Air Quality Sustainability Program in Coconino County

Working Paper 2
Visioning Session and Clean Air Action Plan

Prepared for

Arizona Department of Transportation

Prepared by

LIMA & ASSOCIATES
Transportation - G.I.S.

and

Cathy D. Arthur

July 28, 2003

TABLE OF CONTENTS

Page

1. INTRODUCTION 1

2. VISIONING SESSION 3
PRESENTATIONS 3
FEEDBACK FROM VISIONING GROUP 4

3. CLEAN AIR ACTION PLAN 18
CONCLUSION 18

LIST OF TABLES

Page

1. PERSONS WHO ATTENDED APRIL 30 VISIONING SESSION 1
2. VISIONING SESSION AGENDA 2
3. TECHNICAL ADVISORY COMMITTEE 2
4. IMPORTANT AIR QUALITY ISSUES FOR COCONINO COUNTY 5
5. S.W.O.T. ANALYSIS FOR COCONINO COUNTY 6
6. CATEGORIES USED IN CLASSIFYING AIR QUALITY IMPROVEMENT STRATEGIES 8
7. VOTING RESULTS FOR AIR QUALITY IMPROVEMENT STRATEGIES 9
8. HOW STRATEGIES SUPPORT THE AIR QUALITY GOALS 10
9. CLEAN AIR ACTION PLAN FOR COCONINO COUNTY 18

1. INTRODUCTION

This working paper describes an Air Quality Visioning Session conducted in Flagstaff on April 30, 2003. The material presented to Session participants and the feedback provided by them are described. A visioning statement is presented and the air quality improvement strategies preferred by the visioning group are identified. The paper concludes with a Clean Air Action Plan for Coconino County, based on insights gleaned from the Visioning Session.

The Visioning Session was conducted to establish a framework for air quality improvement in Coconino County. The session involved a one-day meeting with representatives from local governments, chambers of commerce, transportation providers, Northern Arizona University (NAU), and environmental groups. The individuals participating in the session are identified in Table 1 and the agenda for the session is provided in Table 2.

The purpose of the Visioning Session was to provide background information on air quality, discuss potential problems and benefits associated with improving air quality, formulate a vision statement, and identify air quality improvement strategies that might be feasible for implementation in Coconino County.

In preparation for the Visioning Session, two meetings were held with the project Technical Advisory Committee (TAC) comprised of representatives from participating jurisdictions, federal agencies, and the Arizona Department of Transportation (ADOT). The TAC members are identified in Table 3.

TABLE 1. PERSONS WHO ATTENDED APRIL 30 VISIONING SESSION

Organization	Representative
Arizona Department of Transportation	Pat Cupell
BNSF Railway	Mike McCallister BNSF Project Engineer
City of Flagstaff	Hon. Libby Silva, Vice Mayor
City of Sedona	Charles Mosley, Engineer
Coconino County	Gene Stanley, County Surveyor
Coconino County	Hon. Paul Babbitt, County Supervisor
Flagstaff Chamber of Commerce	Thomas Vincent, Government Affairs
Flagstaff Metropolitan Planning Organization	David Wessel
Friends of Flagstaff's Future	Becky Daggett, Executive Director
Grand Canyon Trust	Rick Moore
Mountain Line	Jeff Meilbeck
Northern Arizona University	Terry Baxter, Ph.D.
Project Team	Cathy Arthur, Rob Bohannan

TABLE 2. VISIONING SESSION AGENDA

9:00 a.m.	Introductions
9:15 a.m.	Air Quality Background
10:00 a.m.	"We Can't Afford Polluted Air!"
	Terry E. Baxter, Ph.D., P.E. College of Engineering and Technology Civil and Environmental Engineering Northern Arizona University
10:45 a.m.	Break
11:00 a.m.	Overview of Air Quality Improvement Strategies
11:45 a.m.	Box Lunch (Provided)
	Brainstorm Strategic Issues for Coconino County (S.W.O.T. Analysis)
12:45 p.m.	Formulate Air Quality Vision for Coconino County
1:30 p.m.	Discuss Air Quality Improvement Strategies for Coconino County
2:30 p.m.	Break
2:45 p.m.	Prioritize Air Quality Improvement Strategies
3:45 p.m.	Wrap-up
4:00 p.m.	End of Session

TABLE 3. TECHNICAL ADVISORY COMMITTEE

Organization	Representative
Arizona Department of Transportation	Pat Cupell
Arizona Department of Transportation	James Zumpf, FMPO Liaison
Coconino County	Jerry Flannery, Assistant County Manager
Flagstaff Metropolitan Planning Organization	David Wessel
National Park Service-	Sam Henderson, Superintendent - Flagstaff Areas
National Weather Service	Mike Campbell, Meteorologist-in-Charge
Northern Arizona University	Craig A. Roberts, Ph.D., P.E.
U. S. Forest Service	James W. Golden, Coconino Forest Supervisor
U. S. Forest Service	Pete Lahm, Air Quality Specialist
Project Team	Peter M. Lima, Ph.D., P.E., Rob Bohannan, Cathy Arthur

2. VISIONING SESSION

This chapter describes the elements of the Visioning Session, including the presentations made by the Project Team and by Northern Arizona University Professor Terry Baxter and the feedback obtained from Session participants.

