CLEARING THE AIR

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Tuesday, August 19, 2003

A Publication of the
Surface Transportation Policy Project

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2003

Public Health Threats from Cars and Heavy Duty Vehicles – Why We Need to Protect Federal Clean Air Laws

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Acknowledgements

Clearing the Air was written by Michelle Ernst, James Corless, and Ryan Greene-Roesel, with editorial assistance provided by Anne Canby, Linda Bailey, Andrea Broaddus, Dave Ginns, Nancy Jakowitsch, Kevin McCarty, Trinh Nguyen, and DeAnza Valencia. The data extraction, research design, and data analysis for this report was conducted by Michelle Ernst, Ryan Greene-Roesel, Linda Bailey, and Jeremy Gunderson. The *Clearing the Air* website was designed and built by Charlie King and John Goldener.

Clearing the Air *Online:*

This report, as well as state-by-state fact sheets, are available online at http://www.transact.org

The distribution of this report has been made possible in part by the financial support of the Natural Resources Defense Council, Environmental Defense, American Institute of Architects, and the American Society of Landscape Architects.

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Executive Summary

Air pollution continues to be a serious health problem in America, and one for which our transportation system bears a large responsibility for. While the nation has undeniably achieved significant success in reducing air pollution since Congress passed the Clean Air Act in 1970, the news isn't all positive. Recent studies have shown strong evidence linking air pollution with public health problems like asthma, cancer, and heart disease. Nearly half of all Americans—more than 130 million people—still live with unhealthy levels of air pollution.[1] And new findings contained in this report show that air pollution has actually gotten worse in dozens of metropolitan areas over the last decade.

Federal efforts, along with federal transportation funding aimed at reducing the health risks from air pollution, have started to make a difference, but must be protected and strengthened if the nation's initial progress is to be sustained. Even so, some in Congress and the Bush Administration are proposing to make drastic changes to clean air laws and programs that could severely undermine current and future progress towards cleaner air. These changes could seriously jeopardize ongoing efforts to protect public health from air pollution. This report:

- Provides an overview of the latest scientific evidence linking poor air quality to public health problems including asthma, cancer, and heart disease;
- Determines which populations and places suffer the most from air pollution in the U.S., in addition to analyzing the trends in air pollution over the last decade;
- Quantifies the role that transportation plays in the nation's air pollution problems; and
- Illustrates the importance of federal laws and federal funding – in particular the federal Clean Air Act and clean air money available under the federal transportation law – in reducing the health-related risks from air pollution.

Air Pollution and Public Health

For many years, air pollution was viewed as a visual nuisance. But as the twentieth century progressed, our understanding of air pollution evolved considerably. As a result of several highly publicized air pollution events, including the Donora, Pennsylvania fog, where 17 people died and nearly half the town's 14,000 residents became sick from a severe air pollution episode in 1948, researchers began to acknowledge that air pollution was also a significant threat to public health.[2]

Congress responded in 1970 by passing the Clean Air Act. In 1990, they approved a significant set of strengthening amendments to the Clean Air Act aimed specifically at reducing air pollution from cars and heavy duty vehicles since it was increasingly evident that underestimating transportation as a major source of air pollution had been a significant factor in the failure of many air pollution control plans. In February 2001, the U.S. Supreme Court also upheld the right of the U.S. Environmental Protection Agency to use health-based air quality standards.

Recent medical research has linked air pollution to a host of public health concerns including asthma, cancer, heart disease, heart attacks, strokes, high blood pressure, birth defects, and even brain damage.[3] Air pollution has been found to shorten life expectancy, and not just for sensitive populations such as those with asthma, but for the general population as well.

New research and studies documented in this report also show that:

- Asthma rates are growing significantly in the U.S. population, increasing 59 percent from 1982 through 1996 (see the Appendix, on page 55, for the percentage of adults with a lifetime prevalence of asthma by metropolitan area);

- Transportation-related air pollution, specifically ground-level ozone and particulate matter (PM) from cars and heavy duty vehicles, has been found to severely exacerbate asthma in both adults and children;

- Exposure to air pollution in the form of ozone and particulate matter increases the risk of heart disease;

- Living in neighborhoods with proximity to higher traffic volumes has been linked to increased cancer risk; and,

- Large segments of the U.S. population, in particular minorities, children, and the elderly, are especially vulnerable to the health effects of air pollution.

Places with the Worst Air Pollution

Where you live makes a tremendous amount of difference in how much air pollution you're typically exposed to. In terms of regional air pollution, the U.S. Environmental Protection Agency (U.S. EPA) produces a daily Air Quality Index that tracks air pollution levels for five primary pollutants and has become a standard part of weather forecasting throughout the U.S. Every year, the EPA publishes an annual survey detailing how many times each region's Air Quality Index exceeds a score of 100, the standard for generally unhealthy air which is often translated into a "Code Orange" day or worse (Code Orange days indicate that air quality is unhealthy for children, older adults, and people with respiratory disease). The chart below shows the ten regions with the highest total number of days exceeding a score of 100 for generally unhealthy air over the last three years (for a listing of the fifty metropolitan areas with the highest number of days of unhealthy air quality, see Table 1, on page 26 in the full report).

Rank	Metro Area	Total Number of Days of Unhealthy Air Quality (2000 to 2002)
1	Riverside-San Bernardino, CA	445
2	Fresno, CA	421
3	Bakersfield, CA	409
4	Los Angeles-Long Beach, CA	255
5	Sacramento, CA	163
6	Pittsburgh, PA	134
7	Knoxville, TN	109
8	Birmingham, AL	100
9	Houston, TX	94
10	Baltimore, MD	93

Recent Trends in Air Pollution

Air quality has improved significantly since the Clean Air Act was passed in 1970. Yet almost half of all Americans – over 130 million people – still live in areas that violate federal health standards for air pollution,[4] and we now understand that even modest amounts of air pollution at levels lower than current federal health standards can have significant and detrimental impacts on public health.[5] In some larger metro areas, air pollution routinely reaches unhealthy levels nearly twice a week, and in 52 larger metropolitan areas (for which data was available), air quality was unhealthy at least once a month during the period 2000 to 2002. In short, while significant progress has been made in reducing air pollution nationwide, many regions and millions of people still live with poor air quality that poses a significant threat to public health.

STPP's own analysis of the last ten years of air quality data collected by the U.S. Environmental Protection Agency shows that the number of days of unhealthy ozone pollution (or smog) levels nationally has held just about steady over the last decade (ozone is the only air pollutant of the six major pollutants that the U.S. EPA has collected data for in a consistent manner over the last decade, allowing for comparisons over time). Some metropolitan areas have shown significant improvements in ozone pollution, and nowhere have these changes been more dramatic than in California. While several regions in California – Los Angeles in particular – still have some of the worst air pollution problems in the country, they have also made some of the most significant gains using a combination of air pollution reduction strategies in addition to relying on a strong regional planning agency (known in southern California as the South Coast Air Quality Management District) dedicated exclusively to fighting air pollution.

But in 30 larger metropolitan areas, in 20 states, the number of days of unhealthy ozone has increased over the past decade (see Table 2, on page 28). In all but three of these places, both the number of days of unhealthy levels of air pollution, and the *population* have grown. In other words, not only is air pollution getting worse in these areas, but more people are breathing it. The table on the next page shows the ten metro areas with the highest growth in the number of days of unhealthy ozone levels.

Rank	Metro Area	Number of Days of Unhealthy Ozone (Smog) Levels Avg 1993-1997	Avg 1998-2002	Percent Change
1	Greenville-Spartanburg-Anderson, SC	7.2	19.8	175.0%
2	Knoxville, TN	25.0	42.8	71.2%
3	Charlotte-Gastonia-Rock Hill, NC-SC	22.4	35.6	58.9%
4	Greensboro-Winston-Salem-High Point, NC	12.6	19.6	55.6%
5	Akron, OH	9.4	14.4	53.2%
6	Harrisburg-Lebanon-Carlisle, PA	10.4	15.6	50.0%
7	Raleigh-Durham-Chapel Hill, NC	16.0	23.6	47.5%
8	Memphis, TN-AR-MS	15.8	23.0	45.6%
9	Youngstown-Warren, OH	8.6	12.4	44.2%
10	Middlesex-Somerset-Hunterdon, NJ	15.2	21.8	43.4%

Transportation Is a Major Contributor to Air Pollution

Cars, buses and trucks are a major source of pollutants that can significantly degrade air quality. Transportation is responsible for more than 50 percent of carbon monoxide, about 34 percent of nitrogen oxide (NOx) emissions, and more than 29 percent of hydrocarbon emissions (which combine with NOx in sunlight to form ozone or smog). Transportation (on-road sources only) also accounts for as much as 10 percent of fine particulate matter emissions.[6] The chart below ranks the ten major metropolitan areas in the U.S. with the highest percentage of air pollution from transportation sources (see Table 3, on page 31 in the full report for a ranking of major metropolitan areas).

Rank	Metro Area	Percent of all Criteria Pollutants from Transportation (1999)
1	Fort Worth-Arlington, TX	60.2%
2	San Antonio, TX	57.1%
3	Los Angeles-Long Beach, CA	56.9%
4	Austin-San Marcos, TX	56.7%
5	Dallas, TX	56.4%
6	Hartford, CT	55.6%
7	New York, NY	53.9%
8	Seattle-Bellevue-Everett, WA	53.6%
9	Columbus, OH	53.4%
10	Denver, CO	52.7%

New emissions standards, routine vehicle inspections, and clean technologies established and implemented by the Clean Air Act have had great success in cutting vehicle emissions per mile driven. It's estimated that emissions of criteria pollutants per mile driven have fallen by more than 90 percent since 1970.[7] But at the same time, the number of miles driven, and the number of trips made by cars and trucks has skyrocketed, growing 162 percent and 57 percent, respectively, since 1969.[8] Should this pace continue, the growth in driving will substantially undermine much of the emissions reductions made possible by technology improvements from cleaner cars and more efficient engines.

Transportation-related air pollution impacts not only public health, but also exacts a huge price tag in terms of economic costs. Depending on how you value a life, the public health costs of pollution from cars and heavy duty vehicles have been estimated between $40 billion and $64 billion per year. The bulk of these public health costs are attributable to premature death, accounting for 77 percent of costs. The remainder is attributable to non-fatal illnesses.[9]

STPP has calculated specific public health costs from transportation-related air pollution for every major urban area in the U.S., the results of which can be found in Table 4, on page 36 in the full report.

Federal Efforts to Clean the Air Have Made Progress

Amendments to the Clean Air Act passed in 1990 have helped reduce air pollution from transportation by requiring that transportation plans be consistent with, or "conform to," state efforts to reduce air pollution. This process, referred to as air quality conformity, currently applies to both short-term (three years out) and long-term (20 years out) plans for metropolitan transportation projects and programs. The law requires that metropolitan areas re-evaluate those short- and long-term plans every two and three years respectively.

The air quality conformity process has been critical in getting transportation planners and air agencies to work cooperatively to find transportation and air quality solutions. Frequent updates can also focus public attention on transportation planning and help the public appreciate the need for investments in public transit and other alternative transportation modes. Most importantly, the conformity process has led to increased investments in cost-effective pollution-reducing transportation strategies that support more diverse travel choices.

To help states and metropolitan areas cut pollution from cars, buses and trucks, in addition to meeting the goals of the Clean Air Act, Congress established the Congestion Mitigation and Air Quality Improvement program (CMAQ) when it passed the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991. Under that program, states have spent over $11 billion in federal funds over the last 11 years to provide greater mobility and improve air quality in non-attainment and maintenance areas. Of that, more than $5 billion has been used for public transit projects.

The CMAQ program provides a dedicated source of federal funds to help states meet the air quality standards set under the Clean Air Act. Though the total amount of funding available under the CMAQ program is just a fraction of what the federal government provides to the states each year for transportation projects, the CMAQ program enjoys broad support from a range of interests, including local elected officials, transportation and air quality administrators, business and community groups, and the public.

Together, the Clean Air Act and the CMAQ program have provided critical tools for local officials trying to reduce air pollution and provide cleaner transportation options. As noted above, aggregate emissions of criteria pollutants have been cut by 25 percent over the last several decades. Places which have made the most of the CMAQ program have been even more successful in improving air quality. California in particular has taken full advantage of the CMAQ program, and spent those funds on improving mass transit service, switching to cleaner fuel engines, and other emissions reduction programs. As a result, the number of days of unhealthy ozone pollution levels in California’s larger metro areas has declined by 27 percent.

Proposals to Undermine Federal Clean Air Laws

Despite the progress made under the Clean Air Act and the air quality funding made available under the Congestion Mitigation and Air Quality Improvement (CMAQ) Program under the current federal transportation law, the Bush Administration and some in Congress have authored proposals to exempt many areas from Clean Air Act requirements, delay implementation of the new air quality standards, weaken the conformity process, and undermine the CMAQ program.

Specifically, those proposals would reduce the frequency with which transportation plans must be reviewed for their air quality impacts and excuse metropolitan areas from having to consider the long-term air pollution impacts of transportation projects. Some congressional proposals would allow major road projects to advance even if they don't conform with the air quality plan, thereby ensuring the failure of the air quality plan. Other proposals would eliminate federal review of the adequacy of air quality plan emission limits, allowing huge increases in motor vehicle emissions even though it guarantees the plan will fail and thus endanger public health.

At the same time, the federal air quality funding available under the CMAQ program is threatened by a dilution of its funding, as 135 new counties become eligible for funding under new U.S. EPA clean air standards. The Bush Administration's proposal for fiscal year 2004 cuts CMAQ funding by seven percent. While overall the Administration proposes increasing CMAQ funding by slightly over nine percent over the next six years, it will not be nearly enough to meet the new demand for funding and address the seriousness of the pollution problem from the newly regulated fine particulate pollution as well as from transportation-related air toxics, another major health threat. Under the new EPA standards for ozone and fine particulate pollution, the need for air funding is expected to grow by 33 percent.

Congress should reject efforts to weaken the Clean Air Act, undermine the conformity process, and underfund the CMAQ program. With new medical research illustrating the breadth and the severity of public health problems as a result of poor air quality, the nation must do more – not less – to protect all Americans from air pollution. Below are recommendations which can help fulfill the goal established by Senator Max Baucus (MT) that "...transportation plans and programs also serve as part of the pollution control strategy for the metropolitan area."[10]

Report Policy Recommendations

(1) Protect and strengthen clean air laws and air quality funding made available through the federal surface transportation law

- Significantly increase federal funding available under the Congestion Mitigation and Air Quality Improvement program (CMAQ) when Congress renews the federal transportation law this year. Funding should be increased significantly over current levels, proportional to the new demands from new areas and new pollutants covered under the revised national air standards.
- Require proportional spending authority for CMAQ over the life of the new surface transportation bill.
- Reject proposals to weaken the Clean Air Act and undermine current requirements that ensure transportation projects and programs conform to air pollution reduction plans.

(2) Strengthen the role of regional planning agencies in order to reduce transportation-related air pollution

- Direct CMAQ funding to local areas served by metropolitan planning organizations that do not meet federal air quality standards (including maintenance areas). Air pollution is often a regional problem, and these regional agencies are best suited to design and fund transportation programs that can help clean the air.
- Increase the funding available to metropolitan planning organizations for planning activities that will help reduce air pollution, including the modernization of air pollution models to better account for the impacts of "induced traffic."
- Encourage and provide adequate funding for the use of scenario planning tools that can help states and regions model the air pollution implications of different transportation and growth scenarios 10, 20 or 50 years into the future.

(3) Encourage a balanced approach to reducing air pollution that emphasizes cleaner vehicles and more convenient transportation options

- Increase guaranteed funding for mass transit projects and operations, as well as for bicycle and pedestrian facilities and other investments in non-motorized travel options.
- Maintain a fair and equal federal cost share (known as the federal "match") for all types of transportation projects, preserving the current law's federal match ratio of 80 percent for public transit projects.
- Promote higher fuel economy standards for all vehicles, in particular SUVs, and fund research and deployment of cleaner and more fuel efficient engines for trucks and buses.
- Increase commitments to transit-oriented retail and residential development, and make these factors key criteria for new mass transit ("New Start") projects.

Public Health and the Nation's Air Quality

Air pollution was historically viewed as an issue of visual pollution. But as the twentieth century progressed, our understanding of air pollution evolved considerably. In several highly publicized air pollution events, including the Donora, Pennsylvania fog, where 17 people died and nearly half the town's 14,000 residents became sick from a severe air pollution episode in 1948, both the scientific community as well as the public at large began to understand that air pollution was more than just a visual nuisance, it was also a significant threat to public health.[1]

Congress responded in 1970 by passing the Clean Air Act. In 1990, they approved a significant set of strengthening amendments to the Clean Air Act aimed specifically at reducing and managing air pollution from cars and heavy duty vehicles since it was increasingly evident that underestimating this source of air pollution had been a major factor in the failure of many air pollution control plans. In February 2001, the U.S. Supreme Court also upheld the right of the U.S. Environmental Protection Agency to use health-based air quality standards.

For decades, medical research has examined closely the linkages between different forms of air pollution and a wide array of public health issues. The more studies were done, the stronger the linkages appeared and the more significant the role of transportation appeared to be. Hundreds of peer-reviewed scientific papers have now linked air pollution to a host of serious public health concerns including asthma, cancer, heart disease, strokes, high blood pressure, birth defects, and brain damage.[2] Air pollution has been found to increase the risk of premature death, and not just for sensitive populations such as those with asthma, but for the general population as well. The new research also shows that minorities, children, and the elderly are especially vulnerable to the health effects of air pollution.

By far the most studied health effects of air pollution are asthma, cancer, and heart disease. The next sections will examine how emissions from cars and heavy duty vehicles may be contributing to the rise in asthma rates, causing cancer in both adults and children, and exacerbating heart disease.

