexibility is also an asset of any strategy. Not only should plans be geographically flexible to allow for replication in various areas of the border, they must also be adaptable as conditions change. As an example, vehicle inspection and maintenance (I&M, smog checks, and associated vehicular smog equipment efficacy) programs must be designed to address the principal pollutants of today *and* tomorrow. Because generation of a large quantity of pollutants in the border zone is related to personal behaviors, public understanding of the

strategies is also important. Officials must explain the costs, benefits, and goals of each policy. Only with an informed and cooperative public will policies aimed at increasing the availability and use of public transportation or decreasing open burning truly succeed.

Increasing enforceability will be crucial to future policy success. One traditional pollution control strategy—vehicle inspections—has improved recently, but remains difficult to enforce because tampering with pollution mitigation devices is nearly impossible to stop. If a strategy is not enforceable, the public will not support it, financial and environmental impacts will be skewed and mitigation benefits will decrease. Enforceability is perhaps the most important criterion for strategy evaluation.

In a region where discrepancies in wealth from one side of the border to the other are so great, equitable policy solutions are critical. One segment of the population or side of the border should not suffer any extra environmental or financial costs from mitigation policies intended for general benefit. Residents on the Mexican side of the border have suffered inequitable protection as U.S. energy companies move their plants to Mexico to avoid strict U.S. ambient air quality and emissions standards while still selling the electricity produced to U.S. consumers at a competitive price. Mexican residents realized little environmental or economic benefit.

Scenarios and Strategies

Using scenario planning to identify the best possible policy options today for the most desirable outcomes tomorrow, Border Institute VII developed a set of recommended strategies for managing air quality in the border region.

Scenario I: Modernized Transportation System/Improved Public Mobility

Problem: EPA and SCERP estimate that as few as 10% of all vehicles in the United States emit the same amount of pollution as the remaining 90% of the vehicle emit. The ratio is even higher in Mexico, where lower incomes result in a greater dependence on old cars.

Strategy: Revitalize “Cash for Clunkers” programs, especially on the Mexican side, where inspection and maintenance programs have lower budgets. The greatest “super-emitters” can be easily identified by visual inspection. Removing them upon discovery or purchase would be highly beneficial. This project could use regional EPA AQM funds.

Problem: Diesel vehicles emit some of the dirtiest and most harmful pollutants, and starting in 2007 the United States will have much tougher emission requirements for new diesel engines. At that time, ultra-low sulfur fuel, which is required for the newer technology to work properly, will also be required to be available. The new engines will likely be sold worldwide. At this point, Mexico is considering producing ultra-low sulfur fuel but has not yet made final decisions.

Strategy: Mexico should provide the necessary financing for Petróleos Mexicanos (PEMEX, the country’s oil monopoly) to produce ultra-low sulfur fuel at least for selected border-related transportation corridors, or should allow the import of U.S. fuels

into Mexico. Alternative fuels of all kinds—including biodiesel—ought to be used to effect the greatest emissions reduction from diesel vehicles.

Problem: It will take 20 to 30 years for the existing truck fleet to fully turn over after the introduction of new diesel engines in 2007, and so there is still a major challenge to address with the existing fleet.

Strategy: U.S. states should continue and expand existing grant programs that facilitate owners of existing trucks to retrofit their engines (retrofit devices such as catalytic converters and soot filters are becoming more available for older model diesel vehicles), such as the Carl Moyer Fund in California, and Mexico should continue and expand its Diesel Emission Reduction Collaborative (DERC). Ultra-low sulfur fuel is also needed for the retrofit technology.

Problem: Diesel truck drivers usually leave their engines idling at truck stops, even when they are stopping to sleep, in order to provide power for air conditioning and various appliances (including refrigeration of cargo). This generates a significant amount of pollution. Although diesel engines beginning with the 2007 model year will emit dramatically less, the long turnover period for the existing fleet makes it necessary to address this challenge now.