PRESENTATIONS

Highlights of the background material in Working Paper #1 and three PowerPoint presentations were presented at the Visioning Session. The complete Working Paper was e-mailed to persons who indicated they would be attending and copies of the PowerPoint slides were provided to attendees.

The background material presented at the Visioning Session included the goal and objectives of this ADOT-funded study; local socioeconomic conditions; national and state air pollutants, standards, sources, and trends; and air quality data, plans and programs for Coconino County.

Dr. Terry Baxter, Ph.D., P.E., of the Department of Civil and Environmental Engineering at NAU made a 35 mm slide presentation entitled, "We Can't Afford Polluted Air!" Dr. Baxter's presentation emphasized the medical and aesthetic importance of maintaining healthy air and improving visibility in the region.

Dr. Baxter indicated that the overarching goal should be to maintain a high quality of life and healthful environment. He cited three important reasons to sustain good air quality in the area: tourism, telescopes, and toddlers. He indicated that the number one cause of school days missed is asthma and air pollution is one factor causing these attacks. To support this contention, he stated that during the Rodeo-Chedeski fire in the summer of 2002 the Prescott hospital recorded the highest number of admissions in its history.

Dr. Baxter identified two air pollution threats to the community, ozone and $PM_{2.5}$. He expressed concern that high concentrations of ozone may exist in parts of the County that are not being monitored. He indicated that $PM_{2.5}$ is a problem from both a health and visibility perspective and that high concentrations are typically caused by residential wood smoke, controlled and uncontrolled forest fires, and temperature inversions. These inversions trap polluted air near the ground on winter mornings.

Dr. Baxter pointed out that visibility at the Grand Canyon is worst during the summer months. The number of days when visibility is good at the Grand Canyon has declined to only 10 percent of the days in a year. Visibility at the Grand Canyon is also considered to be poor on about 10 percent of the days.

Dr. Baxter posed the question, "How can we make a difference at the local and national levels?" He recommends that cost-effective air quality measures be implemented and advocates the placement of additional air quality monitors in the County. In addition, he believes the County or local jurisdictions should track state, regional and national

environmental issues. He is especially concerned about the lack of control over federal policies and the potential rollback of initiatives such as the New Source Review Program and "Clear Skies".

After lunch, the Project Team provided an overview of potential air quality improvement strategies that could be implemented by local governments in Coconino County. Measures such as vehicle inspection and maintenance, reformulated fuels, and vapor recovery systems at gas stations were excluded from consideration, because these require State legislation.

Fifty-one air quality improvement strategies were described, along with the pollutants they reduce, and the most-likely mechanism for implementation (i.e., ordinance, voluntary program, municipal plan, municipal program, or zoning). Examples of municipalities that have already implemented these measures were also identified.

FEEDBACK FROM VISIONING GROUP

Session attendees provided feedback on their collective air quality vision for Coconino County. The feedback provided during four interactive phases of the session, Introductions, Brainstorm Strategic Issues, Formulate the Vision Statement, and Prioritize Air Quality Improvement Strategies, is described below.

Introductions

To kick-off the session, attendees were asked to introduce themselves and describe what they considered to be the most important air quality issues facing Coconino County. The issues mentioned by the group are summarized in Table 4. Most notable about the responses is the breadth of the issues identified. This suggests that the participants represented diverse constituencies and interest groups within their communities and brought considerable knowledge and understanding of air quality issues to the session.

Members of the group identified motor vehicles as an air quality issue nine times (i.e., single occupant vehicles, trucks on I-40 and I-17, transportation sources, tourist traffic, traffic congestion, and older vehicles), while fireplaces, wood stoves and other wood burning were cited five times. There were three mentions of dust generating activities (i.e. construction, unpaved roads, and other dust) and two of large stationary sources such as the Navajo Generating Station in Page. Other issues of concern to members of the group were pollution transported from Los Angeles, cinders used to de-ice the roads, national policies, air quality at parks and recreational areas, (i.e., Lake Powell and Grand Canyon), and prescribed fires, especially under current drought conditions.

