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ENVIRONMENTAL PROTECTION

The Federal Government Could Help Communities Better Plan for Transportation That Protects Air Quality

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Mr. Chairman and Members of the Committee:

We are pleased to have the opportunity to comment on how transportation can affect a community's air quality. My statement is based primarily on our October 2001 report on these issues.¹ As you know, since World War II, cities and suburbs grew, more roads were built, and more people had to rely on cars and buses for work, shopping, and business. In fact, in the last 30 years, the total number of vehicle miles driven grew 4 times faster than the rate of population growth, increasing to 2.6 trillion miles per year. The fuel these cars, buses, and other vehicles burn emits substances into the air that harm human health and the environment. Despite regulations limiting these emissions and improved vehicle and fuel technologies, the air in numerous cities and towns still does not meet air quality standards. Therefore, communities may look to change their future transportation and land use plans as a means to curb emissions.

Recognizing that transportation can affect the nation's efforts to improve air quality, the Congress has provided funds for projects that protect air quality. Now, as the Congress begins the work of reauthorizing the surface transportation programs,² it will have to consider whether to continue or revise these initiatives. To help inform this work, we are commenting on (1) the impacts of surface transportation on air quality; (2) the benefits and limits of key federal surface transportation and clean air requirements and programs designed to mitigate these impacts; and (3) ways the federal government can use these requirements and programs to further reduce these impacts. Our findings and recommendations are based to a large extent on the results of a survey we conducted in 2001 of all of the 341 metropolitan planning organizations in existence at that time (295, or 87 percent, responded). These organizations are responsible for developing transportation plans and ensuring that they do not worsen air quality. We surveyed these planners on their views about the types of transportation projects undertaken in their areas, how concerns about air quality impact their plans, and how the federal

¹ U.S. General Accounting Office, *Environmental Protection: Federal Incentives Could Help Promote Land Use that Protects Air and Water Quality*, GAO-02-12 (Washington, D.C.: October 31, 2001).

² The Transportation Equity Act for the 21st Century (TEA-21), the successor to the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), is due to be reauthorized in 2003.

government could help them further assess alternative land use strategies when developing their transportation plans, among other things.

In summary, we found the following:

- Vehicle emissions contain substances, including carbon monoxide, nitrogen oxides, and volatile organic compounds, that degrade air quality, thereby threatening public health and the environment. Vehicles currently account for about one-third to one-half of these pollutants, and the risk they pose to public health is substantial. Epidemiological and other studies have consistently found that breathing emissions containing these compounds contributes to respiratory and other health problems, including the possibility of cancer and increased incidence of childhood asthma. Vehicle emissions can also pose risks to the environment by, for example, harming vegetation and causing crop damage. Regulatory limits on emissions, as well as cleaner fuels and engines, have significantly decreased these harmful substances since 1970, despite the increase in the number of vehicles and in the time they spend on the roads. But EPA estimates that better technology alone will not fully compensate for the increasing vehicle travel and emissions expected in the future.
- Provisions in the clean air and surface transportation laws have helped encourage transportation planners to look for ways to curb harmful emissions, but predominantly in areas that already suffer pollution problems. The provisions have not encouraged those areas with little pollution that still expect significant growth—and that may have the greatest potential to influence it—to grow in ways that preserve clean air. For instance, the Clean Air Act requires transportation planners to demonstrate that their plans and programs will not worsen air quality, but only in areas with current or prior air quality problems. Few planners in areas with clean air try to assess how changing land use or transportation plans can help them maintain the healthy air quality in their communities, according to our survey. Many of those planners that have to demonstrate to the Department of Transportation (DOT) that their plans will protect air quality have had difficulty

doing so, potentially limiting conformity's effectiveness. Provisions of the surface transportation laws, in particular the Congestion Mitigation and Air Quality Improvement Program, also primarily target areas with air quality problems to help them avoid further degradation, but do less to target areas with clean air to help them prevent the pollution in the first place. In addition to these statutory provisions, DOT and the Environmental Protection Agency (EPA) have implemented a number of funding, technical assistance, and public education programs aimed at minimizing transportation's effects on air quality. But some initiatives have had limited funding, or were only implemented in a few communities.