Asthma

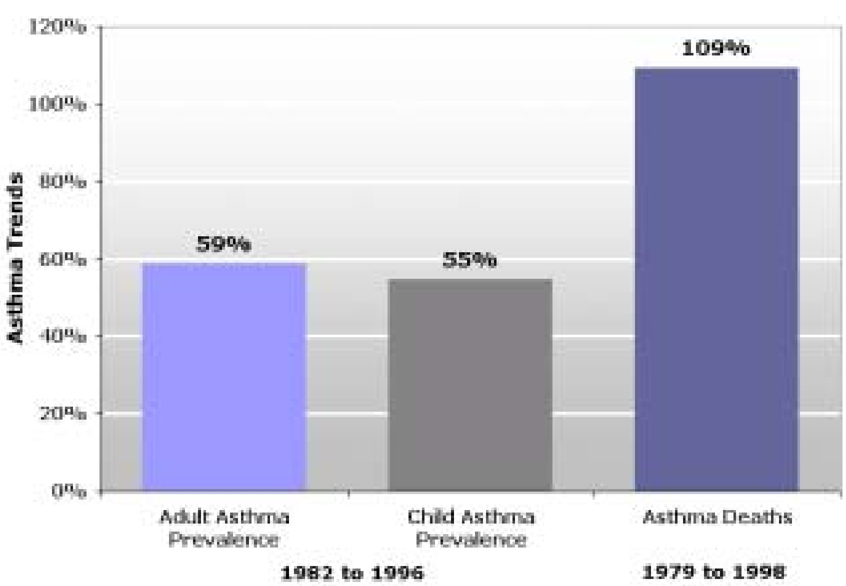
Asthmatics are among the most familiar with the EPA's air pollution warning system, and with good reason. An abundance of scientific literature has established that air pollutants from cars and heavy duty vehicles, particularly ground-level ozone and particulate matter (PM), even at levels below national standards, can exacerbate asthma in both adults and children, triggering attacks and increasing the risk of death.[3]

Asthma is a chronic respiratory disease characterized by episodes or attacks of inflammation and narrowing of small airways in response to irritants. Asthma attacks can vary from mild to life-threatening and involve shortness of breath, coughs, wheezing, chest pain or tightness, or a combination of these symptoms.[4]

Asthma attacks bring nearly 2 million Americans to emergency rooms each year, and account for 17 percent of all pediatric emergency room visits.[5] An estimated 3 million workdays and 10.1 million school days are lost to asthma each year. In 2001, the cost of treating asthma symptoms plus the indirect cost of lost work days totaled $14 billion.[6] (See the Appendix, beginning on page 55 for data showing the percentage of adults with a lifetime prevalence of asthma by metro area.)

The prevalence of asthma has grown significantly in recent years. Between 1982 and 1996, the number of people afflicted with asthma grew from 34.8 per 1,000 persons to 55.2 per 1,000 persons, a 59 percent increase. The prevalence of pediatric asthma also increased during that period, from 40.1 per 1,000 children to 62.0 per 1,000 children, an increase of 55 percent. [7]

Growth in Asthma Prevalence and Deaths



Source: American Lung Association. Minority Lung Disease Data 2000.

The latest data from the CDC puts pediatric asthma prevalence at 8.7 percent (or about one in twelve children), a figure which is not comparable to earlier estimates due to changes in methodology. Meanwhile, deaths from asthma attacks more than doubled from 1979 to 1998, with 5,438 deaths in 1998, up from 2,598 in 1979.[8]

Some of the most compelling evidence of how pollution from cars and heavy duty vehicles is linked to asthma comes from Atlanta, where during the 1996 Summer Olympics the city made a concerted effort to reduce driving. These efforts were so successful that morning traffic dropped by 22.5 percent, with a commensurate decline in peak daily ozone levels of 28 percent and particulate matter of 16 percent. Researchers found a large drop – 41.6 to 44.1 percent – in acute care visits for asthma and an 11.1 percent reduction in pediatric hospital emergency room visits for asthma.[9] In Samet, et al (2000), Sunyer, et al (2002), and other studies, researchers found that air pollution, including that from cars and heavy duty vehicles can take months to years off the lives of adults with severe asthma.[10,11,12,13]

A smaller, but growing set of scientific studies (most notably, Gauderman, et al, 2002, and McConnell, et al, also 2002) have looked at the health effects of long-term exposure to air pollution, including that from cars and heavy duty vehicles. Long-term exposure to ozone, particulate matter, and other pollutants associated with vehicles, has been found to diminish lung function and respiratory health, in both children and adults.[14,15,16,17,18,19]

Cancer

New research ties exposure to toxic chemicals and other air pollutants from cars and heavy duty vehicles to increased cancer rates for both adults and children.[20] Nationwide, the average additional cancer risk[21] from car and truck pollution is 215 cases per 1,000,000 residents. This figure refers to the estimated individual risk of getting cancer due to a lifetime of exposure to hazardous air pollutants from mobile sources. As a point of reference, the Clean Air Act (CAA) sets a goal of reducing lifetime cancer risk from toxic pollutants to 1 in

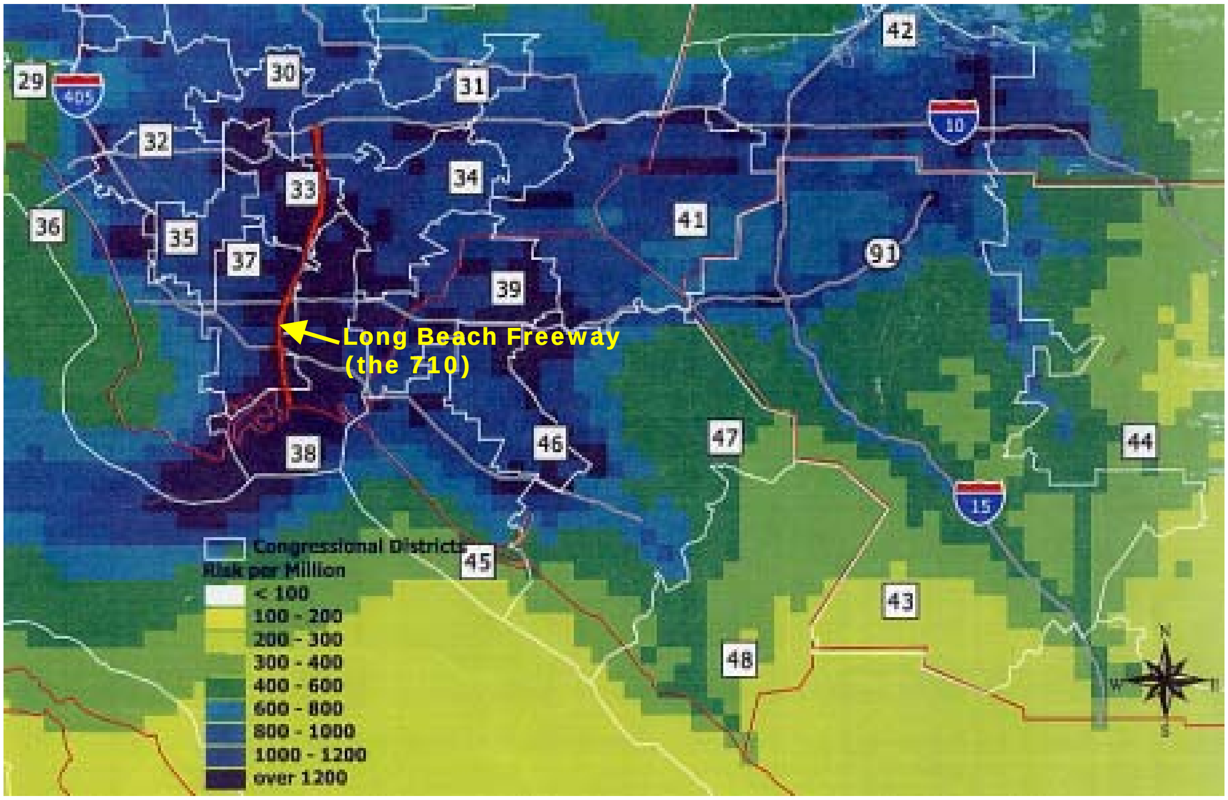
1,000,000; the current added cancer risk from cars and heavy duty vehicles is therefore 215 times the CAA goal.[22]

Particulate matter, toxic chemicals such as benzene (a known human carcinogen[23]), and other pollutants emitted from vehicles have been demonstrated to increase cancer risk.[24,25,26] Studies conducted in Sweden and Germany, for example, have found that adults who live on streets with heavy traffic have significantly higher risk of cancer. For lung cancer, the risk is between 20 and 34 percent greater than for people living on low-traffic streets.[27,28]

Research has also identified a link between air pollution from cars and heavy duty vehicles and childhood cancers such as leukemia and Hodgkin's disease. Exposure to very high benzene and nitrogen dioxide levels during pregnancy has been found to increase the risk of Hodgkin's disease by 25 percent and 51 percent respectively.[29] And a study of Denver children found that those living close to high-traffic roads were eight times more likely to develop leukemia than children not exposed to high levels of traffic.[30]

A Los Angeles study conducted by the South Coast Air Quality Management District found that the additional cancer risk for residents living along highways with heavy truck traffic was 1,700 per million residents, 21 to 42 percent higher than anywhere else in the Los Angeles basin.[31]

Expected Cancer Risk in the Los Angeles Metro Area



Source: SCAQMD. Multiple Air Toxics Exposure Study in the South Coast Air Basin: MATES-II (Final Report). Chapter 5. March 2000.

Heart Disease

Heart disease is the leading cause of death in the United States, causing 710,760 deaths in 2000 according to the Centers for Disease Control and Prevention (CDC). Recent research from the medical and public health community has demonstrated a connection between heart disease and exposure to ozone, and especially particulate matter pollution. Overall, air pollution has been found to be responsible for as much as five percent of hospital admissions for heart disease, as was found in one study of 8 U.S. counties.[32]

In one of the most extensive studies, led by Johns Hopkins School of Public Health, researchers found that for every 10 micrograms per cubic meter increase in coarse particulate matter (PM10) pollution, there was a 1 percent increase in hospital admissions for cardiovascular disease. (As a point of reference, the primary EPA standard for daily PM10 levels is 150 micrograms per cubic meter.)[33,34]

Research published just last year provides strong evidence of a link between acute exposure to coarse particulate matter pollution and premature death from cardiovascular causes.[35] This early mortality may take several months or more off the lives of people exposed to particulate matter pollution.[36] Perhaps most disconcerting, there appears to be no lower threshold for the effects of exposure to particulate matter pollution and early death from heart disease. Even very low levels of particulate matter pollution were linked to increased premature mortality. [37]

People with pre-existing heart conditions are especially susceptible to exacerbated heart disease and premature death brought on by exposure to air pollution.[38] And diabetics, who now comprise between five and 7.7 percent of the U.S. population, have been found to have twice the risk of heart disease problems from exposure to particulate matter pollution as the general population.[39]

Other Health Effects

In addition to asthma and cancer, air pollution from cars and heavy duty vehicles has also been linked to a number of other serious health effects such as strokes, high blood pressure, birth defects, brain damage, and even premature death.

- **Stroke.** New research shows that air pollution from cars and heavy duty vehicles, especially particulate matter and ozone, may cause strokes, one of the leading causes of death and long-term disability. Increases in particulate matter and ozone concentrations were found to have strong, nearly immediate associations with stroke deaths.[40,41]

- **High Blood Pressure.** Particulate matter exposure has recently been linked to increases blood pressure. The results are especially significant as blood pressure is a well-established risk factor for cardiovascular disease and deaths.[42,43]

- **Birth Defects.** A new study of babies born in Southern California finds that exposure to high concentrations of ozone and carbon monoxide during the second month of pregnancy may lead to increased risk of babies born with serious, heart-related birth defects.[44]

- **Brain Damage.** Exposure to high levels of air pollution has even been linked to brain damage. Two studies conducted in Mexico City – notorious for very high pollution levels – found that chronic exposure to high concentrations of ozone, particulate matter, and other pollutants associated with cars and heavy duty vehicles may compromise the brain's natural defenses, eventually resulting in extensive brain damage.[45,46]

- **Premature Death.** Numerous studies implicate ozone, particulate matter and other pollution from cars and heavy duty vehicles with early death.[47,48,49,50] Increases in motor vehicle-related particulate matter accounted for a 3.4 percent increase in daily mortality according to one recent study of six U.S. cities.[51] Chronic exposure to particulate pollution has been found to shorten lives by as much as one to three years.[52,53,54] Even small daily increases in particulate pollution have been shown to increase the number of deaths, particularly from heart and lung-related causes.[55,56,57,58] Further, there appears to be no lower limit, or threshold to death from particulate matter exposure. Mortality was found to be associated with even the lowest levels of particulate matter exposure examined.[59,60]

Populations Disproportionately at Risk

Minorities

Asthma is almost twice as common among African Americans as it is among whites, even when controlling for income levels.[61] On average, African American children are three times as likely as whites to be hospitalized for treatment of asthma.[62] Asthma attacks send more than four times as many African Americans (22.9 visits per 1,000 people) to the emergency room as whites (4.9 visits per 1,000 people). [63]

Even more disturbing are the disparities in asthma deaths among African Americans and whites. Though African Americans make up just under 13 percent of the U.S. population, they account for 23.7 percent of all asthma deaths. In 1998, the age-adjusted mortality rate for asthma was more than three times as high for African Americans (3.7 deaths per 100,000 people) as for whites (1.1 deaths per 100,000 people). [64]

While the exact causes of the excessively high rates of asthma among African American and other minority children are not completely understood, there is growing evidence that pollution plays a major role.[65] Principally, African Americans and Hispanics are much more likely than whites to be exposed to harmful air pollutants. While one-third of whites have been found to live in metropolitan areas failing to meet national air quality standards for two or more pollutants, 50 percent of African Americans and 60 percent of Hispanics lived in these areas. Even greater differences were found for areas that violate air quality standards for three and four pollutants.[66]

Minority and low income communities tend to have disproportionately high cancer rates as well. A newly released study from the American Cancer Society found that African American men in particular have a 20 percent higher incidence rate, and a 40 percent higher death rate from all cancers than do white men.[67] Though a number of factors may contribute to these disproportionate cancer rates, some research suggests that proximity to major roads may be an important factor.

A study conducted by the South Coast Air Quality Management District (the Los Angeles region's air agency) found that the additional cancer risk along highway corridors with significant big truck traffic was 1,700 per million residents, higher than anywhere else in the Los Angeles region, and much higher than the regional average of 1,200 to 1,400 per million residents. And those same highway corridors cut through communities with large numbers of low income and minority residents.[68]

Children

Children are particularly susceptible to the damaging effects of poor air quality for several reasons. First, children have a greater exposure to pollutants because they spend more time outside, often while playing actively. Children also breathe more rapidly, and therefore inhale more pollutants relative to their body weight than adults. Children's airway passages are narrower than those in adults, and so are more vulnerable to airway obstruction. Finally, several studies (most notably, Gauderman, et al, 2002, and McConnell, et al, also 2002) have found that because children's lungs are still developing (typically until the age of 12 years) exposure to high levels of air pollution may cause permanent damage.[69,70]

According to a new report from the U.S. Environmental Protection Agency, nearly 40 percent of American children live in areas where ozone levels exceeded the new eight-hour standard, and 27 percent live in areas exceeding standards for fine particulate matter (PM 2.5). That same study reports that childhood asthma in the U.S. has more than doubled in the last two decades. In 2001, 8.7 percent (6.3 million) of all American children were estimated to have asthma. Emergency room visits and hospital admissions for asthma and other respiratory causes are also continuing to increase, to the rate of 379 ER visits, and 66 hospital admissions per 10,000 children in 1999.[71]

One of the most startling statistics reported in the study is that *every* American child lived in an area where toxic air pollutants exceeded the 1-in-100,000 cancer risk benchmark in 1996, the most recent year for which data was available. (This benchmark is the concentration at which a lifetime of exposure to the pollutant is expected to cause one additional cancer in a population of 100,000 people.[72])

Older adults

Older adults, like children, are especially susceptible to the health effects of air pollution from cars and heavy duty vehicles. Older adults are more likely to suffer from ailments such as heart disease or respiratory (lung) disease, which may be exacerbated by air pollution. Even low levels (below national standards) of ozone, particulate matter and other pollutants increase respiratory symptoms and send elderly patients to the emergency room.[73,74]

In the largest study ever conducted on the subject (Fuchs and Frank, 2002), researchers examined millions of Medicare records and found that air pollution significantly increases the hospital admissions, emergency room visits, and doctor visits for older adults. Researchers compared medical care use for older adults living in areas with high levels of pollution to medical care use for older adults living in areas with low levels of pollution. On average, in the 37 most polluted metropolitan areas, respiratory admissions were 20 percent higher, medical admissions were 10 percent higher, and inpatient care use was seven percent higher than in the 37 least polluted metropolitan areas.[75]

For older adults, premature death from air pollution may be the most serious health concern. As noted above, chronic exposure to particulate pollution has been found to shorten lives by as much as one to three years.[76,77,78] To lose as many as three years of life because of air pollution is an especially critical concern for older Americans.

Places with the Worst Air Pollution

Where you live makes a tremendous amount of difference in terms of how much air pollution you're typically exposed to. There are two types of location that matter when it comes to air pollution – first, how close you live or work to very specific sources of pollution like ports, trucking centers, bus depots or heavily traveled roads. Second, how much pollution is created in the larger metropolitan area where you live.

In terms of regional air pollution, the U.S. Environmental Protection Agency produces a daily Air Quality Index that tracks air pollution levels for the six primary (or "criteria") pollutants and has become a standard part of weather forecasting throughout the U.S. The EPA publishes an annual survey detailing how many times each region's Air Quality Index exceeds 100, the standard for generally unhealthy air (it should be noted some researchers and clean air advocates suggest that health problems can be exacerbated at much lower levels). Table 1, on the next page, ranks the worst regions in terms of national air quality index ratings for the most days that exceeded the 100 level during the last three year period from 2000 to 2002. (For a more complete listing of all metropolitan areas see the Appendix, on page 55).

Air Quality Index (AQI): Ozone

Index Values	Levels of Health Concern	Cautionary Statements
0-50	Good	None
51-100	Moderate	Unusually sensitive people should consider limiting prolonged outdoor exertion.
101-150	Unhealthy for Sensitive Groups	Active children and adults, and people with respiratory disease, such as asthma, should limit prolonged outdoor exertion.
151-200	Unhealthy	Active children and adults, and people with respiratory disease, such as asthma, should avoid prolonged outdoor exertion; everyone else, especially children, should limit prolonged outdoor exertion.
201-300	Very Unhealthy	Active children and adults, and people with respiratory disease, such as asthma, should avoid *all* outdoor exertion; everyone else, especially children, should limit outdoor exertion.
301-500	Hazardous	Everyone should avoid all outdoor exertion.