Strategy: Governments on both sides of the border should promote and provide subsidies for the electrification of truck stops, port of entry inspection stations, and border ship ports. Technology that will allow trucks to hook up to the grid at truck stops is already commercially available and in use but promotion and accelerated adoption are needed. Using electricity rather than engines will not only reduce pollution emitted but will also save truck companies money on engine wear and tear. Studies have shown that investments in reduction of diesel emissions have a high ratio of health benefits to cost, and so reasonable subsidies are justified.

Problem: A recent study concluded that school children are exposed to more diesel particulate matter during their commute to school on a diesel bus than all the rest of the population during the latter's normal activities. Children's developing lungs are especially sensitive to the oxidative, inflammatory, and carcinogenic effects of diesel particulate matter.

Strategy: Governments should implement a school-bus retrofit program as the highest priority offset in the border region.

Problem: Significant consequences of NAFTA have been increased regional trade, increased border crossings by border residents, and the movement of products and produce from maquiladoras (factories) and farms in Mexico to customers in the United States. But both the short-haul drayage fleet and long-haul trucks are slowed by lengthy inspections and security checks at the border. Programs aimed to address this problem ("smart" ports of entry and Fast Pass/SENTRI/Frequent Commuter Lanes/EZPass) have been stalled.

Strategy: The U.S. Department of Homeland Security should speed up traffic at ports of entry. Programs to do so have significant economic benefits. When special lanes are part

of a program, they should incorporate a preference for the cleanest vehicles for those that have passed inspection and maintenance scrutiny.

Problem: There are not enough inspection and maintenance (I&M) programs, and the existing programs do not fully motivate vehicle maintenance that ensures the best-operating and therefore least-polluting vehicles.

Strategy: Governments should continue all I&M programs on the U.S. side and implement new I&M programs on the Mexican side, targeting municipal vehicles first. The standards should be graduated according to the age of the vehicle on the Mexican side so that compliance would be affordable, and thus desirable, to the public.

Problem: U.S. car owners often sell their used (and therefore older, less efficient, and sometimes uninspected) vehicles to Mexicans. In addition, new car dealers in Mexico actively prohibit importation of vehicles newer than 10 years old, thus exacerbating the bifurcation of the Mexican market.

Strategy: Mexico should prevent the import of old, unfit vehicles into Mexico by having customs officials require a smog inspection from the state of export, and by allowing newer vehicles to be imported.

Problem: Planning of transportation infrastructure often breaks down at the border where one jurisdiction ends and another begins. The extra coordination that is necessary to ensure continuous and efficient flow of materials, people, and products in the border region is lacking. As a result, the border has long suffered marginalization of services common in other areas. Basic rail service, for example, exists in only a few locations along the border.

Strategy: Governments and private stakeholders should plan and provide mass transit across the border, including for commuters in identifiable groups, such as students and shoppers headed for particular venues. Secondly, all border and port-of-entry agencies should coordinate rail, road, air, and marine planning processes across the border and with various air, transportation, and planning agencies.

Problem: Many products from the interior of Mexico are offloaded from long-haul trucks and then loaded onto a short-haul drayage fleet that, because of its duties, is not as well maintained as the longer-haul trucks.

Strategy: Convert and upgrade the drayage fleet to modern standards. A recently passed California law (AB 1009) can serve as a model for implementing this strategy.

Scenario II: Renewable Energy Sources and Efficient Use

Problem: Many facilities in the border zone use energy in ways that are technically and economically inefficient. Cost-effective improvements could save significant amounts of electricity and fuels and thereby reduce air pollution. The inefficiencies exist in industrial processes, space heating and cooling, and various appliances and technologies (such as pumps, fans, and motors).