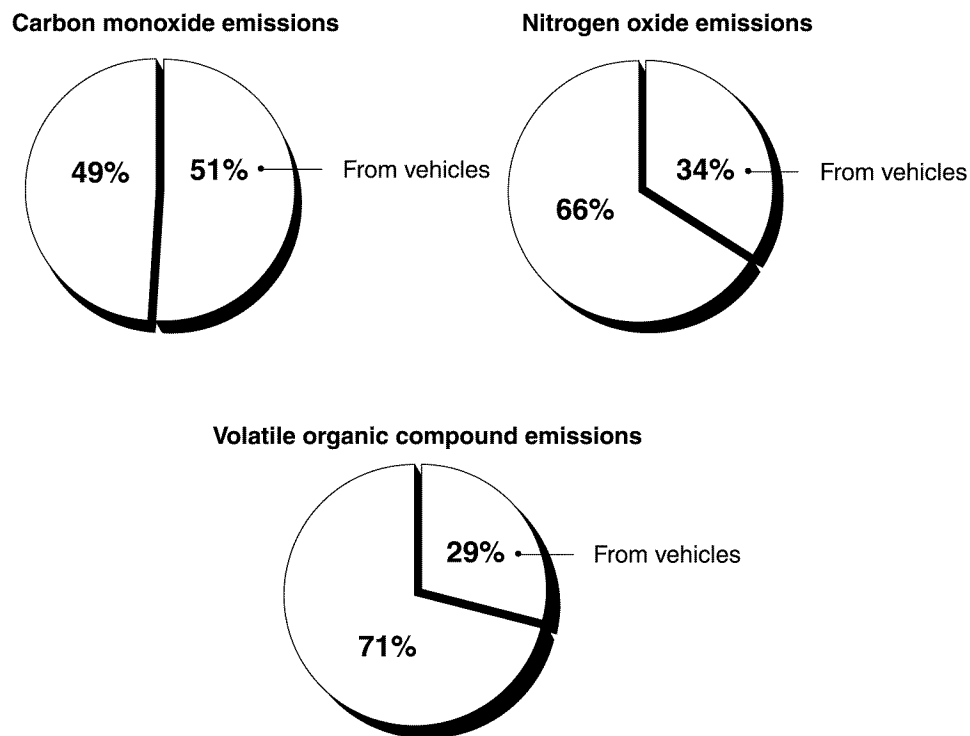
- The Congress and federal agencies have opportunities to provide transportation planners and communities more help in considering the environmental impacts of their transportation and land use decisions. For example, the transportation planners responding to our survey identified several areas in which financial and technical assistance would help them assess these impacts. In addition, in our 2001 report, we made a number of recommendations on ways to leverage the benefits of current laws and programs designed to help limit or prevent the impacts of land use and transportation on air quality or to consider new programs to achieve this outcome. We have summarized some of these recommendations in our statement today.

Air Pollution from Vehicle Emissions Will Continue to Pose Health and Environmental Risks to Some Communities, Despite New Technology and Emissions Limits

Vehicles emissions contribute to air quality degradation and, as a result, threaten public health and the environment. For example, in 1999, emissions from vehicles contributed about 51 percent of the carbon monoxide, 34 percent of the nitrogen oxides, and 29 percent of the volatile organic compounds in the nation's air, according to EPA (see fig. 1).³

³ U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *National Air Quality Emissions Trends Report, 1999* (Washington, D.C.: March 2001).

Figure 1: Proportion of 1999 Motor Vehicle Emissions for Carbon Monoxide, Nitrogen Oxides, and Volatile Organic Compounds



Source: EPA.

Note: The most current data available are for 1999.

In addition, the Department of Energy estimates that in 1999 alone, vehicle emissions, primarily from automobiles and light trucks, contributed about 60 percent of the total carbon emitted by the transportation sector.