TABLE 4. IMPORTANT AIR QUALITY ISSUES FOR COCONINO COUNTY

1.	Single occupant vehicles (SOVs) [2]
2.	Trucks on I-40 and I-17 [2]
3.	Fireplaces, wood stoves and other wood burning [5]
4.	Transport of pollution from Los Angeles
5.	Navajo Generating Station and other large stationary sources [2]
6.	Construction dust
7.	Other sources of dust
8.	Cinders used to de-ice roads
9.	Transportation sources [2]
10.	National policies
11.	Lake Powell and the Grand Canyon
12.	Tourist traffic
13.	Traffic congestion
14.	Older vehicles
15.	Unpaved roads
16.	Prescribed fires and the drought

[ ] – Number of times mentioned by visioning group

Brainstorming Strategic Issues

During lunch, the visioning group participated in a brainstorming session to identify strategic issues associated with improving air quality in Coconino County. This type of exercise is called a **S**trengths **W**eaknesses **O**pportunities **T**hreats (**S.W.O.T.)** analysis. Table 5 summarizes the results.

Some key strengths identified for Coconino County are that air quality is already recognized as a valuable natural resource; there is a strong tradition of planning and cooperation in the region; groups such as Friends of Flagstaff's Future, Keep Sedona Beautiful, and the Grand Canyon Trust provide strong environmental leadership; a wealth of information and technical resources are available, such as NAU and the Western Regional Air Partnership (WRAP); excellent potential for the generation of solar energy exists; and the area is large enough to be sophisticated, but small enough to be agile.

Weaknesses cited include low per-capita income, the rural nature of the area leading to auto dependence, and a high use of wood for heating. Examples of opportunities for redressing these weaknesses and improving air quality include exchanging information with the Tribal communities, developing sources of renewable energy, proximity to national parks (attracting

Federal resources), and broad-based community support for protecting the quality of life and visual appeal of the area.

Some threats to improving air quality include proposed new power plants on the Colorado Plateau, population growth, catastrophic forest fires, lack of regional rule-making and influence on other states such as California, and balancing the management of air quality, water quality and solid waste.

TABLE 5. S.W.O.T. ANALYSIS FOR COCONINO COUNTY

With respect to improving air quality in Coconino County, the following represent				
Strengths	**Weaknesses**	**Opportunities**	**Threats**	**Constraints**
Groups like F3 – Friends of Flagstaff's Future, Keep Sedona Beautiful	Low per-capita income	Persons can benefit from transit financially	Proposed additional power plants on Colorado Plateau	Need Tribal input
Recognition of air quality as valuable natural resource	Rural nature of county leads to auto dependence	broad based support for protecting "golden goose" quality of life visual appeal of area (feds)	Population growth	Large Size of county leads to auto dependence
Large enough to be sophisticated, small enough to be agile	Older vehicle fleets	15% wood use – could reduce	Catastrophic Forest fires	Fed regs (Clear Skies, Pollution Trading)
Good planning tradition	State laws governing subdivisions wildcat subs (dirt roads)	Exchange with Tribes – wood stoves, education County & Flagstaff work with Indian communities on building codes, technology exchange	Lack of regional rule making or consensus (CA)	State laws governing subdivisions
Coop effort between govt. agencies, culture of peer coop	Unpaved Tribal roads – other rural areas	Renewable energy – new sources	Balance air, water, waste	Proximity to California – California power made in Arizona Transport
Low emissions to area ratio	Lack of resources for Renewable energy	Alternatives to campfires in parks and forests		Limited resources for attainment areas
Attractiveness of Visual amenities clear air task force	High use of wood for heat (Census)	Air quality crosses jurisdictional boundaries		
Attainment area		National Parks in close proximity (Federal support)		
WRAP, NAU (information resources)		Small diameter Logs		
Solar potential		Tuba City facility (renewable energy)		

Constraints on improving air quality include the need for Tribal input, the large size of the County, federal regulations, state laws allowing wildcat subdivisions, proximity to and producing power for California, and the limited resources available for attainment areas such as Coconino County.

Formulate Vision Statement

After participating in the S.W.O.T. analysis, members of the group were asked to contribute phrases that would be suitable in an air quality vision statement for Coconino County. The following vision statement paragraph and supporting language were developed using concepts provided by the participants:

> In 1958, a TWA pilot who had just flown across America radioed the control tower that "The cleanest air on the continent was in Flagstaff Arizona." Coconino County will preserve and protect this reputation: All levels of government in the County will work together to preserve healthy air, improve visibility, and reduce greenhouse gas emissions. Coconino County will recognize agencies that advocate clean air or help improve air quality and encourage alternatives to single occupancy vehicles such as carpools, buses, bicycles, and walking. The County will also encourage the use of new technologies such as solar energy and telecommuting. The County will think globally but act locally to enhance our air quality and environment.

To support this vision, concepts presented by participants together with the findings of previous air quality sustainability efforts suggest the following action items:

- Establishment of an Air Quality Steering Committee
- Development and implementation of an Education/Outreach Program
- Identification and implementation of voluntary air quality preservation measures
- Development and implementation of plans, policies, ordinances, and services such as a response system to provide advisories on ambient or predicted air quality conditions

After concepts for inclusion in the Vision Statement and supporting language were recorded, candidate strategies for realizing the concepts were evaluated by the participants as described in the following section.