Strategy: A two-part strategy is recommended. Governments should encourage public and private managers to adopt aggressive “Environmental Management System”

practices, including audits that identify opportunities for cost-effective improvements in efficiency. Government assistance can take the form of regulatory incentives, workshops, and technical assistance, and the latter two approaches can be cross-border. The Texas Commission on Environmental Quality, for instance, should revive its impressive EPA-funded program of technical assistance to maquiladoras in neighboring states, and other states should emulate the example. Secondly, to address the problem of scale and financing, interested private sector firms (including energy service companies) should “bundle” a number of otherwise independent site-specific opportunities at various companies or projects into bankable loan proposals. Sources of financing could include the BECC-NADB collaborative and Mexican projects could additionally use carbon credits developed to take advantage of the Kyoto Protocol’s Clean Development Mechanism. As an extension of this strategy (especially in Mexico), governments should be proactive with new projects. For example, the Comisión Federal de Electricidad, working with the Comisión Nacional para el Ahorro de Energía, could survey proposed large, low-income housing projects for opportunities to adopt energy efficiency up front

Problem: The border region has very good solar energy resources, includes pockets of very good wind energy resources, and has numerous solid waste landfills whose long-term production of methane could support electricity generation. In many cases, these resources are proximate to the grid, and yet the potential is largely untapped. One of the challenges is the incremental cost of production.

Strategy: The United States Congress should extend the production tax credit for renewable fuel energy generation for several more years. In Mexico, the government and the private sector should cooperate in identifying and obtaining sources of financing to cover the incremental costs, such as carbon credits and the World Bank’s Global Environmental Facility.

Problem: Although the U.S. and Mexican governments have established grant funds at the NADB for projects related to water, wastewater, and solid waste in the border region in order to complement funding from the lending program. However, there is no similar grant funding available at the NADBank for projects related to renewable energy, energy efficiency, or other efforts that would reduce air pollution.

Strategy: The U.S. and Mexican governments should expand the availability of grant funds at the NADB to include renewable energy, energy efficiency, and other projects that would reduce air pollution.

Problem: Even if LNG ports and regasification facilities that make the fuel available for local use were built in Mexico there is little distribution system in Mexican cities.

Strategy: The Mexican government should require LNG port builders to build the distribution system for use by local residents.

Scenario III: Properly Engaged Market Forces

Problem: The U.S. has no mechanisms to allow cross-border trading of pollutants, offsets, emission reduction credits, and mitigation funds (with the exception of a

narrowly constructed state-based program in Texas), even though these mechanisms may provide the greatest returns on investments in pollution reduction.

Strategy: U.S. federal and state lawmakers should establish such market incentives as part of State Implementation Plans as they pertain to border areas. This should be accomplished first through state legislation (similar to the Texas law that allowed the El Paso-Ciudad Juárez pollutant trade), and then through amendments to the Clean Air Act. Mexican law already allows for such trades via Articles I-III and III-XI of the General Law of Ecological Equilibrium and Protection of the Environment (often referred to as LGEEPA, its acronym in Spanish) as well as Articles III-IV and III-V of the Federal Air Regulation.

Problem: The commercial banking system does not adequately address the significant opportunities that exist for projects related to alternative energy technologies.

Strategy: Governments and foundations should enhance existing efforts to provide revolving loan funds, including microloans, for cost-effective investments that reduce air pollution, especially through energy technologies. This should include a binational micro-lending program that provides loans for the electrification of truck stops. Such a program could be funded by border-crossing tolls, environmental impact fees (funds available from development), or transportation taxes.

Scenario IV: Improved Natural/Area/Agricultural Source Controls

Problem: Agricultural burns create pollutants that not only affect households or communities in the immediate vicinity, but also the air quality in other airsheds, including those that span the border.

Strategy: Assuming that there are no alternatives to agricultural burns, regulatory agencies should limit the health risks and other negative consequences by developing permit systems that include conditions and notification requirements. Exceedance “No burn” days should preclude burning.

Problem: Currently the BECC reviews and certifies, and the NADB extends loans to, road-paving projects as a strategy to reduce air pollution, but the conditions and requirements lack rigor with respect to the following important factors:

- Planning the best roads to pave (sometimes based on which streets residents or business owners are willing to pay);
- Knowing how much dust is being prevented from re-suspension;
- Assessing pre- and post-project health consequences; and
- Following up with road sweeping programs to maintain decreased dust levels.