Over the past 50 years, epidemiological and other studies have consistently found that these types of pollutants from vehicle emissions pose health risks. Carbon monoxide can damage cardiovascular and nervous systems. Nitrogen oxides and volatile organic compounds react with sunlight to form ozone, which, along with particulate matter, can damage lung tissue, aggravate respiratory disease, and lead to premature deaths. These pollutants also increase susceptibility to respiratory infection, compromise immune systems, and in some cases, increase the risks of cancer, according to EPA.

In addition to health problems, vehicle emissions adversely affect the environment by harming vegetation, damaging water resources, and contributing to global climate change. Emissions increase plant vulnerability to disease, potentially causing long-term damage to forests. According to EPA, air pollution from motor vehicle emissions annually causes about \$2.5 billion to about \$4.5 billion in crop damage. Air pollutants also damage sensitive waters, such as bays and estuaries. For example, nitrogen oxides from vehicle emissions deposited into the Chesapeake Bay have caused algae blooms that threaten the fish hatchery and degrade spawning habitat. Furthermore, motor vehicles emit carbon dioxide, a greenhouse gas and a factor in global climate change, according to the National Research Council.⁴ Although the effect of this change on human health and the environment is uncertain, it is believed to be significant.

The good news is that harmful vehicle emissions have declined significantly since 1970 and are expected to continue downwards because of cleaner fuels and better regulatory and technological controls. For example, stricter emissions limits for sport utility vehicles and light-duty trucks are scheduled to go into effect in 2004. EPA estimates that over the next 30 years these new standards will significantly reduce emissions of nitrogen oxides from vehicles by about 74 percent. Nevertheless, EPA also estimates that by 2005, the benefits gained from technological advances may not be enough to compensate for the increases in vehicle use. A study of emissions in Tennessee also predicts that stricter emissions limits would not be sufficient to offset the increased vehicle use and resulting nitrogen oxide and volatile organic compound emissions in its major cities of Memphis, Nashville, and Knoxville.⁵

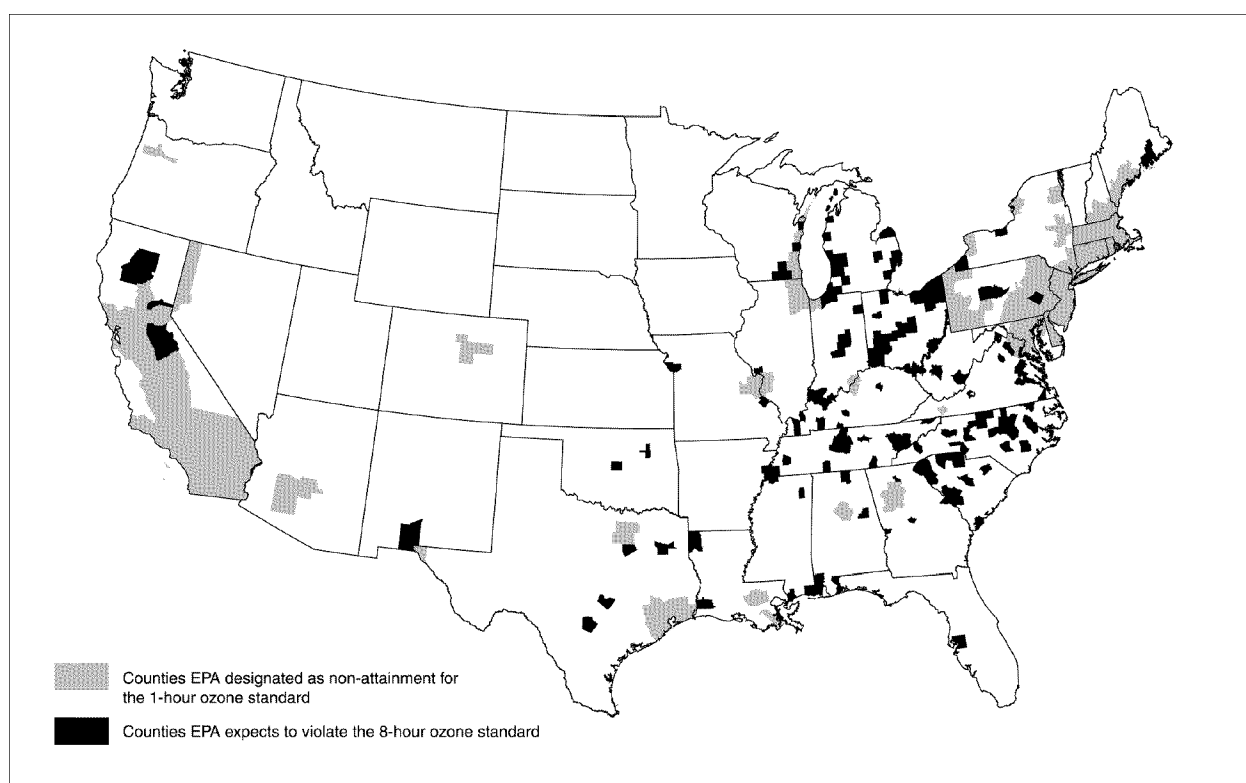
It is not only communities with current pollution problems that need to be concerned. A significant number of new communities will soon face pollution problems when EPA