Source: U.S. EPA. *Air Quality Index: A Guide to Air Quality and Your Health*. June 2000. <www.epa.gov/airnow/aqibroch/>

Table 1. Metro Areas with the Highest Number of Days of Unhealthy Air Quality (Total, 2000 to 2002)

Rank	Metro Area	Total Number of Days of Unhealthy Air Quality (2000 to 2002)
1	Riverside-San Bernardino, CA	445
2	Fresno, CA	421
3	Bakersfield, CA	409
4	Los Angeles-Long Beach, CA	255
5	Sacramento, CA	163
6	Pittsburgh, PA	134
7	Knoxville, TN	109
8	Birmingham, AL	100
9	Houston, TX	94
10	Baltimore, MD	93
11	Charlotte-Gastonia-Rock Hill, NC-SC	92
12	Cleveland-Lorain-Elyria, OH	85
13	Philadelphia, PA-NJ	84
14	San Diego, CA	82
15	Orange County, CA	81
16	Atlanta, GA	76
17	New York, NY	69
17	St. Louis, MO-IL	69
19	Detroit, MI	68
20	Ventura, CA	67
20	Washington, DC-MD-VA-WV	67
22	Louisville, KY-IN	66
23	Monmouth-Ocean, NJ	63
24	Middlesex-Somerset-Hunterdon, NJ	61
25	Harrisburg-Lebanon-Carlisle, PA	59
26	Cincinnati, OH-KY-IN	58
26	Wilmington-Newark, DE-MD	58
28	Fort Worth-Arlington, TX	56
28	Newark, NJ	56
30	Dallas, TX	53
30	Memphis, TN-AR-MS	53
32	Greensboro--Winston-Salem--High Point, NC	52
32	Greenville-Spartanburg-Anderson, SC	52
34	Raleigh-Durham-Chapel Hill, NC	50
35	Dayton-Springfield, OH	49
35	Gary, IN	49
35	New Haven-Meriden, CT	49
35	San Jose, CA	49
39	Salt Lake City-Ogden, UT	48
40	Chicago, IL	45
40	Youngstown-Warren, OH	45
42	Baton Rouge, LA	44
42	Columbus, OH	44
42	Grand Rapids-Muskegon-Holland, MI	44
42	Hartford, CT	44
46	Richmond-Petersburg, VA	43
47	Nashville, TN	42
48	Indianapolis, IN	40
48	Oakland, CA	40
50	Buffalo-Niagara Falls, NY	39

Table 1 is based on the total number of days in which AQI for 5 major pollutants exceeded 100 during the three-year period 2000 to 2002. Source: U.S. EPA. Number of Days with Air Quality Index Values Greater than 100 at Trend Sites, 1993-2002 (forthcoming).

Trends in Air Pollution

Air quality has improved significantly since the Clean Air Act was passed in 1970. Yet almost half of all Americans – more than 130 million people – still live in areas that violate federal health standards for air pollution,[79] and we now understand that even modest amounts of air pollution can have significant and detrimental impacts on public health.[80] In some larger metro areas, air pollution routinely reaches unhealthy levels nearly twice a week, and in 52 larger metropolitan areas for which data was available, air quality was unhealthy at least once a month.

An analysis of the last ten years of air quality data collected by the U.S. Environmental Protection Agency shows that the number of days of unhealthy ozone pollution levels nationally has held steady over the last decade (of the two summaries provided by the EPA, the ozone-only summary is the only one that has used a consistent methodology over the last decade, allowing for comparisons over time). Some metropolitan areas have shown significant improvements in ozone pollution, and nowhere have these changes been more dramatic than in California. While several regions in California – Los Angeles in particular – still have some of the worst air pollution problems in the country, they have also made some of the most significant gains using a combination of air pollution reduction strategies in addition to relying on a strong regional planning agency (known in Southern California as the South Coast Air Quality Management District) dedicated exclusively to fighting air pollution.

But in at least 30 larger metropolitan areas, in 20 states, the number of days of unhealthy air has increased over the past decade (see Table 2 on the next page). The number of unhealthy days of ozone levels nearly tripled in one area, and it increased by more than half in five others. In all but three of these places, both the number of days of unhealthy levels of air pollution, and the *population* have grown. In other words, not only is air pollution getting worse in these areas, but more people are breathing it.

Table 2. Trend in Days of Unhealthy Ozone Levels over Time

Rank	Metro Area	Number of Days of Unhealthy Ozone (Smog) Levels: Avg 1993-1997	Avg 1998-2002	Percent Change
1	Greenville-Spartanburg-Anderson, SC	7.2	19.8	175.0%
2	Knoxville, TN	25.0	42.8	71.2%
3	Charlotte-Gastonia-Rock Hill, NC-SC	22.4	35.6	58.9%
4	Greensboro--Winston-Salem--High Point, NC	12.6	19.6	55.6%
5	Akron, OH	9.4	14.4	53.2%
6	Harrisburg-Lebanon-Carlisle, PA	10.4	15.6	50.0%
7	Raleigh-Durham-Chapel Hill, NC	16.0	23.6	47.5%
8	Memphis, TN-AR-MS	15.8	23.0	45.6%
9	Youngstown-Warren, OH	8.6	12.4	44.2%
10	Middlesex-Somerset-Hunterdon, NJ	15.2	21.8	43.4%
11	Detroit, MI	10.2	14.2	39.2%
12	Birmingham, AL	14.2	19.6	38.0%
13	Grand Rapids-Muskegon-Holland, MI	10.8	14.8	37.0%
14	Newark, NJ	13.6	17.8	30.9%
15	Fresno, CA	64.0	81.8	27.8%
16	Monmouth-Ocean, NJ	19.0	24.2	27.4%
17	Pittsburgh, PA	18.0	22.6	25.6%
18	Baton Rouge, LA	14.4	17.6	22.2%
19	Chicago, IL	10.4	12.6	21.2%
20	New York, NY	16.8	20.0	19.0%
21	Dayton-Springfield, OH	12.8	15.2	18.8%
22	Atlanta, GA	29.6	34.8	17.6%
23	Richmond-Petersburg, VA	13.8	16.2	17.4%
24	Gary, IN	9.4	10.8	14.9%
25	Norfolk-Virginia Beach-Newport News, VA-NC	10.4	11.4	9.6%
26	Hartford, CT	13.2	14.4	9.1%
27	Dallas, TX	20.4	22.2	8.8%
28	Louisville, KY-IN	22.2	23.8	7.2%
29	Columbus, OH	14.0	15.0	7.1%
30	Sacramento, CA	31.8	34.0	6.9%
31	St. Louis, MO-IL	23.0	23.0	0.0%
32	Washington, DC-MD-VA-WV	30.8	30.6	-0.6%
33	Cincinnati, OH-KY-IN	12.2	12.0	-1.6%
34	Indianapolis, IN	16.0	15.6	-2.5%
35	Cleveland-Lorain-Elyria, OH	18.8	18.2	-3.2%
36	Fort Worth-Arlington, TX	19.2	18.4	-4.2%
37	Nashville, TN	21.4	20.4	-4.7%
38	Baltimore, MD	36.4	34.4	-5.5%
39	New Haven-Meriden, CT	13.2	12.4	-6.1%
40	Wilmington-Newark, DE-MD	23.0	21.4	-7.0%
41	Philadelphia, PA-NJ	32.0	29.2	-8.8%
42	Bakersfield, CA	95.2	85.4	-10.3%
43	Houston, TX	41.8	36.0	-13.9%
44	Nassau-Suffolk, NY	12.4	10.0	-19.4%
45	Riverside-San Bernardino, CA	130.8	95.4	-27.1%
46	Phoenix-Mesa, AZ	13.0	9.0	-30.8%
47	San Diego, CA	39.4	18.6	-52.8%
48	Los Angeles-Long Beach, CA	89.0	36.4	-59.1%
49	Ventura, CA	55.6	21.4	-61.5%

Table 2 compares the average number of days in which AQI for ozone only exceeded 100 during the first half of the decade (1993 to 1997), to the average number of days during the second half of the decade (1998 to 2002). Source: U.S. EPA. Number of Days with Air Quality Index Values Greater than 100 at Trend Sites, 1993-2002, Ozone Only (forthcoming).

While a substantial portion of the progress made in reducing air pollution has been attributable to gains made in the transportation sector, transportation is still a major contributor to air pollution – and in some regions of the country the single largest source of air pollution. Cleaner fuel and more efficient engines have made a difference, but in many cases advances in technology have been undermined by an exponential increase in driving. As will be explained in the next chapter, future advances in reducing air pollution will most likely come in metropolitan areas of the U.S. that combine a broad array of strategies including new engine technologies, more convenient transportation options like public transportation, bicycling and walking, and new regional approaches to encouraging smarter growth and land development patterns that will reduce the need for driving for shorter trips.

Metro Areas on the Wrong Track

This report focuses primarily on metro areas with relatively high ozone pollution levels (those averaging at least 10 days of unhealthy ozone levels per year). However, our analysis reveals that several metro areas with relatively low average ozone levels have been experiencing a sharp upward trend in ozone levels over the last decade. Though the ozone levels in these metro areas are not currently cause for alarm, if the trend continues, they may soon join the ranks of the nation's most polluted metro areas. The table below ranks these metro areas according to the relative growth in ozone levels over the last decade.

		Number of Days of Unhealthy Ozone (Smog) Levels		
Rank	**Metro Area**	**Avg 1993-1997**	**Avg 1998-2002**	**Percent Change**
1	Buffalo-Niagara Falls, NY	3.0	12.0	300.0%
2	Little Rock-North Little Rock, AR	2.6	7.2	176.9%
3	Rochester, NY	2.6	6.4	146.2%
4	Tampa-St. Petersburg-Clearwater, FL	2.6	6.0	130.8%
5	Denver, CO	2.0	4.6	130.0%
6	Allentown-Bethlehem-Easton, PA	6.2	13.8	122.6%
7	Orlando, FL	2.8	5.0	78.6%
8	Syracuse, NY	2.4	4.2	75.0%
9	Boston, MA-NH	5.2	8.4	61.5%
10	El Paso, TX	1.8	2.8	55.6%
11	Austin-San Marcos, TX	3.2	4.8	50.0%

Transportation's Role in Air Pollution

Cars, buses and trucks are a major source of pollutants that can significantly degrade air quality. Transportation is responsible for more than 50 percent of carbon monoxide, about 34 percent of nitrogen oxides (NOx) emissions, and more than 29 percent of hydrocarbon emissions (which combine with NOx in sunlight to form ozone or smog). Transportation also accounts for as much as 10 percent of fine particulate matter emissions. Table 3, on the next page, ranks all major metropolitan areas in the U.S. by the percent of all criteria air pollution from transportation sources.

Types of Air Pollutants

Criteria Pollutants

Under the Clean Air Act, the EPA established national air quality standards for six principal pollutants – carbon monoxide (CO), ozone (O_3), nitrogen dioxides (NO_2), sulfur dioxide (SO_2), particulate matter (PM), and lead (Pb). These principal or "criteria" pollutants were found to harm human health. Ozone, NOx, SO_2, and PM are all known to harm the respiratory and lung system. Lead accumulates in the blood, bones, and soft tissue, and can cause neurological damage. Carbon monoxide impedes the transport of oxygen in the blood.[1]

Of the criteria pollutants from cars and heavy duty vehicles, fine particulate matter (PM 2.5) may be the most dangerous to public health due to the ability of the small particles to reach the deepest regions of the lungs. Though cars and trucks account for a relatively small portion of total PM 2.5 emissions, the exposure is more harmful for people than emissions from other sources because the pollutants are emitted directly at ground level. Recognizing this, the U.S. EPA recently revised the air quality standards, adding fine particulate matter as a criteria pollutant.

Table 3. Estimated Percentage of Pollution from Cars and Heavy Duty Vehicles

Rank	Metro Area	Total Criteria Pollutants from Transportation (tons per year) (1999)	Total Criteria Pollutants from Transportation per Capita (pounds per year) (1999)	Percent of Total Criteria Pollutants from Transportation (1999)
1	Fort Worth-Arlington, TX	478,399	587	60.2%
2	San Antonio, TX	476,038	608	57.1%
3	Los Angeles-Long Beach, CA	1,910,100	409	56.9%
4	Austin-San Marcos, TX	365,636	638	56.7%
5	Dallas, TX	961,760	586	56.4%
6	Hartford, CT	425,939	742	55.6%
7	New York, NY	1,265,905	291	53.9%
8	Seattle-Bellevue-Everett, WA	652,430	559	53.6%
9	Columbus, OH	485,433	652	53.4%
10	Denver, CO	604,927	611	52.7%
11	Detroit, MI	1,437,967	643	52.7%
12	Raleigh-Durham-Chapel Hill, NC	387,553	701	50.5%
13	Orlando, FL	478,495	623	49.9%
14	Bergen-Passaic, NJ	273,916	408	49.9%
15	Fort Lauderdale, FL	353,786	461	49.3%
16	Atlanta, GA	1,531,706	794	48.6%
17	Indianapolis, IN	610,654	795	48.5%
18	Providence-Fall River-Warwick, RI-MA	366,760	652	48.5%
19	Oklahoma City, OK	394,375	754	48.1%
20	Nashville, TN	452,285	772	48.0%
21	Richmond-Petersburg, VA	367,572	765	48.0%
22	Chicago, IL	1,762,151	440	47.8%
23	Minneapolis-St Paul, MN-WI	952,670	663	47.7%
24	Monmouth-Ocean, NJ	228,793	413	47.6%
25	Houston, TX	1,035,710	516	47.4%
26	Miami, FL	397,146	365	47.3%
27	Washington, DC-MD-VA-WV	1,210,332	511	46.7%
28	Sacramento, CA	387,839	489	46.3%
29	Newark, NJ	449,913	460	45.4%
30	Philadelphia, PA-NJ	983,410	397	45.3%
31	Norfolk-Virginia Beach-Newport News, VA-NC	445,872	571	45.3%
32	Pittsburgh, PA	638,895	548	45.1%
33	Baltimore, MD	657,092	528	45.0%
34	Charlotte-Gastonia-Rock Hill, NC-SC	491,648	694	44.9%
35	Grand Rapids-Muskegon-Holland, MI	365,377	695	44.9%
36	San Diego, CA	555,818	394	44.4%
37	Kansas City, MO-KS	651,738	742	44.3%
38	Boston, MA-NH	1,389,709	843	44.1%
39	Greensboro-Winston-Salem-High Point, NC	425,335	721	43.7%
40	Middlesex-Somerset-Hunterdon, NJ	257,280	455	43.7%
41	Buffalo-Niagara Falls, NY	356,880	625	43.5%
42	Salt Lake City-Ogden, UT	340,643	534	43.1%
43	Oakland, CA	406,767	346	43.1%
44	Memphis, TN-AR-MS	336,255	609	42.8%
45	Rochester, NY	370,327	686	42.4%
46	Jacksonville, FL	341,008	646	42.4%
47	Cleveland-Lorain-Elyria, OH	624,800	563	41.8%
48	Milwaukee-Waukesha, WI	418,884	573	41.8%
49	Portland-Vancouver, OR-WA	491,951	533	41.5%
50	Riverside-San Bernardino, CA	600,352	375	41.5%

Table 3 shows the contribution of cars and heavy duty vehicles to pollution (all criteria pollutants) in metro areas. Values are calculated by aggregating the total tonnage (short tons) of mobile source pollution by metro area, and dividing it by population (1999) to determine the per capita contribution. Percentages of pollution from cars and heavy duty vehicles are determined by dividing the total amount from mobile sources by the total from all sources. Source: U.S. EPA. *1999 National Emissions Inventory (NEI) Version 2 for Criteria Pollutants, Tier 3 Summary*.

Toxic Pollutants

Selected Toxic Pollutants from Cars and Heavy Duty Vehicles:

- Acetaldehyde
- Acrolein
- Arsenic compounds
- Benzene
- 1,3-Butadiene
- Chromium
- Dioxins/ Furans
- Diesel Particulate Matter and Diesel Exhaust Organic Gases
- Ethyl benzene
- Formaldehyde
- n-Hexane
- Lead compounds
- Manganese compounds
- Mercury compounds
- Methyl tert-butyl ether (MTBE)
- Naphthalene
- Nickel compounds
- Polycyclic Organic Matter
- Styrene
- Toluene
- Xylenes

In addition to harmful criteria pollutants, the U.S. EPA has also identified nearly 190 toxic air pollutants. These pollutants have been linked to cancer and other serious health effects including damage to the immune system and reduced fertility, as well as neurological, developmental, respiratory, and other health problems. Toxic air pollutants can also end up in lakes or streams, or in the soil, where they may be taken up by plants and animals and magnified through the food chain.[2]

The U.S. EPA has identified some 20 toxic air pollutants that come from cars and heavy duty vehicles. Altogether, vehicles contribute nearly 32 percent of the estimated 4.7 million tons of toxic air pollutants released every year. For certain toxics, cars and heavy duty vehicles are an even more important source. For example, they emit over 50 percent of the total quantity of benzene, a known carcinogen. Likewise, more than 45 percent of the total concentration of 1,3-Butadiene, identified as a likely human carcinogen, is emitted by cars and heavy duty vehicles.[3]

It's no surprise that many metropolitan areas continue to see mixed progress towards achieving clean air goals or even worsening air quality. Only recently have policy makers begun to recognize the disconnect between federal efforts to improve air quality and federal transportation policy. Though the Clean Air Act first established vehicle emissions standards in 1970, not until the Clean Air Act Amendments were passed in 1990 were federal transportation funds explicitly tied to a region's efforts to

Diesel Trucks, Buses, and Construction Vehicles

This report focuses on pollution from cars, pickup trucks, SUVs, and vans, and policy efforts aimed at stemming the growth in driving. However, research has found that diesel trucks, buses, and construction vehicles are a significant source of air pollution, particularly fine particulate matter (PM 2.5), and that diesel exhaust is likely to cause cancer (in some areas, diesel exhaust is responsible for 70 percent of the added cancer risk).[4] The 3.3 million heavy-duty diesel trucks and buses on the roads today account for about 25 percent of the smog-forming pollutants, and more than half of the particulate matter emitted by all mobile sources.[5] EPA estimates that nonroad diesel vehicles, such as construction equipment and tractors, currently account for about 44 percent of diesel PM emissions and about 12 percent of NOx emissions from mobile sources nationwide, and in some urban areas the percentage is greater.