Strategy: As road-paving proposals are being developed, BECC should provide criteria-based paving criteria, provide technical guidance related to traffic counts, air quality, and health surveys before and after the projects, and include street sweeping or wetting as a required follow-up activity. New road programs should be paid for by tolls.

Scenario V: Enhanced Data, Analysis, and Outreach

Problem: Governmental agencies that collect and/or analyze air quality or health impact data are not making those data readily available for public education and use by the community. A related data issue in several parts of the border region is that real-time data are insufficiently available or provided through an inadequate interface. Researchers are often confounded by a lack of universality and quality assurance.

Strategy: Government agencies that have air quality data must give greater consideration to the needs of the public and stakeholder groups. Several approaches are advisable. The first step should be developing and standardizing an air quality index along both sides of the border so everyone speaks the same language when discussing air quality conditions. There is also a clear need for a targeted campaign to educate politicians, health care professionals, and education officials on the dangers of air pollution so that they may communicate such health risks to their constituents. Several Border 2012 entities—the Environmental Health Working Group, the Indicators Task Force, and Communications Task Force—could be particularly effective in addressing this problem.

Problem: Governmental agencies that collect and/or analyze air quality or health impact data are not making those data available in a fashion that is optimally useful for analysis. Researchers confront several challenges: access is difficult; the format or presentation of the raw data are unclear or inconsistent; data are often not presented bilingually; information regarding why and how certain data were collected either does not exist or does not appear with corresponding data; and real-time data are often unavailable.

Strategy: In order to ensure that data be both available and optimally useful, a binational committee should be formed to propose to the two federal governments and the states what data are needed and in what format they would be most useful.

PRIORITIES AMONG THE SCENARIOS FOR NEAR-TERM ACTION AT THE FEDERAL LEVEL

Many of the above recommendations cannot be implemented without the active participation of the U.S and Mexican federal governments. At least five actions should be taken in the near term:

- Mexico should set a standard for fine particulate matter (PM_{2.5});
- The United States and Mexico should encourage the development of new, renewable and conservational energy technologies in border-wide and regional air quality discussions under Border 2012;
- Recognizing legitimate issues of sovereignty, Mexico and the United States, along with the ten border states, should find ways to create trans-border airshed management solutions;
- Mexico and the United States should officially designate binational common airsheds based upon topography, meteorology, and health;
- The United States and Mexico should provide grant funding for a Binational Clean Air Trust that can help defray the costs of a transition to technologies that result in less air pollution.

INCREMENTAL UNILATERAL AND COLLABORATIVE EFFORTS CAN BRING SUCCESS

Effective improvement of border air quality is an increasingly complex problem only growing in complexity and as such requires action by a variety of government entities. Some of the recommendations made by Border Institute VII recommend only unilateral action by an agency on side of the border; others require bilateral agreement.

At Border Institute VII, Allen Olson, former governor of North Dakota and a member of the International Joint Commission (IJC) between the United States and Canada, explained that the IJC had 80 years of experience addressing cross-border issues when it decided to tackle air quality. The social infrastructure was mature. The U.S.-Canada Air Quality Agreement (AQA) then took 15 years to finalize. See (<http://www.ijc.org/rel/agree/air.html>) for details.

Likewise the United States and Mexico have experience in developing binational agreements dating back to 1889 with binational agreements on water. Additionally, they have recent experiences over the past ten years with incremental unilateral and cooperative efforts to improve air quality. These growing efforts, both unilateral and binational have had beneficial results in selected sub-regions. These experiences provide a foundation for moving ahead on efforts such as the recommendations of Border Institute VII. Border 2012 can play a very important role by providing the mechanisms and the leadership to launch efforts to improve air quality.

Although the U.S.-Mexican relationship lacks certain elements that may have facilitated U.S.-Canada interactions - similar levels of economic development and a similar cultural and legal history - citizens, many politicians, educators, and air quality and environmental health professionals recognize that the air quality problems in several portions of the U.S.-Mexican border region are serious and require collaborative action. Incremental efforts combined with progress toward a binational air quality agreement are essential to ensuring a clean environment and a positive economic future.