⁴ National Research Council, Transportation Research Board, *Surface Transportation Environmental Research: A Long-Term Strategy* (Washington, D.C.: 2002).

⁵ See Wayne T. Davis, Terry L. Miller, Gregory D. Reed, Prakash Doraiswamy, Anna Tang, and Pedro Sanhueza, "VMT Growth Rates in the U.S. and Their Effects on NOx and VOC Emissions" (Proceedings of the 94th Annual Conference of the Air and Waste Management Association (Orlando, Florida: June 25-27, 2001).

implements stricter limits on ozone and particulate matter around the end of 2004, as planned, in order to better protect public health from these harmful substances.⁶ EPA estimates that approximately 334 of the 3,141 counties nationwide will not meet the new ozone limit, as figure 2 shows.⁷

Figure 2: Areas with Current and Potential Ozone Problems



Source: GAO analysis of EPA data.

While the number of counties not meeting the standard may be relatively small, the number of people that will be living with these air quality problems is significant. For example, in 1999, EPA estimated that twice as many people live in areas that are expected to violate the new standard as compared to the number that live in areas

⁶ The limits have been upheld by the courts, but the United States Supreme Court has found EPA's ozone National Ambient Air Quality Standard implementation policy to be unlawful and has instructed EPA to develop a plan consistent with the Court's opinion. *Whitman v. American Trucking Ass'ns, Inc.*, 531 U.S. 457 (2001); *on remand sub nom. American Trucking Ass'ns, Inc. v. EPA*, 283 F.3d 355 (D.C. Cir. 2002).

⁷ EPA's estimate is based on 8-hour monitoring during 1997 through 1999; these data will change from year to year, and the most current data will be used to make final designations of ozone nonattainment areas when the standard is implemented. The data on the 1-hour ozone areas are as of January 29, 2001.

violating the current standard—123 million people, or 44 percent of the nation’s population, compared with 54 million. This development, coupled with the fact that the technological solutions needed to achieve relatively smaller emissions reductions may become too costly, will require communities to look for other ways to reduce emissions. These alternatives could include altering their future transportation and land use plans.

Federal Laws and Programs Linking Transportation to Improved Air Quality Have Helped Targeted Communities Control Pollution but Could Be More Comprehensive

Both the clean air and surface transportation laws established requirements and programs that have helped to reduce harmful vehicle emissions, but these have focused on managing existing pollution and do not provide areas with clean air an incentive to preserve it. DOT and EPA also have initiatives underway, including joint projects, that encourage transportation planners and communities to consider how their anticipated transportation systems and projects will affect air quality. However, DOT has limited discretion over one of its grant programs, thereby raising questions about whether funds are used most effectively, and EPA has limited funding for its initiatives and therefore has supported only a small number of communities.