Improved freight management, and increased use of rail over trucks can help reduce pollution from heavy duty diesel vehicles. Anti-idling policies are also effective at reducing emissions. But the biggest reductions are likely to come from new technology, and policies that encourage or require the retrofit of older, dirtier diesel engines. While this report does not focus on efforts to clean up diesel emissions, those efforts are clearly an important part of the solution.

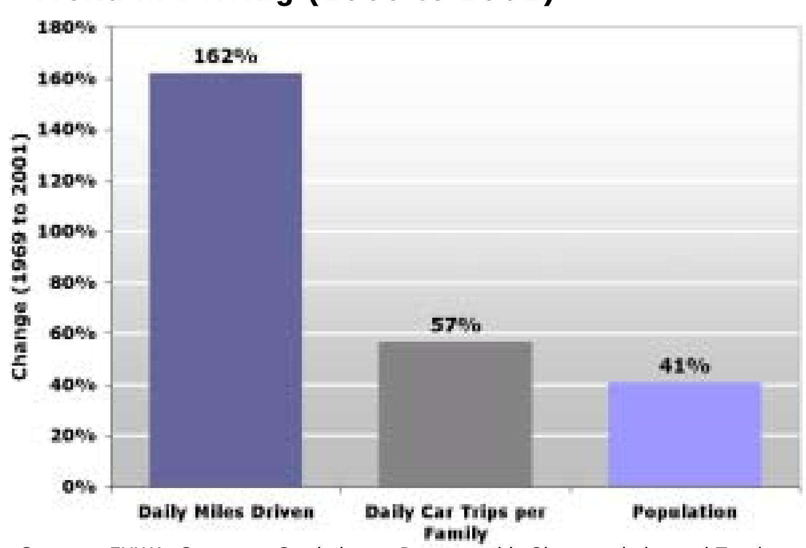
meet air quality standards. (And those requirements are only now being implemented in most metropolitan areas.) As Senator Max Baucus (MT) noted, "this legislation makes clear that it is time to develop transportation plans and programs that also serve as part of the pollution control strategy for the metropolitan area."[6]

Increases in Driving Undermine Gains from Vehicle Technology Improvements

New emissions standards, routine vehicle inspections, and clean technologies established and implemented by the Clean Air Act have had great success in cutting vehicle emissions per mile driven. It's estimated that emissions of criteria pollutants per mile driven have fallen by more than 90 percent since 1970.[7]

Unfortunately, those gains have been offset by huge increases in driving and trip-making. The number of miles driven in America has skyrocketed over the last several decades. From 1969 to 2001, the number of miles driven nearly tripled, growing from 1.1 trillion miles to 2.78 trillion miles. This is nearly four times the growth of population. But Americans aren't just traveling further, they're also traveling more often. Daily trips by vehicle have grown nearly 60 percent over the same period.[8,9,10] The growth in driving is no surprise to people who have been following the trend in community development in the last several decades. Most new communities have been built with the auto in mind, and have made little effort to accommodate public transportation, bicycling, walking, or other less polluting modes. The result is that residents of those communities have no choice but to drive to work, drive their children to school, drive to the grocery store, and drive to visit

Trend in Driving (1969 to 2001)



Sources: FHWA. *Summary Statistics on Demographic Characteristics and Total Travel 1969, 1977, 1983, 1990, and 1995 NPTS, and 2001 NHTS*. 2003. FHWA. *Highway Statistics Series, Summary to 1995, 1996-2001*. US Bureau of the Census.

A recent study found that the degree of sprawl is more strongly related to peak ozone levels than per capita income or employment levels

friends. All those vehicle trips add up to more air pollution. A recent study by Smart Growth America confirmed this, finding that the degree of sprawl is more strongly related to peak ozone levels than to per capita income or employment levels.[11]

The rise in trip-making is especially bad news for air quality, as between 60 to 80 percent of toxic pollutants, and as much as 90 percent of hydrocarbon emissions (which combine with NOx pollution in sunlight to form ozone) are emitted in the first few minutes after the car or truck has been turned on, before the engine has a chance to warm up and the catalytic converter can start doing its job.[12,13]

Los Angeles Takes Strides toward Cleaner Air through Balanced Approach

Los Angeles has pursued an aggressive strategy to reduce air pollution that relies on a broad array of pollution abatement measures. In addition to implementing technology-based measures and clean fuel and engine programs, L.A. has also slowed its road-building dramatically, adding just 5 percent of additional road space to its already massive network from 1993 to 2001. Fleets of new high-speed buses, light rail, and subway service (paid for in part with federal funds from the Congestion Mitigation and Air Quality Improvement program), as well as aggressive promotion of carpooling and vanpooling have also helped keep driving somewhat in check; the number of miles driven per person has grown by just over 11 percent in the last decade. Contrary to popular belief, the public transportation system is also widely used in Los Angeles, and developments like new subway and light rail lines as well as new “rapid bus” lines that rely on cleaner engines are attracting new patrons to an already well used system. Indeed, the Los Angeles transit system is the third largest in the U.S., and serves over 474 million trips per year.

The story of Los Angeles helps illustrate the need for new thinking in transportation policy if the nation is ever to truly tackle the air pollution problem. As noted, federal transportation and clean air policy has only recently established the tools that will make it possible for state and local agencies to address pollution from cars and heavy duty vehicles through better transportation policy and planning. Those tools – the Congestion Mitigation and Air Quality Improvement program (CMAQ), and requirements that planners ensure that transportation projects and programs conform to state plans for achieving air quality (Conformity Determinations) – are already showing results in places where they have been fully embraced.

Calculating the Health Costs of Air Pollution from Transportation

Depending on how you value a life, the public health costs of pollution from cars and heavy duty vehicles have been estimated at between $40 billion and $64 billion per year.[14] The bulk of these public health costs are attributable to premature death, accounting for 77 percent of costs. The remainder is attributable to non-fatal illnesses. These costs are significant when analyzing the public policy debate around minimizing air pollution. As will be explained in greater detail later in this report, one federal program in particular that is geared towards reducing air pollution from transportation sources (the Congestion Mitigation and Air Quality Improvement, or CMAQ, program under the current federal transportation funding law) amounts to a mere fraction of the total cost of transportation-related health problems.

Will Rolling up the Window Help?

Air quality inside cars 2 to 10 times worse than on sidewalk, studies find

Recent studies in the U.S. and in the Netherlands have found that the air we breathe inside our car is anywhere from 2 to 10 times worse than the air outside. A 1999 California Air Resources Board study compared roadside monitoring stations with monitors inside three different vehicles. Benzene, toluene, xylenes, and other volatile organic compounds were in significantly higher concentrations inside the car, varying by pollutant. The study found that the pollutant level inside each car was directly related to the amount of traffic, and type of cars, ahead of the test vehicle. Dr. Alan Lloyd, CARB Chairman said, "We're learning that peoples' highest daily exposure to air pollutants may be during their commute to and from work." This is an especially significant concern given that the average American spends about 66 minutes per day in their car.[15]

In another study, researchers in the Netherlands compared the pollutant intake of drivers, bicyclists and pedestrians. The findings show that bicyclists inhale less carbon monoxide, benzene, toluene, and xylenes than drivers, despite a faster breathing rate. Pedestrians walking along the roadway inhaled the fewest toxic gases, as compared to bicyclists or drivers, a combination of better air quality and slower breathing.[16]

Bill DeOre, *Dallas Morning News*, June 6, 2003. Reprinted with Permission from the *Dallas Morning News.*

STPP has estimated public health costs caused by transportation-related air pollution for every major urbanized area in the U.S., the results of which can be found in Table 4, below.

Table 4. Transportation-Related Public Health Costs from Air Pollution

Urbanized Area Name	Estimated Transportation-Related Public Health Cost from Air Pollution (2001)
Atlanta, GA	$637,606,638
Baltimore, MD	$296,820,738
Boston, MA	$380,663,063
Buffalo-Niagara Falls, NY	$137,752,825
Chicago-Northwestern IN, IL-IN	$1,027,716,813
Cincinnati, OH-KY	$211,317,663
Cleveland, OH	$234,018,838
Dallas-Fort Worth, TX	$676,359,600
Denver, CO	$292,419,750
Detroit, MI	$607,572,613
Fort Lauderdale-Hollywood-Pompano Beach, FL	$247,189,863
Houston, TX	$597,608,113
Kansas City, MO-KS	$266,422,625
Las Vegas, NV	$162,255,275
Los Angeles, CA	$1,807,866,900
Miami-Hialeah, FL	$278,514,163
Milwaukee, WI	$204,297,800
Minneapolis-St. Paul, MN	$394,210,950
New Orleans, LA	$97,990,638
New York-Northeastern NJ, NY-NJ	$1,714,564,688
Norfolk-VA Beach-Newport News, VA	$220,266,550
Oklahoma City, OK	$168,406,438
Orlando, FL	$222,974,850
Philadelphia, PA-NJ	$502,817,613
Phoenix, AZ	$383,665,188
Pittsburgh, PA	$227,126,725
Portland-Vancouver, OR-WA	$202,854,225
Riverside-San Bernardino, CA	$217,794,588
Sacramento, CA	$185,595,200
San Antonio, TX	$193,854,238
San Diego, CA	$417,448,675
San Francisco-Oakland, CA	$556,357,638
San Jose, CA	$249,879,000
Seattle, WA	$332,194,713
St. Louis, MO-IL	$378,274,138
Tampa-St Pete-Clearwater, FL	$301,062,038
Washington, DC-MD-VA	$537,527,288
West Palm Beach-Boca Raton-Delray Beach, FL	$163,832,988

Table 4 provides total transportation-related public health costs from air pollution. The values are derived by multiplying miles driven in each urbanized area in 2001 by $0.0175, an estimate of public health costs from FHWA. Source: FHWA. *FHWA Addendum to the 1997 Federal Highway Cost Allocation Study Final Report (May 2000).*

Federal Efforts to Clear the Air

Two key federal programs work to stem air pollution from transportation. The Clean Air Act establishes air quality standards and sets requirements for states to achieve those standards for vehicles. The Congestion Mitigation and Air Quality Improvement (CMAQ) program provides federal transportation funds to help states and regions implement pollution-cutting transportation projects and programs.

The Clean Air Act

Federal attempts to address air pollution first began in 1955 with the passage of the Air Pollution Control Act, and continued with successive laws. Those early laws were primarily aimed at providing federal funds to assist state-led efforts to improve air quality. However, without air quality standards and enforcement measures, the laws did little to improve air pollution and protect public health.

Not until 1970 did Congress pass the first comprehensive and binding legislation to improve air quality nationwide. The Clean Air Act of 1970 directed the newly-formed U.S. Environmental Protection Agency to establish National Ambient Air Quality Standards (NAAQs) for six common "criteria" pollutants – carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM), and lead (Pb) – which were found to seriously harm public health. Importantly, though the Clean Air Act sets federal air quality standards, the law leaves the primary responsibility for meeting those standards to the states.[1]

Requirements of the 1970 Clean Air Act spurred impressive advancements in pollution control technologies for vehicles. But, as discussed earlier in this report, the law did little to stem the growth in driving.

Congress responded to this shortcoming in the original law with the Clean Air Act Amendments of 1990, bolstering provisions to assure that federally-funded transportation projects in particular would significantly contribute to cleaner air. Since transportation was increasingly understood to be a major part of the air

The Alphabet Soup of Transportation and Air Quality Programs:

MPO – Metropolitan Planning Organization. A governmental agency established to ensure that transportation plans are regionally coordinated. The MPO is also required to evaluate the air quality impacts of regional transportation plans and programs.

SIP – State Implementation Plan. A compilation of control measures established by a state to help meet air quality goals. These control measures are created for stationary sources like power plants, area sources like gas stations and other small businesses, and mobile sources including cars and trucks. The SIP also establishes a transportation emissions budget for cars and trucks.

TIP – Transportation Improvement Program. Describes the regional transportation projects and programs planned by the MPO for the next one to six years.

LRTP – Long Range Transportation Plan. Describes the regional transportation projects and programs planned by the MPO for the next 20 years.

pollution problem, Congress asked transportation to be part of the solution. Under the new requirements, Metropolitan Planning Organizations (MPOs) are required to demonstrate that short-term transportation plans and programs (detailed in the Transportation Improvement Program, or TIP) and long-term transportation plans (described in the Long Range Transportation Plan or LRTP) comply or "conform" with the state's emissions budgets for transportation sources of pollution (outlined in the State Implementation Plan, or SIP). Under current law, MPOs must update their TIP every two years and their LRTP every three years to ensure that they are consistent with, or conform to, the State Implementation Plan. The transportation-air quality conformity process (or "conformity process" for short) requires that emissions from transportation sources contribute less air pollution than the levels established by the State's plan for attaining clean air. [2,3]

The Congestion Mitigation and Air Quality Improvement Program

The Congestion Mitigation and Air Quality Improvement program (CMAQ) was created under the federal transportation bill of 1991 known as "ISTEA." The CMAQ program provides a crucial dedicated source of federal funds to help states and local governments meet the air quality standards set under the Clean Air Act through innovative transportation projects and programs.

Under current law, the amount of CMAQ funding each state receives depends on how many of its residents live in areas that either fail to meet the federal standards for ozone or carbon monoxide, or that are working to avoid slipping into non-compliance. These states may use their CMAQ funding for transit improvements, travel demand management strategies, traffic flow improvements, public vehicle fleet conversions to cleaner fuels, and bicycle and pedestrian facilities, among others.[4]

Though the total amount of funding available under the CMAQ program is just a fraction of what the federal government provides to the states each year for transportation projects, the CMAQ program enjoys broad support from a wide range of interests, including local elected officials, transportation and air quality administrators, business and community groups, and the public.[5]

Current Threats to the Clean Air Act and the CMAQ Program

Limiting Air Quality Reviews

Proposals recently offered by the White House and now being considered in Congress threaten to greatly undermine the future effectiveness of both the Clean Air Act and the CMAQ program.

The Bush Administration, in its proposal for the pending renewal of the nation's transportation law, has called for the elimination of the short-term transportation plan (TIP), and consequently, the requirements for transportation-air quality conformity determinations every two years. The longer range transportation plan (LRTP) would be retained, but air quality impacts would only have to be evaluated every ten years, the latest year of the SIP, or the completion date of a major project, whichever is longest. This change would allow an enormous loophole for government agencies and metropolitan planning organizations considering the long-term air quality impacts of proposed transportation projects or programs. Further, the Administration's proposal would reduce the frequency of conformity determinations for the LRTP from once every three years to once every five years.[6]

These proposals are made under the premise that the conformity review process is a heavy burden for the public agencies required to perform the review. However, in addition to the obvious air quality benefits that are derived from producing more up-to-date plans, there are other benefits generated from a more frequent review process including interagency cooperation, public involvement and citizen education. As a recent report from the Government Accounting Office (GAO) on the transportation-air quality conformity process noted:

> Transportation planners responding to our survey reported that updating their long-range plans as often as currently required does have certain advantages. One primary advantage they identified was that it gave them an incentive to work cooperatively with other agencies. Such cooperation for transportation planners that must demonstrate conformity can promote early and frequent coordination between transportation and air quality planners, helping to avoid last minute conformity problems and lapses. Furthermore, frequent updates can help focus public attention on transportation planning. For example, one transportation planner commented that updating the long-range plan helped provide the public with a greater understanding of the nature of air quality problems and why alternative modes of travel may be needed in the future.[7]

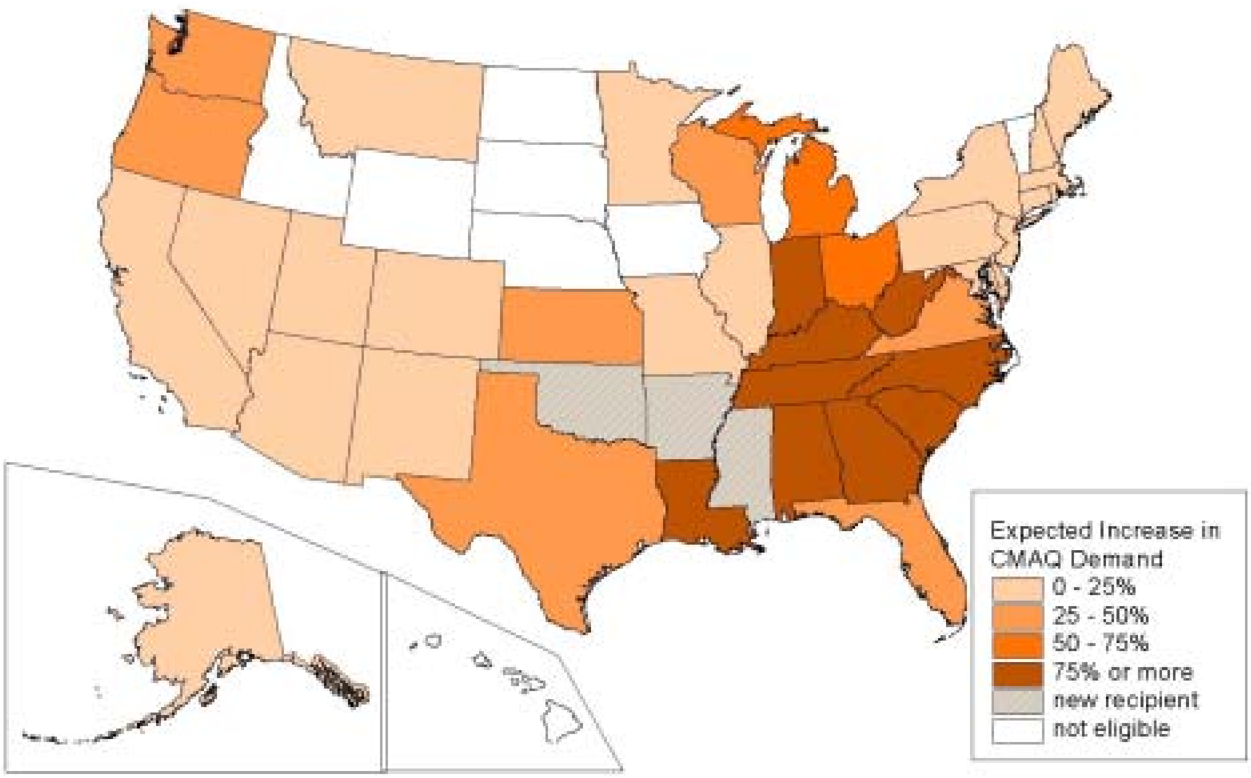
Most importantly, the transportation-air quality conformity process has led to increased investments in cost-effective pollution-reducing transportation strategies that support cleaner and more diverse travel choices, equitable access to jobs and public facilities, smarter growth, improved traffic safety, as well as safer and more attractive opportunities for walking and bicycling. A GAO survey of state air quality planners (conducted as part of the larger report mentioned above) found that more than three times as many planners believed that less frequent updates of the TIP would have a negative impact on air quality, as believed it would have a positive impact.[8]

Threats to the CMAQ Program

The CMAQ program also faces a number of serious threats to its continuing effectiveness in supporting transportation projects that promote clean air. Those threats include shrinking funding, opening the program's eligibility to highway expansion projects, requirements to demonstrate the program's cost-effectiveness, and the failure of states to fully spend available funding.