Many of the recommendations herein require only unilateral action, and most of them have a history that pre-dates Border Institute VII. At the conference, for instance, SEMARNAT's Director General for Air Quality Management Sergio Sánchez reported that Mexico intends to provide ultra-low sulfur fuel in 2006 for gasoline vehicles and in 2008 for diesel vehicles. Part of the incentive for PEMEX to convert refineries – a several billion dollar undertaking – is its desire to be able to sell fuel to U.S.-licensed trucks making long hauls into Mexico. However, PEMEX is taxed very heavily by the federal government and has few resources available for investment.

Figure 2 outlines a possible process to reach a U.S.-Mexican Air Quality Agreement (AQA). It begins with the La Paz Agreement and its implementing programs, the Integrated Border Environment Program (IBEP), Border XXI in the late 1990s, and Border 2012 now. The current iteration has an Air Policy Forum, a mechanism to coordinate actions across government levels as well as with health authorities. The La Paz Agreement also enabled the JAC which promoted the one basin philosophy that enables trading of pollutants and perhaps one day trading of emission reduction credits. Similar inter-jurisdictional advisory committees exist both with the facilitating power of

the Consul Generals' Border Liaison Mechanisms (BLM), as for example in Ambos Nogales, and without facilitating authority, as in the Mexicali-Imperial Valley. BLMs allow local governments to negotiate and arrive at agreement on solutions sets that are later blessed by the respective federal governments in lieu of having to pass each negotiating steps up to and across at the federal level. Both sub-regions have become Border 2012 Air Task Forces and are moving slowly and but surely in the direction of becoming international air quality districts (IAQDs) even if they are not currently authorized by any current state, federal, or local regulations. A bill underway in California would establish a JAC-like body with its Mexican neighboring state and would also move towards obtaining IAQD status.

NAFTA institutions have been slow to address air quality issues and while the Commission for Environmental Cooperation (CEC) is stalled on Transboundary Environmental Impact Assessments (TEIAs) the Border Environment Cooperation Commission (BECC) has certified and the North American Development Bank (NADBank) has funded a number of air and energy projects. An air project grant fund to complement the water and wastewater Border Environment Infrastructure Fund (BEIF), Binational Clean Air Trust (BiCAT), or trading bank could be hosted there.

The Kyoto Clean Development Mechanism (CDM), the UN, the Global Environment Facility (GEF), and the EPA Methane to Market programs offer incentives and potential funding sources for projects related to improving air quality. Concurrently, unilateral but coordinated efforts are underway to characterize air pollution sources and ambient air quality along the border. The private sector is doing its role. Vehicles are being modernized and power plants are being built with more advanced technologies and that burn cleaner fuels.

Significant progress has been made to date in addressing air quality issues of the U.S.-Mexican border region, including coordination on technical activities such as monitoring, modeling, and data availability. Next steps are to:

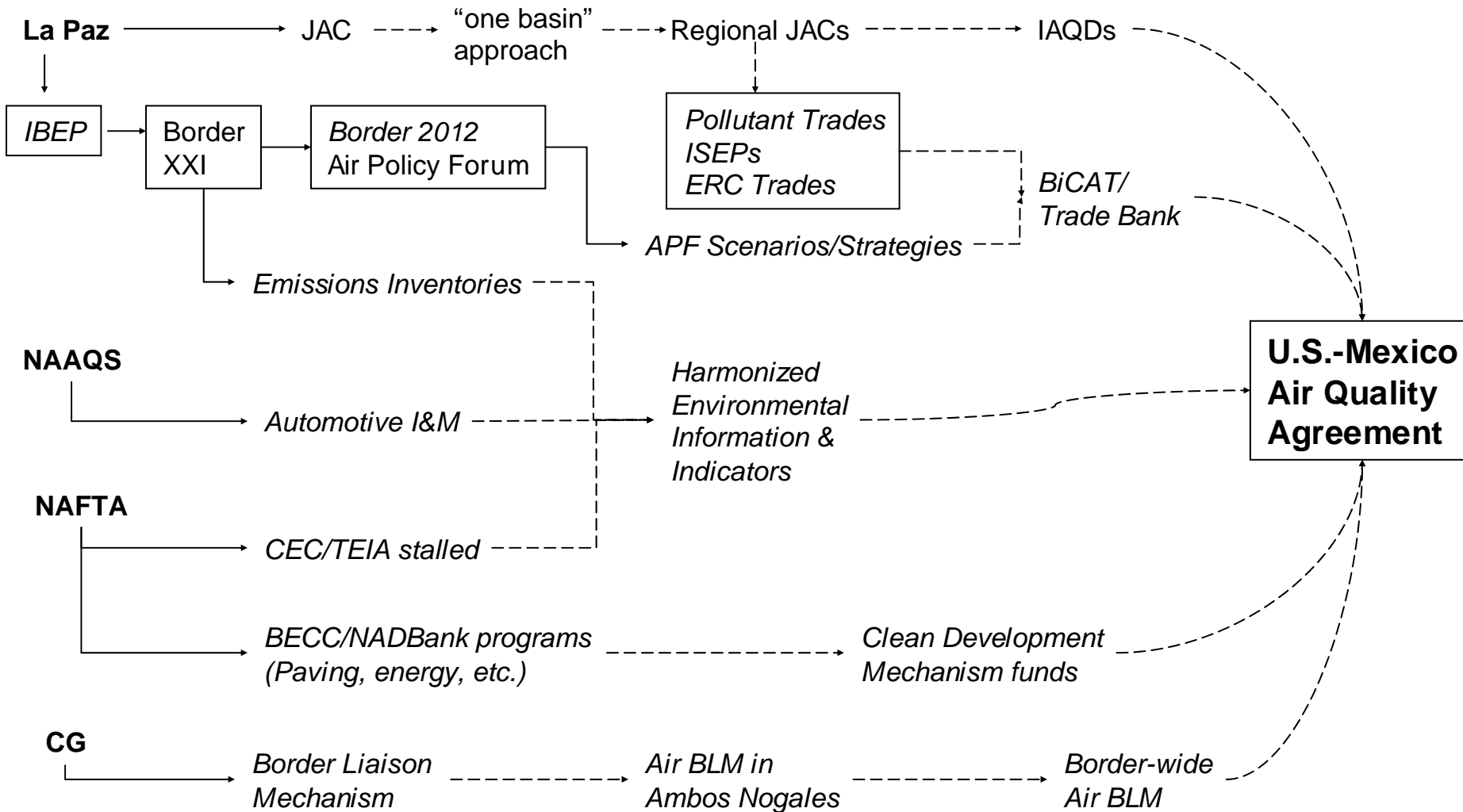
- Institutionalize a formal binational air science study group;
- Notify and consult across the border on significant new air emissions and on-going nuisance emissions (agricultural burns) and their impacts; and
- Develop and share individual nation status and progress reports.

Air quality along the U.S.-Mexican border is too important to delay action on these recommendations provided from border institute VII, and will only grow worse if the current course of action is maintained. While significant progress has been made at the local and state level air quality needs to be on the agenda of every border effort and binational initiative, especially those that address energy and water. The sooner the topic of air quality and its associated environmental health are raised and addressed at highest levels, the more likely it will be that air quality and human health is improved, unnecessary international tensions avoided, averting other conflicts over this ultimately resolvable problem.