Prioritize Air Quality Improvement Strategies

After reviewing potential air quality improvement strategies, each member of the visioning group received fifty 3" x 5" index cards. Each index card described an improvement strategy, the pollutants reduced, and the most-likely implementation mechanism. Table 6 identifies the categories used in classifying the strategies by source or type of control.

TABLE 6. CATEGORIES USED IN CLASSIFYING AIR QUALITY IMPROVEMENT STRATEGIES

Category	Strategies	Source or Type of Control
1	1.1-1.10	Fugitive Dust
2	2.1-2.3	Unpaved Roads
3	3.1-3.3	Paved Roads
4	4.1-4.8	Wood Burning Controls
5	5.1-5.3	Heavy-Duty Vehicles and Equipment
6	6.1-6.2	Agriculture (none in Coconino County)
7	7.1-7.3	Vehicles
8	8.1-8.4	Transportation Control Measures
9	9.1-9.3	Land Use and Growth Controls
10	10.1-10.13	Other Controls

First, the group was asked to identify those measures that would *not* be appropriate for implementation in Coconino County. A strategy was discarded only if *everyone* in the group agreed to remove it. During this first phase, seven strategies were eliminated from further consideration.

Each member of the group was then provided with ten adhesive dots and instructed to "vote" for air quality strategies by applying dots to the index cards. More than one dot could be applied to a single card. The cards were then collected and the votes tallied. Table 7 summarizes the results of this prioritization process. A category number is shown next to each strategy in Table 7.

The air quality improvement strategy receiving the most votes was "Encourage Energy Efficiency and Renewable Sources of Energy" (11). The second highest number of votes was cast for "Educational and Outreach Campaign to Sustain Clean Air" (8). The first eight strategies each received four or more votes. Table 8 identifies how these strategies support the three main goals identified in the vision statement: (1) preserve healthy air (i.e. reduce carbon monoxide, volatile organic compound, nitrogen oxide, or particulate emissions), (2) improve visibility, and (3) reduce greenhouse gases.

The similar strategies, "Stabilize Unpaved Roads and Alleys" and "Reduce Speed Limits on Unpaved Roads," together received a total of five votes. So "Stabilize or Reduce Speeds on Unpaved Roads" has been included as the ninth strategy in Table 8. To round out the top ten and include a strategy that reduces diesel emissions, "Retrofit Municipal Diesel Vehicles" has also been added to Table 8.

TABLE 7. VOTING RESULTS FOR AIR QUALITY IMPROVEMENT STRATEGIES

Category #	Air Quality Improvement Strategy	# of Votes
10.11	Encourage Energy Efficiency and Renewable Sources of Energy	11
10.8	Educational and Outreach Campaign to Sustain Clean Air	8
8.1	Alternatives to Single Occupant Vehicle Travel	6
1.1/1.6	Fugitive Dust Control Plans with Mitigation Bond Requirements	5
4.1	Clean Burning Fireplaces in New Construction	5
4.3	Episode Curtailment Program for Wood Smoke	5
9.2	Innovative Land Use Planning to Encourage Multi-modal Opportunities	5
10.13	Integrate Land Use, Transportation and Air Quality Decision-making	4
2.1	Stabilize Unpaved Roads and Alleys	3
4.8	Smoke Management Programs	3
8.3	Retrofit Municipal Diesel Vehicles	3
7.1	Encourage Conversion to Alternative Fuels	3
9.3	Attract "Green" Industries	3
10.5	Voluntary Business Community Emissions Reductions	3
10.10	Ozone Awareness Program	3
1.7	Limitations on Opacity	2
1.10	Control Dust on Public Property	2
2.2	Reduce Speed Limits on Unpaved Roads	2
2.3	Limit Use of Off-Road Vehicles on Public Property	2
3.1	Deploy PM_{10} Efficient Street Sweepers	2
4.2	Retrofit Existing Fireplaces and Wood Stoves	2
5.2	Inventory Diesel Equipment and Upgrade/Replace High Emitters	2
7.3	Voluntary High Emitter Vehicle Repair/Replacement Program	2
8.4	Employer-Based Measures	2
9.1	Growth Boundaries or Other Limitations	2
1.2	Control Bulk Material Transport	1
3.2	Rapid Cleanup of Material Deposits on Paved Roads	1
4.4	Public Information Program on Fireplaces and Wood Smoke	1
4.7	Provide Alternative Heating Options	1
5.1	Limit Heavy-Duty Vehicle Idling	1
8.2	Traffic Flow Measures	1
8.3	Market Based Measures	1
10.1	Restaurant Charbroiler Controls	1
10.7	Apply Maximum Allowable Increases	1
10.12	Expand Air Quality Monitoring	1
	Total	100