The Clean Air Act Requires Planners to Ensure Transportation Designs Will Not Worsen Air Quality, but Only in Areas that Already Have Pollution Problems

A provision in the Clean Air Act addresses the link between transportation and air quality—the conformity demonstration requirement. Generally speaking, under this requirement, transportation planners in an area with air quality problems must estimate the emissions resulting from their transportation plans and programs and demonstrate that they do not exceed the vehicle emissions ceiling, or budget, approved for that area in the state implementation plan for achieving air quality standards.⁸ If they cannot do so, they must adjust their transportation plans or their area cannot, with limited

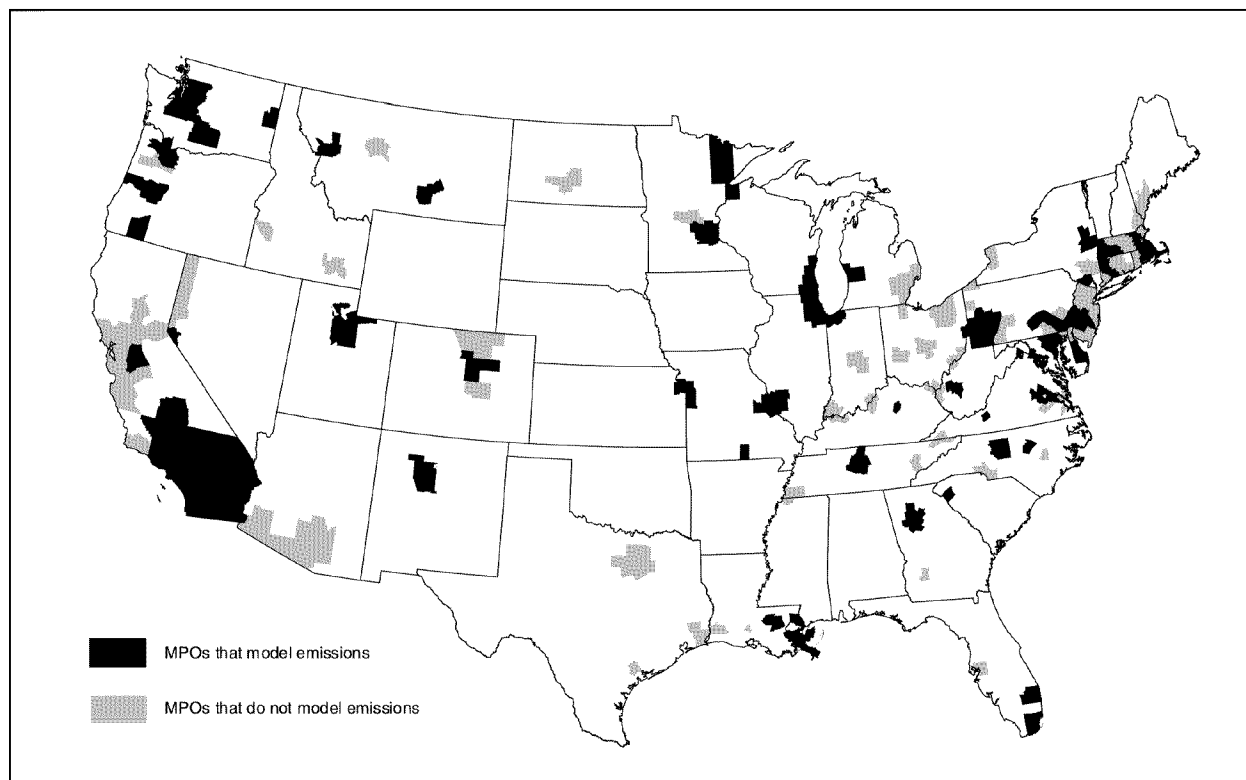
⁸ Areas that exceed the standards— “nonattainment” areas—or are maintaining the standards after prior violations— “maintenance” areas—for ozone, carbon monoxide, particulate matter, and nitrogen dioxide are subject to the conformity requirement.

exceptions, spend federal funds on highway or transit projects that will exacerbate or create air quality problems.⁹