The Administration's reauthorization proposal calls for a 9.1 percent increase in CMAQ funding over the life of the six-year renewal bill. But under the new air quality standards set to take effect in 2005, more than 16 million additional people will live in counties eligible for CMAQ funding. And many counties that are currently eligible for CMAQ funding will be forced to address an additional and difficult pollutant (PM 2.5). Pollution severity and exposure are combined through weighting factors established in current law. These weighting factors help determine each state's share of funding, so that areas which must address more than one pollutant receive additional funds. The Bush Administration proposal makes changes to those weighting factors, in part to acknowledge the importance of PM 2.5 pollution. All together, the increase in exposure, addition of PM 2.5, and change in weighting factors will increase expected demand for funding by 33 percent nationally. For some states, the increase is even more dramatic. Figure 1, below, illustrates the expected increase in demand for each state.

Figure 1. Expected Increase in Demand for CMAQ Funds



Based on analysis conducted by Alix Bockelman of the Metropolitan Transportation Commission. Analysis compares weighted population under proposed weighting factors in SAFETEA and uses preliminary air quality data for the new EPA standards for 8-hour ozone and PM 2.5 to current weighting factors under TEA-21 and EPA standards. Analysis holds population steady at 2000 levels.

Almost since its creation, the CMAQ program has been under fire from highway construction interests because the program restricts spending to projects designed to reduce emissions from cars and heavy duty vehicles. As such, CMAQ funds are not currently eligible for traditional road-building projects, at least in states with nonattainment areas. The Bush Administration's bill maintains current eligibility requirements. But some in Congress continue to push for opening up CMAQ's eligibility for road-building.

Though no other federal highway program is held to the same standard, the Bush Administration's reauthorization proposal sets requirements that the CMAQ program should prove its cost-effectiveness. New legislative language included in SAFETEA requires that the Secretary of Transportation "in consultation with the Administrator of the Environmental Protection Agency, shall evaluate and assess a representative sample of projects funded under the Congestion Mitigation and Air Quality Improvement Program for their actual impact on emissions, and congestion levels and to assure effective program implementation."[9] However, as a recent Transportation Research Board study noted, even local-level evaluations are plagued by the untested accuracy and uncertainty of emissions models.[10] This means that at best, the Administration's requirement for a cost-effectiveness evaluation will prove to be an exercise in frustration for those who must carry it out. At

Do New Roads Cut Air Pollution?

Some transportation experts argue that the best way to cut pollution from cars and heavy-duty vehicles is to expand roadways in an effort to improve traffic flow. Their argument is that cars and heavy-duty vehicle stuck in traffic spew out lots of pollution, much more pollution than they would emit if they were traveling in free-flow conditions.

This was a more-or-less valid argument as recently as two decades ago. But vehicle technology improvements, and new science on the relationship between travel speeds, driving, and emissions has convinced most transportation experts that reducing congestion will not reduce air pollution.

As noted in this report, vehicle technology improvements such as the catalytic converter have helped dramatically reduce emissions per mile driven. However, technology has had a more difficult time addressing "cold start" emissions, those emissions that occur in the first few minutes and miles driven, before the catalytic converter has a chance to warm up. As a result, cold start emissions are now responsible for as much as 80 percent of pollution emitted. Reducing congestion and improving traffic flow will do nothing to address these cold start emissions.

Further complicating this picture is that emission rates for many pollutants follow a U–shaped curve, with emission rates declining as speed increases up to a certain level, and then climbing again. This is especially true for NOx pollution, a precursor to ozone, or smog. The ideal travel speed for NOx appears to be about 45 to 55 mph. But once traffic exceeds that limit, emission rates increase rapidly. While smoothing out traffic flow to get rid of the quick stops and fast accelerations can help reduce pollution, increasing travel speeds has mixed results.

Finally, because of a phenomenon known in the transportation field as "induced travel," adding capacity to major roads often results in additional travel (which then clogs up those very same roads). This occurs because the faster travel speeds, though typically short-lived, attract drivers to the newly expanded roadway. The additional driving that is caused by induced travel may more than offset any gains in pollution reduction from improved traffic flow.

worst, it will underestimate the air quality benefits of worthwhile innovative projects, threatening their eligibility for future CMAQ funding.

Perfectly accurate cost-benefit analysis does have the potential to improve the CMAQ program by assuring that only the most effective projects and programs receive funding. If an appropriate methodology can be agreed upon, it should be utilized not just for the CMAQ program but for all federal-aid highway programs.

Finally, the CMAQ Program is greatly undermined by a loophole in federal transportation funding. The average obligation rate (the portion of funds available that are actually spent) for core highway programs was 91.6 percent from Fiscal Year 1992 through Fiscal Year 2002. And traditional highway-building programs such as the National Highway System (NHS) program enjoyed a 94 percent obligation rate. But only 83.3 percent of CMAQ program funds were obligated over this period.[11] (For state-by-state CMAQ obligation rate data, see Table 5 on the next page.) As a result of this low obligation rate, more than $2 billion ($2.3 billion) in unobligated balance (the amount of available funds not spent) remains in the CMAQ program at the end of its first 11 years. This lost potential results largely from the discrepancy between contract authority (funding the federal government provides to each state), which is specific to each major program, and obligation limitation (the amount of funding that the federal government permits each state to actually spend), which applies to the entire contract authority for a state and is not differentiated by program.

Table 5. CMAQ Obligation Rates (FY1992-2002)

State	CMAQ Obligations (FY1992-2002) (millions)	CMAQ Apportionment (FY1992-2002) (millions)	Obligation Rate
Alabama	$50.1	$68.2	73.5%
Alaska	$57.1	$107.7	53.0%
Arizona	$226.8	$244.9	92.6%
Arkansas	$45.3	$68.4	66.3%
California	$2,266.3	$2,497.1	90.8%
Colorado	$121.1	$139.9	86.6%
Connecticut	$319.2	$336.8	94.7%
Delaware	$60.9	$67.2	90.6%
District of Columbia	$48.9	$61.8	79.2%
Florida	$364.9	$405.0	90.1%
Georgia	$251.9	$263.1	95.7%
Hawaii	$42.6	$68.2	62.4%
Idaho	$58.2	$72.0	81.0%
Illinois	$539.1	$665.9	81.0%
Indiana	$126.5	$151.5	83.5%
Iowa	$63.6	$64.0	99.3%
Kansas	$52.5	$63.4	82.8%
Kentucky	$99.6	$102.2	97.4%
Louisiana	$52.1	$67.2	77.6%
Maine	$55.2	$67.1	82.2%
Maryland	$325.6	$409.4	79.5%
Massachusetts	$367.8	$445.2	82.6%
Michigan	$292.5	$343.9	85.1%
Minnesota	$94.7	$121.0	78.3%
Mississippi	$53.2	$65.9	80.6%
Missouri	$138.9	$160.3	86.7%
Montana	$48.0	$74.8	64.1%
Nebraska	$45.3	$63.4	71.4%
Nevada	$56.9	$91.9	62.0%
New Hampshire	$42.7	$67.7	63.1%
New Jersey	$610.4	$760.0	80.3%
New Mexico	$50.8	$69.2	73.4%
New York	$1,116.4	$1,331.3	83.9%
North Carolina	$121.8	$150.2	81.1%
North Dakota	$65.9	$66.4	99.3%
Ohio	$423.0	$506.4	83.5%
Oklahoma	$58.9	$64.7	91.0%
Oregon	$79.6	$86.5	92.0%
Pennsylvania	$518.2	$707.3	73.3%
Rhode Island	$70.8	$77.6	91.2%
South Carolina	$49.1	$71.4	68.8%
South Dakota	$61.0	$67.4	90.5%
Tennessee	$104.7	$133.0	78.7%
Texas	$807.9	$1,066.0	75.8%
Utah	$74.0	$78.5	94.2%
Vermont	$58.5	$66.1	88.5%
Virginia	$203.4	$281.0	72.4%
Washington	$176.8	$204.9	86.3%
West Virginia	$55.0	$66.7	82.4%
Wisconsin	$122.9	$178.2	69.0%
Wyoming	$64.9	$65.8	98.6%
Nationwide	**$11,261.4**	**$13,523.9**	**83.3%**

Table 5 provides obligations and apportionments for the CMAQ program for the period FY 1992 to FY 2003. Obligation rate is calculated by dividing obligations by apportionments. Source: STPP Analysis of FHWA Fiscal Management Information System.

Recommendations for Improving the Clean Air Act and the CMAQ Program

The Clean Air Act and incentives such as the CMAQ program have helped improve air quality for millions of Americans, despite the poor performance of many states. Full implementation of the requirements of the Clean Air Act Amendments of 1990 have only recently taken hold due to delays and bureaucratic foot-dragging. And, as we've just seen, many states are not taking full advantage of funding available under the CMAQ program. Even so, aggregate emissions of criteria pollutants have been cut by 25 percent since the Clean Air Act was first passed in 1970. And the CMAQ program has provided more than $5 billion in funds to transit agencies, plus almost $3 billion for other transportation improvements, efforts that have helped states reduce pollution.

Projects funded through the CMAQ program "improve our quality of life, by reducing pollution, by relieving congestion, and by allowing us to walk or bike in a more pleasant environment."

-- Mary Peters, FHWA Administrator

Both the Clean Air Act and the CMAQ program can be made more effective. But improvements must build on the success of the statutes rather than undermining them. Now is no time to be turning our back on laws and funding programs that can help clean the air and protect public health, especially when medical research continues to demonstrate the link between transportation, air pollution and public health,

Below are three recommendations that will help policy-makers fulfill their promise to deliver clean air to millions of Americans.

(1) <u>Protect and strengthen clean air laws and air quality funding made available through the federal surface transportation law</u>

- Increase total funding available under the CMAQ Program. CMAQ funding must rise significantly over current levels in the next transportation authorization to sustain the current level of effort in non-attainment areas.

- Require proportional spending authority for CMAQ over the life of the new transportation bill. This would ensure that states don't underobligate the CMAQ Program in favor of road-building programs and other priorities to the detriment of clean air.

- Congress should resist changes to CMAQ's eligibility limitations. CMAQ funds, which now represent only a small share of total transportation spending, should not be made available to fund new road construction or road expansion projects. Before any changes to eligibility are accepted, Congress should require the GAO to review the air quality benefits of the proposed project types, helping to focus CMAQ funding on projects with air quality benefits.

<u>(2) Strengthen the role of regional planning agencies in order to reduce transportation-related air pollution</u>

- Direct (or "suballocate") CMAQ funds to local areas (those served by MPOs) that are in non-compliance with (or maintaining) applicable federal air quality standards for ozone, carbon monoxide, and particulate matter. This recommendation largely follows the provisions of the Surface Transportation Program (STP), which allocates STP funds to larger metropolitan planning organizations serving areas of 200,000 or more (including proportional obligation authority).

- Congress should increase the funding available to MPOs for planning activities. This would help MPOs acquire additional staff and resources in order to better meet the current air quality conformity requirements set under the Clean Air Act in addition to updating emissions forecasting models to take into account the effects of induced travel.

- To ensure that planners consider how proposed projects will affect land use development, Congress should encourage (and provide adequate funding for) the integration of scenario planning tools, particularly those that involve the visual display and quantitative projection of long-range plan outcomes, into the development of the LRTP and the short-term TIP.

(3) Encourage a balanced approach to reducing air pollution that emphasizes cleaner vehicles and more convenient transportation options

- Increase guaranteed funding for mass transit projects and operations, as well as for bicycle and pedestrian facilities and other investments in non-motorized travel options.
- Maintain a fair and equal federal cost share (known as the federal "match") for all types of transportation projects, preserving the current law's federal match ratio of 80 percent for public transit projects.
- Promote higher fuel economy standards for all vehicles, in particular SUVs, and fund research and deployment of cleaner and more fuel efficient engines for trucks and buses.
- Increase commitments to transit-oriented retail and residential development, and make these factors key criteria for new mass transit ("New Start") projects.

Methodology

Clearing the Air contains several different metro area and state rankings, including some entirely original to this report. In this section we will describe the various metrics, and explain how they were derived.

Air Quality Index

The Air Quality Index, or AQI, is a measure of the severity of air pollution, developed by the U.S. EPA. Air quality is rated on a scale of 0 to 500, with 500 being the worst, though the AQI rarely reaches this level. These figures are often reported along with temperature and rainfall averages in the weather section of newspapers. In general, an AQI value greater than 100 for any given pollutant indicates that the air is unhealthy for sensitive people, including children, asthmatics, and older persons. Using that level as a benchmark, EPA provides a summary of the number of days in which AQI exceeds 100 in a given year for major Metropolitan Statistical Areas (MSAs) and Primary Metropolitan Statistical Areas (PMSAs) across the U.S. The summary is provided for both ozone only (using the 8-hour standard) and for five major air pollutants regulated by the Clean Air Act (ground-level ozone, particulate matter, carbon monoxide, sulfur dioxide, and nitrogen dioxide).

STPP used these EPA summaries in two ways. First, to demonstrate current pollution levels in various metro areas across the U.S., STPP totaled the number of days of unhealthy air quality for *all pollutants* over the three-year period from 2000 to 2002 in each metro area. Metro areas were then sorted according to this figure, with the highest ranking metro area having the highest number of days over the period.

Second, STPP also wanted to examine the trend in pollution levels over the last decade. To do so, we averaged the number of days of unhealthy *ozone* levels over the first five years in the decade, 1993 to 1997, and compared that value to the average over the last five years in the decade, 1998 to 2002. It was deemed necessary to look at five years of data because of significant year-to-year fluctuations in air quality due to weather and other non-recurring events. We were also restricted to using the ozone only data because EPA changed the methodology by which they track AQI days for all pollutants in

1999, adding data for PM 2.5 in that year. Metro areas which averaged 10 or fewer days of unhealthy air quality over the decade were excluded from this analysis, as were metro areas which had 5 or fewer years in which at least one day of unhealthy air quality was recorded.

Mobile Source Contribution to Air Pollution

While mobile sources are a primary source of pollution across the country, their contribution varies considerably from place to place. To illustrate the relative importance of cars and heavy-duty vehicles to air pollution in each metro area, STPP analyzed the U.S. EPA's National Emissions Inventory for criteria pollutants, most recently published in 1999. This data is provided by county, and in terms of total short tons (2,000 pounds) of each pollutant emitted, and by all sources. STPP aggregated the data for all criteria pollutants, and by MSA and PMSA, for on-road mobile sources, and all sources of pollution. This figure was divided by the population for each metro area in 1999 and multiplied by 2,000 pounds to determine the per capita quantity of pollution emitted from mobile sources in each metro area. It should be noted that this figure does not imply that each person is responsible for the quantity of pollution shown. Dividing the total value for mobile sources by the value for all sources gives the relative contribution of mobile sources, in each metro area.

Public Health Costs of Air Pollution from Cars and Heavy-Duty Vehicles

In a 2000 addendum to a 1997 study on the costs of highways, the Federal Highway Administration (FHWA) estimated the costs of premature death and increased illness caused by air pollution from cars and heavy-duty vehicles. This analysis only considers criteria air pollutants, and does not factor in public health costs from toxic air pollutants.

In its study, FHWA puts the public health costs from air pollution at $0.0175 per mile driven in urban areas (the value is lower, $0.015 per mile driven, in rural areas). STPP estimated the public health costs per urbanized area (UZA) by multiplying the 2001 number of miles driven in each UZA by $0.0175. Note, these figures are by urbanized area, rather than by MSA or

PMSA. Urbanized areas are similar, but do not correspond exactly to MSAs or PMSAs.

Adult Asthma

The percentage of adults with a lifetime prevalence of asthma (shown in the Appendix, beginning on page 55) was calculated using data from the Center for Disease Control and Prevention's 2002 Behavioral Risk Factor Surveillance System (BRFSS). In that survey, respondents were asked whether they had ever been told by a doctor that they have asthma. This data is provided by MSA, PMSA, and New England County Metropolitan Area (NECMA). However, where the sample size was fewer than 50 respondents (the benchmark for validity set by the CDC), those metro areas were excluded. The percentage shown in the Appendix was calculated simply by dividing the number of respondents who indicated that they had, at some time, been diagnosed with asthma, by the total number of respondents for each metro area.