TABLE 8. HOW STRATEGIES SUPPORT THE AIR QUALITY GOALS

	Strategy	Preserve Healthy air	Improve Visibility	Reduce *G*reenhouse Gases
1.	Encourage Energy Efficiency and Renewable Sources of Energy	X	X	X
2.	Educational and Outreach Program to Sustain Clean Air	X	X	X
3.	Alternatives to SOV Travel	X	X	X
4.	Fugitive Dust Control Plans with Mitigation Bond Requirements	X	X	
5.	Clean Burning Fireplaces in New Construction	X	X	X
6.	Episode Curtailment Program for Wood Smoke	X	X	X
7	Innovative Land Use Planning to Encourage Multi-modal Opportunities	X	X	X
8.	Integrate Land Use, Transportation, and Air Quality Decision-making	X	X	X
9.	Stabilize or Reduce Speeds on Unpaved Roads		X	X
10.	Retrofit Municipal Diesel Vehicles	X	X	

*Close to the source

Preferred Strategies for Improving Air Quality

Descriptions of each of the top ten preferred strategies are provided below. The strategies are presented in the order that they have been ranked based on points assigned by the Coconino County Visioning group.

1. Encourage Energy Efficiency and Renewable Sources of Energy

This strategy involves implementing a public information program and incentives to encourage more efficient use of petroleum and wood products, and, where feasible, substitution of renewable sources of energy, such as solar and wind power. Since Coconino County has an abundance of annual sunshine (an average of 264 days per year are either clear or partly cloudy), solar-powered options should be fully explored via research and demonstration projects. Individuals might be encouraged to use solar energy in their homes and businesses if they were shown they can realize monetary savings (i.e., tax incentives, lower annual energy costs). On the Hawaiian island of Oahu, the major utility (Hawaiian Electric) encourages and subsidizes the use of solar power in order to minimize their outlay for construction of additional costly power plants in the islands.

Municipal and county codes should be examined to determine if there are current impediments to—or opportunities for—conserving energy or substituting solar power. To be most effective, there should be research, outreach, and financial incentive components to this program. The program might be most effectively coordinated and implemented as a joint venture involving Northern Arizona University, energy providers, and the local governments in Coconino County.

2. Educational and Outreach Program to Sustain Clean Air

This strategy would be a comprehensive "Air Aware" campaign that would communicate the actions that individuals and employers could take to reduce air pollution in Coconino County. The campaign would promote alternatives to single occupant vehicles (bus, carpool, vanpool, bike, or walk), compressed work schedules and telecommuting, alternatives to wood-burning in the winter, and fueling vehicles after sundown in the summer. As part of this campaign, it would be helpful if the public were advised when air quality is unhealthy. This will require that a real-time air quality forecasting system be developed; additional monitors may be needed to support this system.

In addition to educating the general public on measures to reduce air pollution, this campaign could inform construction, demolition, hauling, and landscaping operators about the importance of dust control and effective practices to reduce particulate pollution. ADOT is sponsoring a voluntary training and certification program ("Blue Skies") to promote dust reduction at construction sites; this training could be offered periodically in Coconino County.

A multi-media approach could include a web page, television, radio, newspaper, and/or bus flyers. Businesses could be targeted thought direct mail, management briefings, and advertising in business publications. Booths could be set up at community events to provide information directly to the public. Brochures could be given to employers to distribute to their employees. Valley Metro in Phoenix has considerable experience in air pollution alert programs and represents an excellent resource for additional information on conducting multi-media campaigns.

The jurisdictions in Coconino County could obtain co-sponsors, such as the Chambers of Commerce and environmental groups, to help fund and support a local "Air Aware" education and outreach program. This campaign should be coordinated by a single organization, such as the Flagstaff MPO or Coconino County.

3. Encourage Alternatives to Single Occupant Vehicle Travel

This strategy encourages new programs and capital expenditures for bus system improvements, bicycle and pedestrian facilities, ridesharing and vanpooling, high occupancy vehicle (HOV) lanes, and park-and-ride facilities. The objective of this strategy is to increase the attractiveness and level of service of alternative modes, so that individuals will choose to bus, carpool, vanpool, bike or walk, rather than drive alone in an automobile, SUV, or truck.

The jurisdictions in Coconino County have the authority to plan for and implement local transportation programs and improvements. These are constrained by limited local transportation funding. Capital improvements to state highways would have to be coordinated with and funded through ADOT.

In light of the fiscal constraints facing local governments, another effective approach might be to encourage employers to reduce the single occupant vehicle (SOV) travel of their employees. Voluntary targets might be established and contests held each year to reward employers that are most successful in reducing SOV travel. From a marketing perspective, encouraging alternatives to SOVs can be accomplished as a part of the "Educational and Outreach Program to Sustain Clean Air", described above.

4. Fugitive Dust Control Plans with Mitigation Bond Requirements

This strategy requires land-clearing and construction activities to develop a plan to control dust at each work site. The dust control plan would have to be approved before the operator could proceed with initial grading and drainage work. The objective of the plan would be to minimize particulate emissions from earthmoving activities. In Maricopa County these plans are required for projects that disturb one-tenth of an acre or more.