In our 2001 survey, 56 percent of the 134 transportation planners in areas of poor air quality, and thereby required to demonstrate conformity, said that they made at least moderate changes to their transportation plans and programs to reduce emissions. These changes could include, for example, adding more transit projects, bike and pedestrian facilities, or intelligent transportation systems like electronic toll collection systems on highways. Furthermore, the conformity requirement provided an incentive for planners in areas with air quality problems to go beyond just looking for ways to make changes in their transportation plan to reduce emissions. Some of these planners also assessed whether changing local land use plans could have an even more dramatic effect on transportation plans and prevent pollution by reducing reliance on cars. In fact, 46 percent of the 134 planners said that they evaluated the emissions from the mix of transportation projects generated from alternative land uses, as shown in figure 3.

⁹ Projects related to highway safety, transportation control measures included in an approved state implementation plan, or transportation projects approved or funded by the federal government can move forward.

Figure 3: MPOs in Areas with Air Quality Problems That Have Modeled Emissions from Different Land Uses

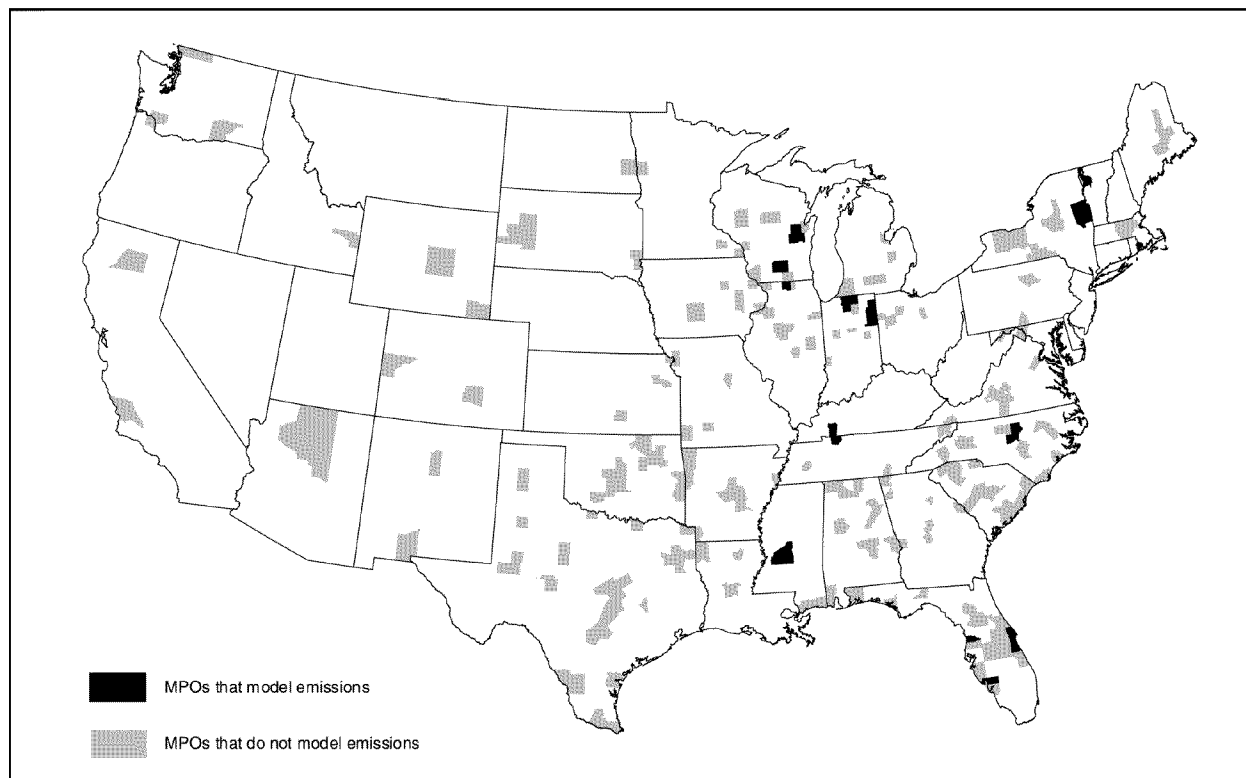


Note: The boundaries covered by the planning organizations are based on survey data and may not reflect exact borders. We designated an organization's entire boundary as being an area with air quality problems if any one county within the borders has problems. The results from Alaska are not included.