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Appendix

Major Metro Areas (over 1 million population)

Metro Area	Total Number of Days of Unhealthy Air Quality (2000 to 2002) (all pollutants)	Number of Days of Unhealthy Ozone (Smog) Levels												
		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Avg 1993-1997	Avg 1998-2002	Percent Change
Atlanta, GA MSA	76	36	15	36	28	33	52	61	27	10	24	29.6	34.8	17.6%
Austin-San Marcos, TX MSA	11	2	4	10	0	0	5	8	6	0	5	3.2	4.8	50.0%
Baltimore, MD PMSA	93	48	40	36	28	30	51	40	16	26	39	36.4	34.4	-5.5%
Bergen-Passaic, NJ PMSA	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Boston, MA-NH PMSA	29	2	6	7	4	7	8	8	1	12	13	5.2	8.4	61.5%
Buffalo-Niagara Falls, NY MSA	39	1	4	6	3	1	13	8	5	13	21	3	12	300.0%
Charlotte-Gastonia-Rock Hill, NC-SC MSA	92	29	15	18	21	29	50	42	24	26	36	22.4	35.6	58.9%
Chicago, IL PMSA	45	3	8	24	7	10	12	14	1	16	20	10.4	12.6	21.2%
Cincinnati, OH-KY-IN PMSA	58	5	16	19	10	11	13	11	4	6	26	12.2	12	-1.6%
Cleveland-Lorain-Elyria, OH PMSA	85	16	23	24	18	13	21	20	4	17	29	18.8	18.2	-3.2%
Columbus, OH MSA	44	8	12	18	19	13	21	22	6	7	19	14	15	7.1%
Dallas, TX PMSA	53	12	24	29	10	27	33	25	22	16	15	20.4	22.2	8.8%
Denver, CO PMSA	19	3	2	3	2	0	9	3	2	2	7	2	4.6	130.0%
Detroit, MI PMSA	68	5	11	12	12	11	17	14	3	16	21	10.2	14.2	39.2%
Fort Lauderdale, FL PMSA	8	4	1	1	1	0	1	1	1	2	1	1.4	1.2	-14.3%
Fort Worth-Arlington, TX PMSA	56	9	31	28	14	14	17	19	16	17	23	19.2	18.4	-4.2%
Grand Rapids-Muskegon-Holland, MI MSA	44	3	14	18	9	10	19	21	3	11	20	10.8	14.8	37.0%
Greensboro--Winston-Salem--High Point, NC MSA	52	22	7	13	7	14	26	24	12	12	24	12.6	19.6	55.6%
Hartford, CT MSA	44	14	18	13	5	16	10	18	7	16	21	13.2	14.4	9.1%
Houston, TX PMSA	94	27	41	66	28	47	38	51	41	28	22	41.8	36	-13.9%
Indianapolis, IN MSA	40	9	22	21	16	12	19	24	4	8	23	16	15.6	-2.5%
Jacksonville, FL MSA	1	0	0	0	0	0	3	2	0	0	0	0	1	-
Kansas City, MO-KS MSA	22	3	10	21	6	16	14	3	10	4	7	11.2	7.6	-32.1%
Las Vegas, NV-AZ MSA	9	3	3	0	4	0	3	0	0	1	2	2	1.2	-40.0%
Los Angeles-Long Beach, CA PMSA	255	112	117	97	74	45	46	19	45	37	35	89	36.4	-59.1%
Louisville, KY-IN MSA	66	22	28	26	17	18	29	44	10	10	26	22.2	23.8	7.2%
Memphis, TN-AR-MS MSA	53	13	10	21	18	17	27	35	24	13	16	15.8	23	45.6%
Miami, FL PMSA	4	6	1	2	1	3	8	5	0	1	0	2.6	2.8	7.7%
Middlesex-Somerset-Hunterdon, NJ PMSA	61	13	9	20	15	19	22	26	11	21	29	15.2	21.8	43.4%
Milwaukee-Waukesha, WI PMSA	32	4	12	14	5	5	12	17	4	12	12	8	11.4	42.5%
Minneapolis-St Paul, MN-WI MSA	5	0	0	3	0	0	1	0	0	2	1	0.6	0.8	33.3%
Monmouth-Ocean, NJ PMSA	63	24	13	20	17	21	31	27	11	21	31	19	24.2	27.4%
Nashville, TN MSA	42	18	21	26	22	20	30	33	16	7	16	21.4	20.4	-4.7%
Nassau-Suffolk, NY PMSA	21	17	15	10	8	12	11	18	5	3	13	12.4	10	-19.4%
New Orleans, LA MSA	24	6	8	20	8	7	7	18	17	5	2	9.8	9.8	0.0%
New York, NY PMSA	69	11	16	20	14	23	18	25	11	16	30	16.8	20	19.0%
Newark, NJ PMSA	56	13	11	20	11	13	22	21	6	13	27	13.6	17.8	30.9%
Norfolk-Virginia Beach-Newport News, VA-NC MSA	27	19	6	6	4	17	15	16	5	6	15	10.4	11.4	9.6%
Oakland, CA PMSA	40	4	3	12	11	0	12	8	3	3	5	6	6.2	3.3%
Oklahoma City, OK MSA	10	2	5	13	2	4	7	4	6	2	2	5.2	4.2	-19.2%
Orange County, CA PMSA	81	25	15	8	9	3	6	1	4	2	0	12	2.6	-78.3%
Orlando, FL MSA	10	4	3	1	1	5	14	4	3	3	1	2.8	5	78.6%

Appendix

Major Metro Areas (over 1 million population)

Metro Area	Total Number of Days of Unhealthy Air Quality (2000 to 2002) (all pollutants)	Number of Days of Unhealthy Ozone (Smog) Levels												
		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Avg 1993-1997	Avg 1998-2002	Percent Change
Philadelphia, PA-NJ PMSA	84	51	25	30	22	32	37	32	17	27	33	32	29.2	-8.8%
Phoenix-Mesa, AZ MSA	26	14	7	19	15	10	14	10	9	6	6	13	9	-30.8%
Pittsburgh, PA MSA	134	13	20	25	12	20	39	23	4	19	28	18	22.6	25.6%
Portland-Vancouver, OR-WA PMSA	15	0	1	2	6	0	3	0	0	0	1	1.8	0.8	-55.6%
Providence-Fall River-Warwick, RI-MA MSA	22	0	5	7	2	3	2	2	2	10	9	3.4	5	47.1%
Raleigh-Durham-Chapel Hill, NC MSA	50	17	15	12	14	22	40	29	12	8	29	16	23.6	47.5%
Richmond-Petersburg, VA MSA	43	22	9	14	5	19	22	21	5	12	21	13.8	16.2	17.4%
Riverside-San Bernardino, CA PMSA	445	167	149	119	115	104	95	96	98	92	96	130.8	95.4	-27.1%
Rochester, NY MSA	19	0	1	6	0	6	4	9	1	5	13	2.6	6.4	146.2%
Sacramento, CA PMSA	163	20	37	41	44	17	29	39	29	34	39	31.8	34	6.9%
St Louis, MO-IL MSA	69	9	31	38	23	14	24	29	16	14	32	23	23	0.0%
Salt Lake City-Ogden, UT MSA	48	2	9	5	12	2	19	4	7	4	7	6	8.2	36.7%
San Antonio, TX MSA	17	3	3	17	2	3	6	9	0	0	17	5.6	6.4	14.3%
San Diego, CA MSA	82	58	46	48	31	14	33	16	14	17	13	39.4	18.6	-52.8%
San Francisco, CA PMSA	33	0	0	2	0	0	0	0	0	0	0	0.4	0	-100.0%
San Jose, CA PMSA	49	4	2	14	8	0	8	3	1	3	6	5.6	4.2	-25.0%
Seattle-Bellevue-Everett, WA PMSA	16	0	3	0	6	1	3	1	1	0	0	2	1	-50.0%
Tampa-St Petersburg-Clearwater, FL MSA	12	1	3	2	3	4	11	9	6	4	0	2.6	6	130.8%
Washington, DC-MD-VA-WV PMSA	67	52	22	32	18	30	47	39	11	22	34	30.8	30.6	-0.6%
West Palm Beach-Boca Raton, FL MSA	1	3	0	0	0	0	2	1	0	1	0	0.6	0.8	33.3%

Appendix

Major Metro Areas (over 1 million population)

Metro Area	Total Criteria Pollutants from Transportation (tons per year) (1999)	Total Criteria Pollutants from Transportation per Capita (pounds per year) (1999)	Percent of Total Criteria Pollutants from Transportation (1999)	Percentage of Adults Who Have Ever Been Diagnosed with Asthma (2002)
Atlanta, GA MSA	1,531,706	794	48.6%	11.9%
Austin-San Marcos, TX MSA	365,636	638	56.7%	14.6%
Baltimore, MD PMSA	657,092	528	45.0%	12.5%
Bergen-Passaic, NJ PMSA	273,916	408	49.9%	10.4%
Boston, MA-NH PMSA	1,389,709	843	44.1%	
Buffalo-Niagara Falls, NY MSA	356,880	625	43.5%	9.6%
Charlotte-Gastonia-Rock Hill, NC-SC MSA	491,648	694	44.9%	11.3%
Chicago, IL PMSA	1,762,151	440	47.8%	11.0%
Cincinnati, OH-KY-IN PMSA	510,319	627	36.9%	10.8%
Cleveland-Lorain-Elyria, OH PMSA	624,800	563	41.8%	11.8%
Columbus, OH MSA	485,433	652	53.4%	8.7%
Dallas, TX PMSA	961,760	586	56.4%	14.0%
Denver, CO PMSA	604,927	611	52.7%	12.6%
Detroit, MI PMSA	1,437,967	643	52.7%	13.3%
Fort Lauderdale, FL PMSA	353,786	461	49.3%	8.8%
Fort Worth-Arlington, TX PMSA	478,399	587	60.2%	15.1%
Grand Rapids-Muskegon-Holland, MI MSA	365,377	695	44.9%	9.5%
Greensboro--Winston-Salem--High Point, NC MSA	425,335	721	43.7%	10.4%
Hartford, CT MSA	425,939	742	55.6%	
Houston, TX PMSA	1,035,710	516	47.4%	9.5%
Indianapolis, IN MSA	610,654	795	48.5%	12.8%
Jacksonville, FL MSA	341,008	646	42.4%	10.9%
Kansas City, MO-KS MSA	651,738	742	44.3%	12.1%
Las Vegas, NV-AZ MSA	373,148	540	34.7%	13.2%
Los Angeles-Long Beach, CA PMSA	1,910,100	409	56.9%	13.1%
Louisville, KY-IN MSA	338,562	673	39.1%	11.1%
Memphis, TN-AR-MS MSA	336,255	609	42.8%	9.9%
Miami, FL PMSA	397,146	365	47.3%	11.7%
Middlesex-Somerset-Hunterdon, NJ PMSA	257,280	455	43.7%	10.7%
Milwaukee-Waukesha, WI PMSA	418,884	573	41.8%	14.3%
Minneapolis-St Paul, MN-WI MSA	952,670	663	47.7%	11.6%
Monmouth-Ocean, NJ PMSA	228,793	413	47.6%	10.7%
Nashville, TN MSA	452,285	772	48.0%	11.4%
Nassau-Suffolk, NY PMSA	394,339	293	39.1%	9.2%
New Orleans, LA MSA	286,874	439	31.3%	10.8%
New York, NY PMSA	1,265,905	291	53.9%	13.1%
Newark, NJ PMSA	449,913	460	45.4%	10.8%
Norfolk-Virginia Beach-Newport News, VA-NC MSA	445,872	571	45.3%	11.9%
Oakland, CA PMSA	406,767	346	43.1%	13.8%
Oklahoma City, OK MSA	394,375	754	48.1%	10.9%
Orange County, CA PMSA	494,177	358	41.0%	16.1%
Orlando, FL MSA	478,495	623	49.9%	13.4%

Urbanized Area	Estimated Transportation-Related Public Health Cost from Air Pollution (2001)
Atlanta, GA	$637,606,638
Baltimore, MD	$296,820,738
Boston, MA	$380,663,063
Buffalo-Niagara Falls, NY	$137,752,825
Chicago-Northwestern IN, IL-IN	$1,027,716,813
Cincinnati, OH-KY	$211,317,663
Cleveland, OH	$234,018,838
Dallas-Fort Worth, TX	$676,359,600
Denver, CO	$292,419,750
Detroit, MI	$607,572,613
Fort Lauderdale-Hollywood-Pompano Beach, FL	$247,189,863
Houston, TX	$597,608,113
Kansas City, MO-KS	$266,422,625
Las Vegas, NV	$162,255,275
Los Angeles, CA	$1,807,866,900
Miami-Hialeah, FL	$278,514,163
Milwaukee, WI	$204,297,800
Minneapolis-St. Paul, MN	$394,210,950
New Orleans, LA	$97,990,638
New York-Northeastern NJ, NY-NJ	$1,714,564,688
Norfolk-VA Beach-Newport News, VA	$220,266,550
Oklahoma City, OK	$168,406,438
Orlando, FL	$222,974,850
Philadelphia, PA-NJ	$502,817,613
Phoenix, AZ	$383,665,188
Pittsburgh, PA	$227,126,725
Portland-Vancouver, OR-WA	$202,854,225
Riverside-San Bernardino, CA	$217,794,588
Sacramento, CA	$185,595,200
San Antonio, TX	$193,854,238
San Diego, CA	$417,448,675
San Francisco-Oakland, CA	$556,357,638
San Jose, CA	$249,879,000
Seattle, WA	$332,194,713
St. Louis, MO-IL	$378,274,138
Tampa-St Pete-Clearwater, FL	$301,062,038
Washington, DC-MD-VA	$537,527,288
West Palm Beach-Boca Raton-Delray Beach, FL	$163,832,988

Appendix

Major Metro Areas (over 1 million population)

Metro Area	Total Criteria Pollutants from Transportation (tons per year) (1999)	Total Criteria Pollutants from Transportation per Capita (pounds per year) (1999)	Percent of Total Criteria Pollutants from Transportation (1999)	Percentage of Adults Who Have Ever Been Diagnosed with Asthma (2002)
Philadelphia, PA-NJ PMSA	983,410	397	45.3%	11.6%
Phoenix-Mesa, AZ MSA	614,335	408	39.3%	13.5%
Pittsburgh, PA MSA	638,895	548	45.1%	10.7%
Portland-Vancouver, OR-WA PMSA	491,951	533	41.5%	14.2%
Providence-Fall River-Warwick, RI-MA MSA	366,760	652	48.5%	
Raleigh-Durham-Chapel Hill, NC MSA	387,553	701	50.5%	9.3%
Richmond-Petersburg, VA MSA	367,572	765	48.0%	13.3%
Riverside-San Bernardino, CA PMSA	600,352	375	41.5%	14.1%
Rochester, NY MSA	370,327	686	42.4%	12.2%
Sacramento, CA PMSA	387,839	489	46.3%	15.8%
St Louis, MO-IL MSA	829,147	645	38.4%	9.9%
Salt Lake City-Ogden, UT MSA	340,643	534	43.1%	12.9%
San Antonio, TX MSA	476,038	608	57.1%	11.3%
San Diego, CA MSA	555,818	394	44.4%	12.0%
San Francisco, CA PMSA	227,908	270	36.4%	12.4%
San Jose, CA PMSA	260,929	317	40.2%	11.9%
Seattle-Bellevue-Everett, WA PMSA	652,430	559	53.6%	14.8%
Tampa-St Petersburg-Clearwater, FL MSA	558,875	491	38.6%	10.5%
Washington, DC-MD-VA-WV PMSA	1,210,332	511	46.7%	12.8%
West Palm Beach-Boca Raton, FL MSA	237,948	453	34.5%	9.9%

Appendix

Large Metro Areas (500,000 to 1 million population)

Metro Area	Total Number of Days of Unhealthy Air Quality (2000 to 2002) (all pollutants)	Number of Days of Unhealthy Ozone (Smog) Levels												
		1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	Avg 1993-1997	Avg 1998-2002	Percent Change
Akron, OH PMSA	38	10	8	12	11	6	14	20	4	12	22	9.4	14.4	53.2%
Albany-Schenectady-Troy, NY MSA	20	5	6	3	4	3	3	6	1	11	8	4.2	5.8	38.1%
Albuquerque, NM MSA	5	0	1	0	0	0	0	1	0	1	0	0.2	0.4	100.0%
Allentown-Bethlehem-Easton, PA MSA	32	3	3	7	6	12	18	19	5	9	18	6.2	13.8	122.6%
Ann Arbor, MI PMSA														
Bakersfield, CA MSA	409	97	105	106	110	58	76	93	82	85	91	95.2	85.4	-10.3%
Baton Rouge, LA MSA	44	12	10	22	12	16	21	26	30	5	6	14.4	17.6	22.2%
Birmingham, AL MSA	100	10	6	32	15	8	23	30	21	11	13	14.2	19.6	38.0%
Charleston-North Charleston, SC MSA	5	2	2	1	3	3	3	5	4	0	1	2.2	2.6	18.2%
Colorado Springs, CO MSA														
Columbia, SC MSA														
Dayton-Springfield, OH MSA	49	11	14	11	18	10	19	19	6	4	28	12.8	15.2	18.8%
Daytona Beach, FL MSA														
El Paso, TX MSA	26	3	2	3	1	0	6	0	3	1	4	1.8	2.8	55.6%
Fort Wayne, IN MSA														
Fresno, CA MSA	421	59	55	61	70	75	67	81	78	92	91	64	81.8	27.8%
Gary, IN PMSA	49	0	6	18	12	11	9	10	5	10	20	9.4	10.8	14.9%
Greenville-Spartanburg-Anderson, SC MSA	52	8	5	7	7	9	28	19	11	13	28	7.2	19.8	175.0%
Harrisburg-Lebanon-Carlisle, PA MSA	59	15	12	13	3	9	22	17	5	17	17	10.4	15.6	50.0%
Honolulu, HI MSA	6	0	0	0	0	0	0	0	0	0	0	0	0	0.0%
Jersey City, NJ PMSA	19	19	12	16	5	9	7	17	3	6	6	12.2	7.8	-36.1%
Knoxville, TN MSA	109	25	16	26	21	37	54	62	36	17	45	25	42.8	71.2%
Little Rock-North Little Rock, AR MSA	29	2	2	7	1	1	2	5	16	4	9	2.6	7.2	176.9%
McAllen-Edinburg-Mission, TX MSA														
Mobile, AL MSA														
New Haven-Meriden, CT PMSA	49	12	13	14	8	19	9	16	6	11	20	13.2	12.4	-6.1%
Omaha, NE-IA MSA	2	0	0	0	0	0	0	2	0	0	0	0	0.4	-
Sarasota-Bradenton, FL MSA														
Scranton--Wilkes-Barre--Hazleton, PA MSA	38	10	7	12	4	11	7	12	1	10	16	8.8	9.2	4.5%
Springfield, MA MSA	28	13	12	9	4	10	7	10	2	13	12	9.6	8.8	-8.3%
Stockton-Lodi, CA MSA														
Syracuse, NY MSA	14	4	1	5	0	2	3	4	1	4	9	2.4	4.2	75.0%
Tacoma, WA PMSA	9	0	2	0	1	0	4	0	0	0	0	0.6	0.8	33.3%
Toledo, OH MSA	24	7	8	9	11	4	5	4	2	9	13	7.8	6.6	-15.4%
Tucson, AZ MSA	3	1	0	3	0	1	0	1	0	0	1	1	0.4	-60.0%
Tulsa, OK MSA	21	4	12	21	14	7	9	14	10	4	5	11.6	8.4	-27.6%
Vallejo-Fairfield-Napa, CA PMSA														
Ventura, CA PMSA	67	43	63	66	62	44	29	22	27	19	10	55.6	21.4	-61.5%
Wichita, KS MSA														
Wilmington-Newark, DE-MD PMSA	58	29	24	27	13	22	28	21	18	19	21	23	21.4	-7.0%
Worcester, MA-CT PMSA														
Youngstown-Warren, OH MSA	45	9	5	11	8	10	20	12	2	12	16	8.6	12.4	44.2%