A typical dust control plan for a work site would identify the potential sources of dust, the location of delivery, transport, and storage areas, the types of material to be stored, and the size of piles. In addition, the plan would describe measures to be applied at the site during periods of dust generation, including the frequency and duration of watering or other suppressant application. The plan would also address control of material track-out where unpaved access points join paved surfaces and handling of loads during transport to and from the work site (i.e., all truck loads covered with no less than 3 inches of freeboard).

The dust control plan could include a variety of work practices such as frequent watering of disturbed surfaces and storage piles and use of wind fences for control of windblown dust. Other site-specific prevention and mitigation measures could include paving of roads and access points early in the project, compaction or stabilization (chemical or vegetative) of disturbed soil, phasing of earthmoving activities, reduction of mud and dirt tracked onto paved streets, installation of truck wash or devices to remove dirt from vehicles and tires prior to exiting the site, and periodic cleaning of the street near work site entrances.

Under the mitigation bond requirement, a company seeking a grading and drainage permit would have to provide a letter of credit or surety bond to cover the cost of mitigation measures contained in the dust control plan. The full amount posted plus interest would be refunded at the completion of the project if the company followed the dust control plan and the municipality incurred no costs in controlling dust at the project site. Mitigation bond requirements have been implemented in Clark County, Nevada, and Rancho Mirage, California. Typical surety bonds posted in Clark County are in the $500-$20,000 range, depending upon the size of the construction project.

Arizona law provides local governments with the authority to suppress environmental nuisances. Under this authority, the cities and towns in Coconino County could adopt ordinances to require dust control plans in order to avert public nuisances. Building inspectors could inspect construction sites to ensure that the dust control plan is being implemented. Due to the potential increase in resources required to implement and enforce

this ordinance, the requirement for a dust control plan and mitigation bond might be most appropriately applied to large construction projects (i.e., greater than 50 acres) in Coconino County.

5. Clean Burning Fireplaces in New Construction

This strategy reduces emissions from new residential and commercial fireplaces and wood stoves. The Arizona Department of Environmental Quality has estimated that wood burning may cause up to 40 percent of the pollution in neighborhoods during winter temperature inversions. A clean burning fireplace ordinance would prohibit the installation or construction of a fireplace or wood stove after a certain date, unless it is one of the following:

- A fireplace that has a permanently installed gas or electric log insert,
- A fireplace or wood stove or any other solid fuel burning appliance that is certified as conforming to Phase II EPA Standards of Performance for Wood Heaters in 40 CFR Part 60, Subpart AAA, as amended through July 1, 1998, or
- A fireplace that has a permanently installed wood stove insert that complies with paragraph 2 above.

The ordinance would prohibit the subsequent conversion or alteration of an approved fireplace or wood stove to an unapproved use. The ordinance typically provides exemptions for home heating, industrial equipment, cooking devices, and outdoor fireplaces.

The beauty of this air quality strategy is that it helps to offset the increase in emissions due to population growth. In the Phoenix area, where fireplaces are largely ornamental, all cities, towns and Maricopa County were required by the Arizona Legislature (S.B. 1427) to adopt, implement, and enforce clean burning fireplace ordinances by December 31, 1998.

6. Episode Curtailment Program for Wood Smoke

This strategy restricts the use of wood stoves and fireplaces during episodes when monitored concentrations of air pollutants exceed predetermined thresholds. Unless additional monitors are activated, a wood smoke curtailment program in Coconino County would be based upon PM_{10} concentrations at the Flagstaff monitors or degraded visibility readings at the Grand Canyon monitor. When one of these monitors reached certain threshold levels and other environmental conditions such as calm winds were evident, a no-burn alert would be announced. Alerts would be communicated to the public through the broadcast media (radio, TV) and to employers via fax notification.

Maricopa County adopted an ordinance establishing a residential wood burning restriction program in 1994. The annual period during which restrictions on burning can be called is October 1 through February 29. The County Air Pollution Control Officer can call a restricted burn period on the basis of an assessment of meteorological data, atmospheric conditions, ambient temperatures and monitored carbon monoxide or PM_{10} concentrations.

When a restriction is called, all fireplaces and wood heating devices must be shut down within three hours. Exemptions include those that are the sole source of heat in a residence and those that qualify as an approved wood burning device (i.e. gas logs, EPA Phase II certified wood heaters, pellet stoves, and masonry heaters). Wood-fired barbeques and commercial cooking devices are also exempt. Any person who violates this ordinance within a 1-year period, after being issued a warning notice, is guilty of a civil offense and subject to a $100 fine. In addition to Maricopa County, this strategy has been implemented in Missoula, Montana, Mammoth Lakes, California, and Clark and Washoe counties in Nevada.