Existing Authorities/Programs
(Unilateral → Increasingly Cooperative)

Emerging Regimes
(Collaborative)

Goals/Models
(Bilateral)



List of Participants

Mr. Leo G. Acosta, U.S. Governmental Accountability Office
Ms. Amanda Aguirre, Western AZ Health Education Center
Mr. Lee Alter, Western Governor's Association
Mr. Fernando Amador, CA Environmental Protection Agency
Dr. James Anderson, Arizona State University
Mr. John Beale, U.S. EPA Headquarters
Mr. Frank Bevacqua, International Joint Commission
Mr. Gonzalo Bravo, Border Environment Cooperation Comm.
Mr. Daniel Buckley, SCERP
Mr. Javier Chávez, Universidad Autónoma de Ciudad Juárez
Ms. Kimberly Collins, CCBRES, San Diego State University
Mr. Bob Currey, University of Texas at El Paso
Mr. Carlos De la Parra Rentería, SEMARNAT
Mr. Plácido dos Santos, Arizona Dept of Environmental Quality
Dr. Sally J. Edwards, Pan American Health Organization
Mr. Christopher A. Erickson, New Mexico State University
Mr. David C. Fege, U.S. Environmental Protection Agency
Mr. Luis Fernández, U.S. Environmental Protection Agency
Ms. Carey Fitzmaurice, U.S. Environmental Protection Agency
Mr. Peter H. Flournoy, J.D., International Law Offices
Dr. Craig B. Forster, University of Utah
Dr. Paul Ganster, IRSC, San Diego State University
Dr. Alfredo Granados Olivas, Universidad Autónoma Juárez
Mr. Saúl Guzmán García, SEMARNAT Baja California
Mr. Michael Hadrick, U.S. Environmental Protection Agency
Mr. Richard Halvey, Western Governor's Association
Dr. George Hepner, University of Utah
Ms. Bertha Hernández, San Diego State University
Mr. David C. Johnson, WERC, New Mexico State University
Dr. Kerry Kelly, ICES, University of Utah
Mr. Sean Kiernan, InterGen
Ms. Michéle Kimpel Guzmán, AZ Dept of Environment Quality
Ms. Elaine Koerner, Good Neighbor Environmental Board
Mr. Jerry Kurtzweg, U.S. Environmental Protection Agency
Dr. JoAnn S. Lighty, ICES, University of Utah
Dr. Francisco Llera Pacheco, Universidad Autónoma Juárez
Mr. William Luthans, U.S. Environmental Protection Agency
Mr. John Maynard, Santa Cruz County Supervisor
Dr. Gerardo M. Mejía-Velazquez, ITESM de Monterrey
Mr. Alberto Mendoza Dominguez, ITESM de Monterrey
Ms. Kristen Miller Aliotti, Porter Novelli
Dr. Mario Molina, Scripps Institute of Oceanography
Mr. Gerardo J. Monroy, AZ Dept of Environmental Quality
Mr. David Noble, Noble Associates
Mr. Arturo Nuñez, North American Development Bank
Mr. Edward (Jay) Olaguer, Houston Advanced Research Center
Com. Allen I. Olson, International Joint Commission
Mr. Saúl Pérez, Drake University
Mr. Eduardo Pérez Eugia, Universidad Autónoma Cd Juárez
Mr. Brad Poirez, Imperial County Air Pollution Control District
Mr. Cruz Porto, Consejo Ecologico de Participacion Ciudadana
Mr. Ross Pumfrey, University of Texas at Austin and TCEQ
Dr. Margarito Quintero Núñez, Universidad Autónoma de BC
Dr. Matiana Ramírez Aguilar, Instituto Nacional de Salud
Mr. David E. Randolph, Arizona-Mexico Commission
Mr. Paul Rasmussen, Arizona Dept of Environmental Quality
Mr. Enrique Rebelledo, SEMARNAT
Mr. Romero Reyes, Imperial Air Pollution Control District
Dr. Marco Antonio Reyna, Universidad Autónoma de BC
Mr. José Rodríguez, Universidad Autónoma de Baja California
Dr. Guillermo Rodríguez Ventura, Universidad Autónoma de BC
Dr. Miguel Angel Romero Ogawa, ITESM de Monterrey
Ms. Marcy A. Rood, Clean Cities, U.S. Department of Energy
Mr. Gabriel Ruiz, California Air Resources Board
Mr. Richard Ryan, San Diego State University
Dr. Sergio Sánchez Martínez, SEMARNAT
Mr. Eduardo Sandoval, Universidad Autónoma de Cd Juárez
Ms. Shelly Scalzo, San Diego State University
Mr. Stephen Secrist, U.S. Governmental Accountability Office
Ms. Lariza Sepúlveda, New Mexico State University
Dr. Luis Felipe Siqueiros Falomir, IMIP, Ciudad Juárez
Ms. María Sisneros, U.S. Environmental Protection Agency
Ms. Sarah Sowell, U.S. Environmental Protection Agency
Dr. Harold J. Stolberg, National Science Foundation
Dr. Ned Strong, LASPAU: Academic and Professional Programs
Mr. Soll Sussman, Texas General Land Office
Dr. Alan Sweedler, San Diego State University
Mr. Sean Tanaka, San Diego State University
Ms. Irene Tejeda, Houston Advanced Research Center
Mr. Carlos Tercero-Romero García, CPIDRNVT
Ms. Pilar Tomás, Agencia de Protección al Medio Ambiente y Recursos Naturales, Nuevo León
Dr. Guillermo Torres Moya, Universidad Autónoma de Baja CA
Mr. José Treviño Fernández, SEMARNAT, Chihuahua
Mr. Rick Van Schoik, SCERP
Ms. Denisse Varela, Abogada, Pricewaterhouse Coopers
Mr. Guillermo Velasco, Harvard University
Ms. Angélica Villegas, IRSC, San Diego State University
Ms. Christine Vineyard, U.S. Environmental Protection Agency
Mr. Trent Wells, U.S. Environmental Protection Agency
Mr. James Yarbrough, U.S. Environmental Protection Agency
Dr. Joseph Zehnder, Arizona State University
Ms. Amy K. Zimpfer, U.S. Environmental Protection Agency