Appendix

Large Metro Areas (500,000 to 1 million population)

Metro Area	Total Criteria Pollutants from Transportation (tons per year) (1999)	Total Criteria Pollutants from Transportation per Capita (pounds per year) (1999)	Percent of Total Criteria Pollutants from Transportation (1999)	Percentage of Adults Who Have Ever Been Diagnosed with Asthma (2002)
Akron, OH PMSA	211,442	613	49.9%	10.9%
Albany-Schenectady-Troy, NY MSA	325,010	748	46.4%	16.0%
Albuquerque, NM MSA	221,701	653	31.7%	13.1%
Allentown-Bethlehem-Easton, PA MSA	177,806	575	41.6%	11.5%
Ann Arbor, MI PMSA	207,399	744	52.3%	15.8%
Bakersfield, CA MSA	181,013	563	37.8%	15.5%
Baton Rouge, LA MSA	167,863	580	28.0%	11.3%
Birmingham, AL MSA	360,708	788	31.4%	10.2%
Charleston-North Charleston, SC MSA	173,056	626	33.7%	9.7%
Colorado Springs, CO MSA	109,708	439	47.0%	12.8%
Columbia, SC MSA	192,273	745	43.7%	12.0%
Dayton-Springfield, OH MSA	291,529	608	55.8%	11.3%
Daytona Beach, FL MSA	158,824	669	43.8%	11.6%
El Paso, TX MSA	123,067	351	59.6%	8.4%
Fort Wayne, IN MSA	185,308	765	42.9%	11.1%
Fresno, CA MSA	247,541	563	41.5%	13.9%
Gary, IN PMSA	179,742	572	19.8%	11.2%
Greenville-Spartanburg-Anderson, SC MSA	344,710	742	38.0%	9.6%
Harrisburg-Lebanon-Carlisle, PA MSA	246,317	797	54.3%	12.2%
Honolulu, HI MSA	165,098	382	47.1%	13.5%
Jersey City, NJ PMSA	120,147	435	50.8%	15.4%
Knoxville, TN MSA	274,385	817	46.2%	16.9%
Little Rock-North Little Rock, AR MSA	223,327	799	48.7%	13.0%
McAllen-Edinburg-Mission, TX MSA	143,965	538	58.3%	11.2%
Mobile, AL MSA	182,249	681	26.7%	14.2%
New Haven-Meriden, CT PMSA	233,314	893	55.4%	
Omaha, NE-IA MSA	235,345	673	41.2%	9.9%
Sarasota-Bradenton, FL MSA	149,364	543	41.1%	9.6%
Scranton--Wilkes-Barre--Hazleton, PA MSA	202,817	663	52.6%	11.1%
Springfield, MA MSA	169,812	592	49.4%	
Stockton-Lodi, CA MSA	136,618	485	44.1%	11.1%
Syracuse, NY MSA	249,244	680	47.9%	13.6%
Tacoma, WA PMSA	178,770	519	51.4%	16.0%
Toledo, OH MSA	216,538	711	49.1%	13.7%
Tucson, AZ MSA	178,152	443	38.1%	15.2%
Tulsa, OK MSA	319,783	814	38.7%	11.1%
Vallejo-Fairfield-Napa, CA PMSA	119,164	470	45.5%	9.3%
Ventura, CA PMSA	150,571	404	41.8%	16.2%
Wichita, KS MSA	171,881	626	36.3%	11.7%
Wilmington-Newark, DE-MD PMSA	171,843	601	42.9%	11.7%
Worcester, MA-CT PMSA	359,716	1,447	48.6%	
Youngstown-Warren, OH MSA	191,324	649	41.5%	11.6%

Urbanized Area	Estimated Transportation-Related Public Health Cost from Air Pollution (2001)
Akron, OH	$84,909,038
Albany-Schenectady-Troy, NY	$91,411,513
Albuquerque, NM	$78,892,013
Austin, TX	$134,546,300
Birmingham, AL	$147,199,938
Charlotte, NC	$124,933,113
Columbus, GA-AL	$36,364,038
Columbus, OH	$168,163,713
Dayton, OH	$102,928,175
El Paso, TX-NM	$78,489,600
Fresno, CA	$72,089,325
Grand Rapids, MI	$78,872,850
Hartford-Middletown, CT	$103,624,413
Honolulu, HI	$74,439,925
Indianapolis, IN	$196,613,638
Jacksonville, FL	$155,260,963
Jacksonville, NC	$9,881,463
Louisville, KY-IN	$140,550,550
Memphis, TN-AR-MS	$148,624,350
Nashville, TN	$146,733,650
Omaha, NE-IA	$79,409,400
Oxnard-Ventura, CA	$82,667,025
Providence-Pawtucket, RI-MA	$127,270,938
Richmond, VA	$118,520,063
Rochester, MN	$10,833,200
Rochester, NY	$96,738,688
Salt Lake City, UT	$138,346,863
Sarasota-Bradenton, FL	$65,548,525
Springfield, IL	$20,184,500
Springfield, MA-CT	$82,916,138
Springfield, MO	$26,310,113
Springfield, OH	$9,887,850
Tacoma, WA	$88,875,675
Tucson, AZ	$90,236,213
Tulsa, OK	$116,757,113
Wilmington, DE-MD-NJ	$82,571,213
Wilmington, NC	$22,362,638

Appendix

Medium Metro Areas (200,000 to 500,000 population)

Metro Area	Total Criteria Pollutants from Transportation (tons per year) (1999)	Total Criteria Pollutants from Transportation per Capita (pounds per year) (1999)	Percent of Total Criteria Pollutants from Transportation (1999)	Percentage of Adults Who Have Ever Been Diagnosed with Asthma (2002)
Amarillo, TX MSA	76,703	735	39.9%	17.7%
Anchorage, AK MSA	69,886	542	58.8%	
Appleton-Oshkosh-Neenah, WI MSA	110,904	637	38.7%	11.4%
Asheville, NC MSA	103,829	965	52.6%	13.6%
Atlantic-Cape May, NJ PMSA	75,799	449	34.3%	15.3%
Augusta-Aiken, GA-SC MSA	165,430	718	39.9%	9.3%
Beaumont-Port Arthur, TX MSA	128,734	684	32.1%	7.8%
Biloxi-Gulfport-Pascagoula, MS MSA	122,075	691	27.0%	9.0%
Binghamton, NY MSA	102,573	829	49.9%	16.0%
Boise City, ID MSA	131,119	643	32.4%	11.0%
Boulder-Longmont, CO PMSA	66,176	485	46.0%	11.7%
Brazoria, TX PMSA	61,492	525	32.4%	7.7%
Bremerton, WA PMSA	66,371	561	55.5%	16.4%
Bridgeport, CT PMSA	418,836	1,878	55.4%	
Brockton, MA PMSA	449,445	3,545	43.9%	
Brownsville-Harlingen-San Benito, TX MSA	74,964	456	54.3%	4.3%
Canton-Massillon, OH MSA	113,601	565	49.4%	6.7%
Charleston, WV MSA	105,913	843	26.2%	14.3%
Chattanooga, TN-GA MSA	185,930	823	53.9%	8.9%
Chico-Paradise, CA MSA	63,023	646	41.5%	
Clarksville-Hopkinsville, TN-KY MSA	73,033	725	50.1%	12.2%
Columbus, GA-AL MSA	87,609	646	47.9%	9.4%
Corpus Christi, TX MSA	123,467	638	38.8%	12.4%
Danbury, CT PMSA	242,841	2,374	52.2%	
Davenport-Moline-Rock Island, IA-IL MSA	119,201	664	42.5%	11.2%
Des Moines, IA MSA	153,166	691	46.2%	10.6%
Duluth-Superior, MN-WI MSA	82,451	698	25.8%	9.5%
Dutchess County, NY PMSA	89,086	664	51.0%	13.4%
Erie, PA MSA	85,387	617	39.0%	8.7%
Eugene-Springfield, OR MSA	103,382	657	36.3%	16.8%
Evansville-Henderson, IN-KY MSA	123,241	846	22.8%	9.7%
Fayetteville, NC MSA	104,660	738	57.9%	9.4%
Fayetteville-Springdale-Rogers, AR MSA	93,538	656	39.1%	10.9%
Flint, MI PMSA	168,039	768	63.6%	14.9%
Fort Collins-Loveland, CO MSA	66,435	561	43.7%	17.5%
Fort Myers-Cape Coral, FL MSA	138,282	690	44.2%	7.4%
Fort Pierce-Port St Lucie, FL MSA	89,026	594	42.7%	4.2%
Fort Smith, AR-OK MSA	83,834	857	43.1%	10.3%
Gainesville, FL MSA	59,643	601	42.8%	13.8%
Galveston-Texas City, TX PMSA	67,321	542	34.8%	12.5%
Greeley, CO PMSA	77,152	931	36.3%	10.4%
Green Bay, WI MSA	80,302	742	37.7%	9.8%
Hamilton-Middletown, OH PMSA	76,790	461	41.0%	

Urbanized Area	Estimated Transportation-Related Public Health Cost from Air Pollution (2001)
Allentown-Bethlehem-Easton, PA-NJ	$60,048,888
Anchorage, AK	$29,069,513
Ann Arbor, MI	$46,967,288
Augusta, GA-SC	$48,921,863
Bakersfield, CA	$47,082,263
Baton Rouge, LA	$54,319,300
Boise City, ID	$37,801,225
Bridgeport-Milford, CT	$56,043,925
Canton, OH	$32,576,250
Charleston, SC	$57,391,688
Charleston, WV	$31,056,025
Chattanooga, TN-GA	$71,597,488
Colorado Springs, CO	$55,647,900
Columbia, MO	$12,921,913
Columbia, SC	$63,089,338
Corpus Christi, TX	$48,717,463
Davenport-Rock Island-Moline, IL-IA	$35,207,900
Daytona Beach, FL	$39,404,488
Des Moines, IA	$52,345,563
Durham, NC	$52,556,350
Eugene-Springfield, OR	$26,201,525
Fayetteville, NC	$43,000,650
Flint, MI	$62,143,988
Fort Myers-Cape Coral, FL	$41,959,488
Fort Wayne, IN	$38,146,150
Greensboro, NC	$49,107,100
Greenville, NC	$9,447,113
Greenville, SC	$43,511,650
Harrisburg, PA	$62,131,213
Hesperia-Apple Valley-Victorville, CA	$27,638,713
Huntsville, AL	$35,259,000
Jackson, MI	$14,359,100
Jackson, MS	$57,513,050
Jackson, TN	$11,625,250
Knoxville, TN	$79,805,425
Lancaster, PA	$28,820,400
Lancaster-Palmdale, CA	$29,171,713
Lansing-East Lansing, MI	$40,956,650
Lawrence-Haverhill, MA-NH	$55,334,913
Lexington-Fayette, KY	$47,740,175
Lincoln, NE	$24,809,050
Little Rock-North Little Rock, AR	$59,116,313
Lorain-Elyria, OH	$34,339,200
Lowell, MA-NH	$37,443,525

Appendix

Medium Metro Areas (200,000 to 500,000 population)

Metro Area	Total Criteria Pollutants from Transportation (tons per year) (1999)	Total Criteria Pollutants from Transportation per Capita (pounds per year) (1999)	Percent of Total Criteria Pollutants from Transportation (1999)	Percentage of Adults Who Have Ever Been Diagnosed with Asthma (2002)
Hickory-Morganton-Lenoir, NC MSA	130,631	802	35.0%	13.5%
Huntington-Ashland, WV-KY-OH MSA	116,919	748	40.3%	12.7%
Huntsville, AL MSA	106,205	619	40.9%	13.6%
Jackson, MS MSA	150,143	694	44.0%	8.5%
Johnson City-Kingsport-Bristol, TN-VA MSA	180,088	778	33.5%	13.1%
Johnstown, PA MSA	72,735	622	43.5%	7.0%
Kalamazoo-Battle Creek, MI MSA	175,857	787	54.7%	12.7%
Killeen-Temple, TX MSA	84,190	568	57.0%	11.3%
Lafayette, LA MSA	140,377	744	44.3%	8.5%
Lakeland-Winter Haven, FL MSA	131,880	577	39.6%	14.9%
Lancaster, PA MSA	138,020	600	46.1%	10.4%
Lansing-East Lansing, MI MSA	164,675	731	51.9%	17.8%
Laredo, TX MSA	42,560	441	49.1%	
Lawrence, MA-NH PMSA	271,609	1,397	44.8%	
Lexington, KY MSA	191,768	842	52.4%	14.1%
Lincoln, NE MSA	68,859	579	41.0%	12.1%
Longview-Marshall, TX MSA	82,599	789	41.5%	14.5%
Lowell, MA-NH PMSA	462,688	3,114	47.6%	
Lubbock, TX MSA	76,767	674	51.4%	7.3%
Lynchburg, VA MSA	64,518	618	39.8%	16.5%
Macon, GA MSA	112,589	700	43.2%	11.1%
Madison, WI MSA	150,095	700	46.6%	13.6%
Manchester, NH PMSA	195,426	2,054	45.2%	
Melbourne-Titusville-Palm Bay, FL MSA	149,782	637	50.0%	9.9%
Merced, CA MSA	66,311	661	36.9%	
Modesto, CA MSA	112,736	516	45.1%	7.9%
Montgomery, AL MSA	118,278	734	45.6%	12.9%
Myrtle Beach, SC MSA	63,650	713	41.9%	6.9%
Naples, FL MSA	69,944	676	35.7%	7.0%
New London-Norwich, CT-RI MSA	171,248	1,206	51.8%	
Newburgh, NY-PA PMSA	138,533	738	46.5%	12.1%
Ocala, FL MSA	84,607	688	43.5%	11.5%
Odessa-Midland, TX MSA	70,487	582	44.3%	28.8%
Olympia, WA PMSA	71,415	695	57.3%	14.3%
Pensacola, FL MSA	140,919	699	33.5%	10.0%
Peoria-Pekin, IL MSA	117,849	680	25.5%	13.3%
Portland, ME MSA	100,334	855	34.8%	
Portsmouth-Rochester, NH-ME PMSA	141,828	1,187	43.9%	
Provo-Orem, UT MSA	94,198	543	42.4%	10.8%
Reading, PA MSA	113,289	633	47.9%	12.4%
Reno, NV MSA	88,706	555	31.4%	11.3%
Richland-Kennewick-Pasco, WA MSA	67,135	727	43.4%	10.8%
Roanoke, VA MSA	84,595	743	49.5%	12.4%

Urbanized Area	Estimated Transportation-Related Public Health Cost from Air Pollution (2001)
Madison, WI	$39,813,288
Mcallen-Edinburg-Mission, TX	$46,315,763
Melbourne-Palm Bay, FL	$54,913,338
Mobile, AL	$55,296,588
Modesto, CA	$31,969,438
New Haven-Meriden, CT	$67,234,825
Ogden, UT	$45,351,250
Pensacola, FL	$53,425,050
Peoria, IL	$33,413,013
Provo-Orem, UT	$44,137,625
Raleigh, NC	$101,018,313
Reno, NV	$34,045,375
Rockford, IL	$31,273,200
Salem, OR	$20,957,388
Santa Rosa, CA	$29,714,650
Savannah, GA	$38,280,288
Scranton-Wilkes-Barre, PA	$46,149,688
Shreveport, LA	$43,211,438
South Bend-Mishawaka, IN-MI	$32,761,488
Spokane, WA	$42,649,338
Stamford, CT-NY	$29,644,388
Stockton, CA	$37,743,738
Syracuse, NY	$62,386,713
Toledo, OH-MI	$77,710,325
Trenton, NJ-PA	$54,900,563
Wichita, KS	$52,792,688
Winston-Salem, NC	$48,225,625
Worcester, MA-CT	$59,921,138
Youngstown-Warren, OH	$46,845,925

Appendix

Medium Metro Areas (200,000 to 500,000 population)

Metro Area	Total Criteria Pollutants from Transportation (tons per year) (1999)	Total Criteria Pollutants from Transportation per Capita (pounds per year) (1999)	Percent of Total Criteria Pollutants from Transportation (1999)	Percentage of Adults Who Have Ever Been Diagnosed with Asthma (2002)
Rockford, IL MSA	117,067	653	43.0%	9.9%
Saginaw-Bay City-Midland, MI MSA	138,641	692	39.2%	12.0%
Salem, OR PMSA	103,498	618	38.1%	11.5%
Salinas, CA MSA	79,382	427	32.4%	
San Luis Obispo-Atascadero-Paso Robles, CA MSA	68,863	581	37.0%	13.5%
Santa Barbara-Santa Maria-Lompoc, CA MSA	87,279	446	33.4%	8.6%
Santa Cruz-Watsonville, CA PMSA	56,153	458	45.6%	20.8%
Santa Rosa, CA PMSA	106,333	483	45.3%	9.6%
Savannah, GA MSA	107,799	747	33.2%	15.3%
Shreveport-Bossier City, LA MSA	124,575	660	47.2%	8.2%
South Bend, IN MSA	78,754	609	48.3%	13.5%
Spokane, WA MSA	97,814	477	41.8%	13.5%
Springfield, IL MSA	73,160	717	35.0%	18.6%
Springfield, MO MSA	114,174	741	37.2%	12.8%
Stamford-Norwalk, CT PMSA	222,984	1,340	53.7%	
Tallahassee, FL MSA	76,870	591	44.5%	9.2%
Trenton, NJ PMSA	99,677	597	45.5%	10.3%
Utica-Rome, NY MSA	108,066	737	40.6%	13.5%
Visalia-Tulare-Porterville, CA MSA	130,210	726	35.4%	
Waco, TX MSA	78,561	769	52.1%	23.4%
Waterbury, CT PMSA	215,710	1,938	55.1%	
Wilmington, NC MSA	74,585	672	34.8%	9.5%
Yakima, WA MSA	71,052	644	41.7%	14.0%
York, PA MSA	115,279	612	33.8%	10.5%