Jurisdictions in Coconino County have the authority to adopt ordinances establishing a wood smoke curtailment program and setting criteria for no-burn advisories. The local governments would need to work cooperatively with the Arizona Department of Environmental Quality (ADEQ) to set up a real-time forecasting system using meteorology and the PM_{10} and visibility monitoring data available in Coconino County. The ADEQ can assist in determining whether additional monitors (i.e. carbon monoxide) would be needed to augment the forecasting system.

7. Innovative Land Use Planning to Encourage Multi-Modal Opportunities

This strategy would promote land use plans and policies that will increase the use of modes other than the single occupant vehicle. The urban growth boundary implemented in Flagstaff will have the eventual effect of increasing both residential and employment densities, which, in turn, will promote the use of alternative modes. Limited parking exists in downtown Flagstaff; rather than providing more parking, the fees for the existing spaces could be increased. These measures are also typical of land use policies that encourage transit-oriented development.

Like many university towns, Flagstaff has taken the initiative to develop an extensive network of bike paths, the Flagstaff Urban Trail System, to encourage bicycling in lieu of driving. Similarly, land use planning that creates convenient access for pedestrians will increase walking, improve public health, and reduce vehicle trips. Other design techniques such as traffic calming, roundabouts, and auto-free zones have been applied elsewhere in the country to discourage vehicular traffic. Although these planning and design innovations are important in increasing the attractiveness of alternative modes, another element in their success has been the parallel, and often major, investment in improved service and infrastructure for alternative modes such as late night and weekend bus service, coordinated networks of bicycle and pedestrian paths, and pedestrian-friendly street redesign.

This strategy would be implemented as part of the comprehensive planning processes at all levels of government in Coconino County. In order to be effective in reducing SOV travel, policies that promote increased residential and commercial densities, restrict parking supply, and impose higher parking fees need to be paired with increased capital investments in transit, bike, and pedestrian facilities. Because public funding is limited (especially at this time), financing for these capital investments may require considerable political will. Strong public support will also be needed to increase parking rates, as this action, although effective

in encouraging use of alternative modes, has proven to be politically unacceptable in many parts of the country.

Another potential source of funding for innovative land use planning to support transportation and environmental goals is federal grants. There is considerable interest at the federal level in funding projects that demonstrate the impacts of land use planning on transportation and air quality. These impacts are intuitively suspected, but have not been quantified to any great extent. Local governments might consider teaming with Northern Arizona University to apply for a grant from EPA or U.S. DOT to show how innovative land use policies can result in increased use of alternative transportation modes.

8. Integrate Land Use, Transportation and Air Quality Decision-Making

This strategy would first involve a review of development and transportation plans, programs and policies at all levels of government in Coconino County to determine if land use, transportation and the environment, including air quality, are adequately addressed. Typically, long range plans include land use, transportation and environmental goals and objectives. However, these may not be translated into integrated programs and policies. Day-to-day decisions of local government officials may not reflect the same level of integration as is contained in these plans. If not, then better coordination needs to take place within agencies. This is complicated by the fact that land use, transportation and environmental issues are typically handled by different departments and reviewing work of other departments may not be the highest priority.

To ensure that land use, transportation and air quality decisions are integrated across Coconino County, coordination also needs to take place at all levels of government. For example, County staff should be familiar with the plans, programs, policies and decisions being made by the City of Flagstaff and the Flagstaff MPO, and vice versa. Coordination with other large land owners and policy-makers, such as the Indian tribes, state, and federal government, is also important.

To make informed decisions, elected officials and municipal/county managers need to obtain staff recommendations that reflect an understanding of the land use, transportation and environmental implications of proposed actions. One way to ensure that coordination has occurred is to require a formal review of major proposals by appropriate departments within the agency. Another approach would be to assign a staff person as an integrator; that is, someone who understands the issues and impacts of proposed actions across all functions. As an initial step, decision-makers could direct their staffs to consider the land use, transportation and environmental implications of each proposed action and point out significant problems or discontinuities with internal programs and policies or those at other levels of government.

9. Stabilize or Reduce Speeds on Unpaved Roads

This involves actions to mitigate the dust and associated PM_{10} generated by vehicles traveling on dirt roads in Coconino County. Potential measures include paving, covering the surface with gravel, chemical stabilization, watering, or reducing speeds of vehicle traffic. Speeds could be reduced by posting lower speed limits (i.e., 15 mph) or building speed bumps. The cities, towns and County could implement these measures on public unpaved roads under their jurisdiction. Since there are a large number of unpaved roads in Coconino County, controlling dust on all of them would not be practical. It might be appropriate to target the unpaved roads in Coconino County with the highest average number of vehicles per day (ADT) first. In Maricopa County dirt roads that carry more than 150 ADT must be stabilized by June 10, 2004. In addition, PM_{10} from unpaved roads can contribute to degradation of visibility (although it is typically not a major contributor). So another high priority could be to stabilize or reduce speeds on the dirt roads closest to the Grand Canyon.