SCERP: Promoting a Brighter Future for the U.S.-Mexican Border Region through Sustainability Science

Discovery, learning, and innovations related to people, ideas, and tools

The Southwest Consortium for Environmental Research and Policy (SCERP, also known as Consorcio de Investigación y Política Ambiental del Suroeste or CIPAS in Spanish), a collaboration of five U.S. and five Mexican universities located in all ten border states, assists U.S.-Mexican border peoples and their environments by applying research information, insights, and innovations. The five American universities are Arizona State University, New Mexico State University, San Diego State University, the University of Texas at El Paso, and the University of Utah. The Mexican universities are El Colegio de la Frontera Norte (COLEF), Instituto Tecnológico de Ciudad Juárez, Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM), Universidad Autónoma de Baja California, and Universidad Autónoma de Ciudad Juárez.

SCERP was created in 1989 and was first funded by Congress in 1991 to address environmental issues of the U.S.-Mexico border region and to “initiate a comprehensive analysis of possible solutions to acute air, water and hazardous waste problems that plague the United States - Mexico border region.” Since then SCERP has implemented about 400 projects involving as many as a thousand individuals. Many SCERP students go on to careers in border environmental issues.

The collaboration works closely with the EPA-HHS-SEMARNAT-SALUD IBEP, Border XXI, and 2012 Programs and other multi-national organizations and has the multi-fold mission of applied research, outreach, education, policy development, and regional capacity building for the communities, our ultimate customers.

SCERP exists to address the rapidly deteriorating border environment, to protect and enhance the quality of life and health of border residents, and to support the educational mission of our universities. SCERP’s vision is a vital region with dynamic and diverse economy, sustainable environmental quality, intact ecological systems and processes, and a more equitable quality of life.

The approach used by SCERP, is to integrate and focus trans-disciplinary academic expertise; binational, state, tribal, and local policy making; non-governmental organization advocacy capacity; and private industry attention and influence on trans-border issues.

SCERP informs the decision-making process without advocating for or against a particular position. By interpreting the results of unbiased scientific inquiry it provides motivation to adopt comprehensive, regional, and long-term policies and solution sets.

SCERP is also the primary sponsor of an annual think tank-style policy conference, called the Border Institute that convenes the 100 top decision-makers and stakeholders from the region to examine complex and critical issues and to recommend policy actions.