Appendix

Small Metro Areas (under 200,000 population)

Metro Area	Total Criteria Pollutants from Transportation (tons per year) (1999)	Total Criteria Pollutants from Transportation per Capita (pounds per year) (1999)	Percent of Total Criteria Pollutants from Transportation (1999)	Percentage of Adults Who Have Ever Been Diagnosed with Asthma (2002)
Abilene, TX MSA	44,393	725	57.1%	
Albany, GA MSA	29,185	497	33.3%	10.6%
Alexandria, LA MSA	51,968	820	20.8%	15.9%
Altoona, PA MSA	41,814	644	51.4%	13.9%
Anniston, AL MSA	50,381	865	39.1%	11.8%
Athens, GA MSA	40,972	584	40.0%	11.7%
Auburn-Opelika, AL MSA	35,419	693	48.9%	5.1%
Bangor, ME MSA	36,315	792	36.6%	
Barnstable-Yarmouth, MA MSA	50,773	660	31.2%	
Bellingham, WA MSA	49,537	618	27.2%	16.4%
Benton Harbor, MI MSA	71,142	891	55.5%	14.7%
Billings, MT MSA	38,514	605	24.4%	13.5%
Bismarck, ND MSA	35,044	762	12.2%	12.1%
Bloomington, IN MSA	33,560	574	45.9%	13.1%
Bloomington-Normal, IL MSA	57,333	788	43.7%	6.4%
Bryan-College Station, TX MSA	39,581	590	55.3%	
Burlington, VT MSA	73,733	889	49.9%	
Casper, WY MSA	26,225	830	23.6%	9.4%
Cedar Rapids, IA MSA	54,210	586	36.6%	7.5%
Champaign-Urbana, IL MSA	53,851	633	40.9%	21.7%
Charlottesville, VA MSA	52,272	691	43.5%	6.7%
Cheyenne, WY MSA	37,590	953	24.3%	13.1%
Columbia, MO MSA	45,998	707	37.4%	15.0%
Corvallis, OR MSA	19,201	497	31.2%	13.7%
Cumberland, MD-WV MSA	50,173	1,022	36.9%	16.9%
Danville, VA MSA	26,851	499	37.2%	15.6%
Decatur, AL MSA	54,267	757	28.6%	8.7%
Decatur, IL MSA	35,224	622	24.1%	3.8%
Dothan, AL MSA	54,930	812	32.9%	18.1%
Dover, DE MSA	43,827	695	47.9%	11.3%
Dubuque, IA MSA	23,961	544	28.1%	9.1%
Eau Claire, WI MSA	65,459	906	48.0%	9.2%
Elkhart-Goshen, IN MSA	69,462	795	44.0%	10.4%
Elmira, NY MSA	28,559	623	50.2%	
Enid, OK MSA	14,970	526	18.0%	9.4%
Fargo-Moorhead, ND-MN MSA	58,466	687	28.0%	10.7%
Fitchburg-Leominster, MA PMSA	581,052	8,148	47.1%	
Flagstaff, AZ-UT MSA	77,427	1,283	27.7%	14.1%
Florence, AL MSA	49,449	723	21.2%	17.4%
Florence, SC MSA	49,885	797	44.1%	11.4%
Fort Walton Beach, FL MSA	50,213	591	28.8%	6.1%
Gadsden, AL MSA	39,957	772	38.6%	13.6%
Glens Falls, NY MSA	50,071	824	44.4%	

Urbanized Area	Estimated Transportation-Related Public Health Cost from Air Pollution (2001)
Abilene, TX	$18,459,875
Alexandria, LA	$11,542,213
Alton, IL	$11,746,613
Altoona, PA	$8,897,788
Amarillo, TX	$25,090,100
Anderson, IN	$13,049,663
Anderson, SC	$7,997,150
Annapolis, MD	$13,298,775
Anniston, AL	$15,962,363
Antioch-Pittsburg, CA	$19,271,088
Appleton-Neenah, WI	$26,163,200
Asheville, NC	$38,535,788
Atlantic City, NJ	$27,600,388
Auburn-Opelika, AL	$13,643,700
Bangor, ME	$9,606,800
Battle Creek, MI	$13,375,425
Bay City, MI	$10,322,200
Beaumont, TX	$24,119,200
Bellingham, WA	$9,938,950
Beloit, WI	$8,188,775
Benton Harbor, MI	$11,408,075
Billings, MT	$9,983,663
Biloxi-Gulfport, MS	$30,858,013
Binghamton, NY	$31,362,625
Bismarck-Mandan, ND	$7,320,075
Bloomington, IN	$8,827,525
Bloomington-Normal, IL	$15,036,175
Boulder, CO	$11,548,600
Bremerton, WA	$18,632,338
Bristol, CT	$6,489,700
Bristol, TN	$13,445,688
Brockton, MA	$25,422,250
Brownsville, TX	$13,056,050
Bryan-College Station, TX	$20,561,363
Burlington, NC	$22,567,038
Burlington, VT	$25,141,200
Casper, WY	$8,290,975
Cedar Rapids, IA	$20,740,213
Champaign-Urbana, IL	$13,094,375
Charlottesville, VA	$9,440,725
Cheyenne, WY	$8,846,688
Chico, CA	$8,265,425
Clarksville, TN-KY	$18,804,800
Danbury, CT-NY	$26,431,475

Appendix

Small Metro Areas (under 200,000 population)

Metro Area	Total Criteria Pollutants from Transportation (tons per year) (1999)	Total Criteria Pollutants from Transportation per Capita (pounds per year) (1999)	Percent of Total Criteria Pollutants from Transportation (1999)	Percentage of Adults Who Have Ever Been Diagnosed with Asthma (2002)
Goldsboro, NC MSA	37,279	667	32.4%	
Grand Forks, ND-MN MSA	30,142	632	18.6%	8.3%
Grand Junction, CO MSA	35,539	617	38.8%	11.3%
Great Falls, MT MSA	22,974	587	26.4%	14.0%
Greenville, NC MSA	36,100	564	44.5%	10.8%
Hagerstown, MD PMSA	64,863	1,015	50.0%	11.7%
Hattiesburg, MS MSA	39,792	704	38.0%	10.9%
Houma, LA MSA	49,663	510	27.4%	13.2%
Iowa City, IA MSA	34,858	672	41.5%	9.3%
Jackson, MI MSA	63,661	810	55.1%	20.8%
Jackson, TN MSA	44,554	877	49.1%	14.8%
Jacksonville, NC MSA	34,251	481	49.4%	
Jamestown, NY MSA	55,511	808	30.1%	9.5%
Janesville-Beloit, WI MSA	56,731	751	46.1%	17.0%
Jonesboro, AR MSA	22,629	583	34.1%	7.0%
Joplin, MO MSA	63,859	852	32.3%	10.4%
Kankakee, IL PMSA	30,078	586	37.4%	
Kenosha, WI PMSA	36,204	495	23.7%	12.3%
Kokomo, IN MSA	37,071	739	40.7%	14.9%
La Crosse, WI-MN MSA	46,978	771	41.1%	8.0%
Lafayette, IN MSA	61,359	699	37.4%	9.2%
Lake Charles, LA MSA	59,352	657	21.5%	7.7%
Las Cruces, NM MSA	89,507	1,051	33.3%	12.2%
Lawrence, KS MSA	23,870	485	27.4%	13.8%
Lawton, OK MSA	38,628	725	42.1%	11.6%
Lewiston-Auburn, ME MSA	26,716	601	36.3%	
Lima, OH MSA	55,887	726	44.2%	
Mansfield, OH MSA	53,271	603	46.5%	
Medford-Ashland, OR MSA	56,574	644	33.3%	15.5%
Missoula, MT MSA	26,555	594	24.4%	12.5%
Monroe, LA MSA	47,127	643	32.3%	9.6%
Muncie, IN MSA	41,624	721	39.6%	15.8%
Nashua, NH PMSA	102,978	1,114	49.3%	
New Bedford, MA PMSA	248,073	2,813	38.0%	
Owensboro, KY MSA	28,495	625	30.8%	9.5%
Panama City, FL MSA	34,533	467	20.5%	8.6%
Parkersburg-Marietta, WV-OH MSA	58,052	777	17.0%	5.0%
Pine Bluff, AR MSA	25,886	641	13.3%	10.9%
Pittsfield, MA MSA	34,941	836	41.7%	
Pocatello, ID MSA	27,546	736	31.1%	11.2%
Pueblo, CO MSA	49,115	717	39.6%	16.8%
Punta Gorda, FL MSA	36,797	537	51.6%	12.5%
Racine, WI PMSA	39,279	423	38.3%	12.4%

Urbanized Area	Estimated Transportation-Related Public Health Cost from Air Pollution (2001)
Danville, VA	$7,946,050
Davis, CA	$5,550,738
Decatur, AL	$16,313,675
Decatur, IL	$11,567,763
Denton, TX	$14,141,925
Dothan, AL	$13,209,350
Dover, DE	$9,849,525
Dubuque, IA	$7,058,188
Duluth-Superior, MN-WI	$15,042,563
Eau Claire, WI	$11,836,038
Elkhart-Goshen, IN	$18,606,788
Elmira, NY	$9,268,263
Erie, PA	$17,444,263
Evansville, IN-KY	$28,379,663
Fairfield, CA	$21,283,150
Fall River, MA-RI	$24,304,438
Fargo-Moorhead, ND-MN	$14,442,138
Fayetteville-Springdale, AR	$15,636,600
Fitchburg-Leominster, MA	$10,034,763
Flagstaff, AZ	$7,703,325
Florence, AL	$14,314,388
Florence, SC	$8,131,288
Fort Collins, CO	$16,530,850
Fort Pierce, FL	$30,417,275
Fort Smith, AR-OK	$15,457,750
Frederick, MD	$11,382,525
Fredericksburg, VA	$14,295,225
Gadsden, AL	$14,684,863
Gainesville, FL	$26,073,775
Galveston, TX	$7,396,725
Gastonia, NC	$29,950,988
Glen Falls, NY	$10,616,025
Goldsboro, NC	$11,280,325
Grand Forks, ND	$4,905,600
Grand Junction, CO	$10,175,288
Great Falls, MT	$6,068,125
Greeley, CO	$9,466,275
Green Bay, WI	$30,647,225
Hamilton, OH	$12,353,425
Harlingen, TX	$12,660,025
Hattiesburg, MS	$10,481,888
Hemet-San Jacinto, CA	$8,054,638
Hickory, NC	$24,700,463
High Point, NC	$30,136,225

Appendix

Small Metro Areas (under 200,000 population)

Metro Area	Total Criteria Pollutants from Transportation (tons per year) (1999)	Total Criteria Pollutants from Transportation per Capita (pounds per year) (1999)	Percent of Total Criteria Pollutants from Transportation (1999)	Percentage of Adults Who Have Ever Been Diagnosed with Asthma (2002)
Rapid City, SD MSA	32,544	739	32.6%	11.1%
Redding, CA MSA	56,063	681	29.6%	
Rochester, MN MSA	46,019	773	42.3%	10.5%
Rocky Mount, NC MSA	56,779	772	41.9%	7.1%
St Cloud, MN MSA	73,434	891	37.9%	8.3%
St Joseph, MO MSA	39,685	816	40.4%	9.6%
San Angelo, TX MSA	25,004	489	44.0%	
Santa Fe, NM MSA	67,059	941	31.0%	11.6%
Sharon, PA MSA	49,876	821	57.5%	12.1%
Sheboygan, WI MSA	34,968	635	27.9%	7.4%
Sherman-Denison, TX MSA	41,476	800	58.9%	
Sioux City, IA-NE MSA	36,395	604	21.7%	6.7%
Sioux Falls, SD MSA	51,308	624	37.2%	7.8%
State College, PA MSA	44,666	676	48.4%	17.8%
Steubenville-Weirton, OH-WV MSA	40,237	604	7.8%	11.7%
Sumter, SC MSA	36,760	654	47.8%	6.3%
Terre Haute, IN MSA	68,100	919	21.1%	12.9%
Texarkana, TX-Texarkana, AR MSA	57,927	943	54.1%	14.0%
Topeka, KS MSA	56,955	667	41.4%	11.5%
Tuscaloosa, AL MSA	76,688	950	29.1%	14.9%
Tyler, TX MSA	74,030	873	63.4%	10.0%
Victoria, TX MSA	23,862	581	39.8%	
Vineland-Millville-Bridgeton, NJ PMSA	30,242	432	40.6%	
Waterloo-Cedar Falls, IA MSA	38,913	649	42.7%	11.3%
Wausau, WI MSA	49,957	808	37.4%	5.7%
Wheeling, WV-OH MSA	58,956	766	12.7%	10.8%
Wichita Falls, TX MSA	40,502	593	44.5%	13.2%
Williamsport, PA MSA	38,912	667	49.0%	9.7%
Yolo, CA PMSA	36,265	466	34.5%	
Yuba City, CA MSA	43,268	627	33.1%	
Yuma, AZ MSA	48,786	719	44.7%	9.6%

Urbanized Area	Estimated Transportation-Related Public Health Cost from Air Pollution (2001)
Holland, MI	$10,309,425
Houma, LA	$7,894,950
Huntington-Ashland, WV-KY-OH	$24,840,988
Hyannis, MA	$27,025,513
Idaho Falls, ID	$7,332,850
Indio-Coachella, CA	$9,114,963
Iowa City, IA	$7,665,000
Ithaca, NY	$4,828,950
Janesville, WI	$7,677,775
Johnson City, TN	$17,616,725
Johnstown, PA	$8,048,250
Joplin, MO	$13,004,950
Kailua, HI	$11,638,025
Kalamazoo, MI	$29,976,538
Kankakee, IL	$7,102,900
Kannapolis, NC	$23,531,550
Kenosha, WI	$11,184,513
Killeen, TX	$15,674,925
Kingsport, TN-VA	$18,530,138
Kokomo, IN	$7,428,663
La Crosse, WI-MN	$12,117,088
Lafayette, LA	$24,029,775
Lafayette-West Lafayette, IN	$13,241,288
Lake Charles, LA	$17,674,213
Lakeland, FL	$32,755,100
Laredo, TX	$17,540,075
Las Cruces, NM	$14,838,163
Lawrence, KS	$7,671,388
Lawton, OK	$12,691,963
Lewiston-Auburn, ME	$9,261,875
Lewisville, TX	$22,880,025
Lima, OH	$10,520,213
Lodi, CA	$5,735,975
Logan, UT	$8,469,825
Lompoc, CA	$3,193,750
Longmont, CO	$5,621,000
Longview, TX	$12,538,663
Longview, WA	$8,744,488
Lubbock, TX	$25,173,138
Lynchburg, VA	$16,268,963
Manchester, NH	$20,356,963
Mansfield, OH	$8,150,450
Medford, OR	$9,606,800
Merced, CA	$6,821,850

Appendix

Small Metro Areas (under 200,000 population)

Urbanized Area	Estimated Transportation-Related Public Health Cost from Air Pollution (2001)
Middletown, OH	$19,788,475
Midland, TX	$13,292,388
Missoula, MT	$6,694,100
Monessen, PA	$7,530,863
Monroe, LA	$18,204,375
Montgomery, AL	$36,677,025
Muncie, IN	$10,456,338
Muskegon, MI	$15,131,988
Myrtle Beach, SC	$16,511,688
Napa, CA	$7,696,938
Nashua, NH	$14,531,563
New Bedford, MA	$15,745,188
New Britain, CT	$20,459,163
New London-Norwich, CT	$32,704,000
Newark, OH	$6,125,613
Newburgh, NY	$19,315,800
Newport, RI	$5,346,338
Norwalk, CT	$21,570,588
Odessa, TX	$14,812,613
Olympia, WA	$21,966,613
Oshkosh, WI	$7,237,038
Owensboro, KY	$8,214,325
Palm Springs, CA	$20,459,163
Parkersburg, WV	$7,185,938
Pascagoula, MS	$9,402,400
Petersburg, VA	$22,784,213
Pine Bluff, AR	$7,958,825
Pittsfield, MA	$6,285,300
Pocatello, ID	$7,224,263
Port Arthur, TX	$12,308,713
Port Huron, MI	$11,535,825
Portland, ME	$9,542,925
Portsmouth-Dover-Rochester, NH-ME	$20,586,913
Pottstown, PA	$6,483,313
Poughkeepsie, NY	$27,887,825
Pueblo, CO	$13,298,775
Racine, WI	$11,363,363
Rapid City, SD	$8,227,100
Reading, PA	$23,735,950
Richland-Kennewick-Pasco, WA	$20,459,163
Roanoke, VA	$29,471,925
Rock Hill, SC	$11,784,938
Rocky Mount, NC	$8,367,625
Saginaw, MI	$20,171,725

Urbanized Area	Estimated Transportation-Related Public Health Cost from Air Pollution (2001)
San Angelo, TX	$10,303,038
Santa Barbara, CA	$29,095,063
Santa Fe, NM	$13,177,413
Santa Maria, CA	$11,631,638
Sharon, PA	$5,589,063
Sheboygan, WI	$6,540,800
Sherman-Denison, TX	$14,244,125
Simi Valley, CA	$17,891,388
Sioux City, IA-NE-SD	$10,673,513
Sioux Falls, SD	$14,212,188
Slidell, LA	$9,134,125
Spartanburg, SC	$18,185,213
St. Cloud, MN	$9,702,613
St. Joseph, MO-KS	$10,264,713
State College, PA	$7,256,200
Sumter, SC	$7,192,325
Tallahassee, FL	$31,228,488
Taunton, MA	$19,411,613
Temple, TX	$14,250,513
Terre Haute, IN	$15,387,488
Texarkana, AR	$11,593,313
Texas City, TX	$21,985,775
Topeka, KS	$19,117,788
Tuscaloosa, AL	$20,797,700
Tyler, TX	$17,022,688
Utica-Rome, NY	$29,880,725
Vacaville, CA	$13,592,600
Victoria, TX	$6,317,238
Vineland-Millville, NJ	$12,500,338
Visalia, CA	$12,442,850
Waco, TX	$29,861,563
Waterbury, CT	$20,791,313
Waterloo-Cedar Falls, IA	$14,857,325
Wausau, WI	$9,830,363
Wichita Falls, TX	$11,612,475
Williamsport, PA	$8,936,113
Yakima, WA	$12,161,800
York, PA	$20,867,963
Yuba City, CA	$9,044,700

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