10. Retrofit Municipal Diesel Vehicles and Equipment

Although this strategy only received three votes from the Visioning group (versus the four or more votes received by each of the others), it was added to the list of top ten preferred strategies because it is the only one that mitigates the impact of diesel emissions on public health and visibility. In 2001, EPA mandated stricter standards for heavy duty diesel vehicles that will begin phasing in with model year 2007. The catalytic converters that will be installed in the cleaner diesel vehicles are quickly rendered inoperative by the high sulfur content of the diesel fuel currently sold in America (except California). To address this problem, EPA is also requiring that low sulfur diesel fuel be sold nationwide by mid-2006. In May 2003, EPA also proposed stricter standards for nonroad diesel equipment, such as that used for construction and agricultural purposes, which may begin to take effect as early as 2007.
These national standards will reduce emissions from new diesel vehicles and engines. However, due to the longevity of this equipment and its high cost, it will be many years before older "dirty" vehicles are retired and diesel fleets are "clean". In the meantime, local governments are taking actions to accelerate the conversion to cleaner diesel fuels and reduce diesel tailpipe emissions. For example, in 2002 the State of Arizona inaugurated a Diesel Conversion Grant Program that provides up to $30,000 of the cost of converting a diesel vehicle over 19,500 pounds GVW to alternative fuels. To qualify for the grant, the vehicle must travel 50 percent or more of the time in the Phoenix or Tucson metropolitan areas. Alternative fuels are defined as compressed natural gas (CNG), liquid natural gas (LNG), propane, electric, solar, or hydrogen.

Retrofitting municipal diesel vehicles and equipment to reduce emissions in Coconino County could take many forms, including conversion to alternative fuels (i.e., biodiesel), installation of oxidation catalysts and particulate filters, and application of idling reduction technology (i.e., electrification kits). Professor William Auberle at Northern Arizona University received a grant from EPA in 2001 to conduct workshops on technologies that are available to reduce vehicle idling at truck stops and other locations. He would be an excellent resource for additional information on diesel technologies that could be applied to municipal vehicles and equipment.

It is envisioned that these retrofit technologies could be applied to garbage trucks, street sweepers, school buses, or nonroad diesel equipment (i.e., construction) owned by city or county governments. The cities of Mesa and Tempe are jointly planning to retrofit 45 municipal vehicles with oxidation catalysts and particulate filters and run them on low sulfur diesel fuel. The estimated cost of this FY 2007 demonstration project will be $350,000.

The City of Flagstaff has issued a request for bids to supply the City's vehicle fleet with biodiesel. The product will be used in over 100 city vehicles including fire trucks, refuse trucks, and roadway maintenance vehicles.

Other local governments in Coconino County could team with Northern Arizona University to request a grant from EPA to conduct a demonstration project to retrofit municipal diesel vehicles and equipment. Although stricter federal standards for new on-road diesel vehicles will kick-in in 2008, additional research needs to be done to encourage local governments to retrofit older vehicles and equipment and accelerate the reduction in diesel emissions that not only degrade visibility, but have been shown to be carcinogenic.

3. CLEAN AIR ACTION PLAN

The air quality vision statement and preferred strategies developed by the visioning group establish a framework for a Clean Air Action Plan for Coconino County. Implementation of the tasks in Table 9 will create the momentum needed to achieve improvements in air quality. A key task in the Plan is the strategy receiving the second highest number of votes during the visioning process, an air quality education and outreach program. A Web site, fact sheets and other collateral materials for the education/outreach program will be provided as part of this ADOT contract to develop an air quality sustainability program for Coconino County. It is envisioned that either the Flagstaff Metropolitan Planning Organization (FMPO) or Coconino County would assume the lead role in implementing the Clean Air Action Plan, since air quality is a regional issue that transcends city and town boundaries.

CONCLUSION

The residents of Coconino County desire to improve their air quality. Specifically, they want to reduce air pollutants that are unhealthy to breathe, impair visibility, and contribute to global warming. Through a visioning process, local stakeholders have identified the issues of greatest concern, contributed to a vision statement, and prioritized potential air quality improvement strategies. A framework for a Clean Air Action Plan has been developed to ensure that the "vision" becomes a reality. Air quality can be improved and the quality of life can be sustained in Coconino County through a coordinated regional effort with a clear "vision" and the direction provided by a Clean Air Action Plan.

TABLE 9. FRAMEWORK FOR A CLEAN AIR ACTION PLAN FOR COCONINO COUNTY

Task	Responsibility	Time Frame
Set up Air Quality Steering Committee	FMPO or County lead; Committee membership – elected, staff, ADOT	1-3 months
Conduct Education/ Outreach Program	FMPO or County lead w/input from Air Quality Steering Committee	3-6 months
Identify Voluntary Measures, Estimate Costs, & Identify Funding Sources	FMPO or County lead w/input from Air Quality Steering Committee	1 year
Develop Plans/Policies/Ordinances, Estimate Costs, & Identify Funding Issues	Local Governments	1-3 years