Source: GAO analysis of survey data.

In contrast, transportation planners in areas with good air quality that did not have to meet the conformity requirement seemed to have little incentive to assess emissions from alternative land uses as a means to preserve their air quality. In fact, only 8 percent of these 155 planners reported assessing emissions from the mix of transportation projects generated from alternative land uses, as shown in figure 4, compared with the 46 percent of planners in areas with air quality problems. By not conducting these assessments, the localities—many of which could be facing rapid growth in the future—may have missed an opportunity to plan their growth—and the transportation systems to support it—in ways that preserve clean air.

Figure 4: MPOs in Areas Without Air Quality Problems that Have Modeled Emissions from Different Land Uses



Note: The boundaries covered by the planning organizations are based on survey data and may not reflect exact borders. We designated an organization's entire boundary as being an area with air quality problems if any one county within the borders has problems. The results from Alaska are not included.

Source: GAO analysis of survey data.

While recognizing that the conformity requirement has encouraged certain communities to look for ways to reduce emissions, only 31 percent of the planners responding to our survey found the process of demonstrating conformity to be effective in helping their areas achieve air quality goals (40 percent found it to be ineffective). Managers of state air quality programs, who we surveyed separately, expressed similar views about the effectiveness of the process. Planners, managers, and DOT officials identified several difficulties in executing the various steps needed to demonstrate conformity. These include the following:

- The required time frames for updating transportation plans and testing conformity do not match those for updating an area's vehicle emissions budget in the air quality plan, and this difference can further complicate efforts to meet the conformity requirement, according to DOT officials. For example, when planners

in the Washington, D.C., metropolitan area had to update their transportation plans and test for conformity, they had to use the most current data on the types of vehicles driven in the area. That data showed an unexpected increase in the number of sport-utility vehicles on the roads and, consequently, projected emissions were higher. To ensure conformity did not lapse, the planners had to try to find additional ways to alter their transportation plans to achieve the necessary emissions offsets. Because the area's air quality plan was not updated at the same time, it was not possible to assess whether the emission budgets needed to be revised to reflect the increased vehicle emissions.

- Planners responded in the survey that they could use additional technical assistance and training to help them better understand the models used to compute emissions expected from their transportation plans, thereby helping them better demonstrate conformity.
- Planners furthermore reported that the public lacks knowledge about the air quality impacts of their transportation choices. This may make it less likely that they will support transportation changes that better protect air quality.
- Planners responded that land use decisionmakers are not systematically involved in the conformity process, despite the belief that certain land uses can impact regional air quality. Therefore, land use decisionmakers may be less likely to support changes that better protect air quality, such as denser housing and development in older, urban areas rather than scattered development on undeveloped land.
- According to DOT program managers, some planners have found the requirement to update their transportation plans and meet the conformity test at least every 3 years to be too burdensome. Because of the complexity and time involved in preparing the plan and demonstrating conformity, it can take some areas more than 3 years to complete their plan updates, after which time they need to begin the update process all over again. The tight time frame inhibits them from devoting their attention or resources to developing more strategic transportation solutions or adopting new and better models for assessing emissions and analyzing transportation plans, among other things.

Resolving these issues and improving the effectiveness of the conformity process could be even more important because of the new counties that are expected not to meet the new ozone and particulate matter standards. Having to demonstrate conformity will be among the challenges these counties will have to face. At the chairman's request, we are initiating a more comprehensive review of the conformity requirement's effectiveness, impact on transportation planning, and possible improvements.

Federal Surface Transportation Laws Created Programs to Protect Air Quality but Some Are Not Comprehensive Enough to Prevent Pollution

ISTEA, and its successor, TEA-21, included provisions to promote transportation plans and programs that better protect air quality. The largest of these is the Congestion Mitigation and Air Quality Improvement program (CMAQ), receiving \$8.1 billion through 2003. This program provides federal funds for transportation projects to reduce emissions and congestion in areas with poor air quality. For example, Boulder, Colorado, used CMAQ to partially fund a transit service that helps connect residents to employment centers and retail districts. Because this service transports nearly 10,000 riders per day, it has helped the city meet its clean air and congestion relief goals.

Although CMAQ encourages projects that reduce emissions, it targets areas with existing air quality problems, and provides less of an incentive to areas with clean air that may have emerging air quality problems.¹⁰ This is important because implementation of EPA's new limits on ozone and fine particulate matter will increase the number of communities with air quality problems and may increase demand for the program's limited funding (see fig. 2). Furthermore, DOT program managers observed that communities tend to use their funds on "tried and true" projects, such as carpool lanes, and overlook other, more innovative projects, such as cleaner diesel engines, that could potentially achieve greater emissions reductions per dollar. In addition, the formula used to distribute CMAQ funds takes into account whether an area has an ozone or

¹⁰ Funds are distributed to states according to a formula based on attainment status for ozone and carbon monoxide and the population living in the affected area. States without air quality problems receive a minimum amount of funds and can spend some of them on projects not prescribed under the program.

carbon monoxide problem, but not a particulate matter problem, even though this pollutant can pose similar health risks.

TEA-21 also created the Transportation and Community and System Preservation Pilot program to help planners and localities improve the efficiency of the transportation system and reduce the environmental impacts of transportation, among other objectives. However, program managers may not be able to ensure funds are used most effectively on projects that could best demonstrate the linkages between transportation, air quality, and land use because most of the funds were already designated, or “earmarked,” to projects before they were reviewed using the competitive selection factors.

Other DOT and EPA Initiatives Show Promise, but Scope and Funding Are Limited

In addition to the programs authorized under TEA-21, a number of funding, technical assistance, and outreach initiatives have helped localities minimize the impacts of transportation on air quality. For example:

- **Funding.** EPA has programs to encourage transportation projects that are more protective of air quality. The agency’s Clean Air Transportation Communities grants program, implemented in 2001, provided \$1.27 million in seed money, technical assistance, and recognition for transportation projects that reduce emissions. For example, one project will encourage a car-sharing program to introduce new low-emissions vehicles. EPA also created the Mobile Source Outreach Assistance program, funded at \$770,000 in fiscal year 2001, to help educate communities about transportation choices that reduce vehicle miles and emissions.
- **Technical assistance.** DOT and EPA have a number of joint technical assistance efforts underway to help transportation planners consider air quality impacts. For example, the agencies (1) are issuing guidance to better clarify the modeling needed to comply with the conformity requirement and (2) initiated the Travel Model Improvement Program to update transportation models so that they help planners better perform travel-related technical analyses.

- **Outreach.** EPA has several initiatives aimed at encouraging planners and communities to think about alternative land uses as a way to better protect the environment, initiatives sometimes referred to as “smart growth.” In particular, EPA has (1) information networks, Web sites, guidance on best practices, and training programs for local officials, among other things and (2) is issuing guidance on ways to calculate the potential emissions reductions from alternative land uses, such as redeveloping old industrial sites in an urban area rather than building on a new site in the suburbs, in order to discourage and reduce sprawl and reduce vehicle miles.

While these efforts have met with success, the available resources and scope of impact has been limited. For example, EPA has been able to award Clean Air Transportation Communities grants to only 10 state, local, or tribal governments, for a total of about \$1.27 million to date, but has discontinued funding for fiscal year 2002 because of budget constraints. In addition, efforts to improve travel models are not focused on creating models that fully integrate transportation, the environment, and land use, which would help planners consider the effects that their transportation decision will have on land use, future growth, and air quality. Furthermore, at the time of our survey, few planners were aware of EPA’s guidance on how to obtain credit in their emissions budgets for reductions from alternative land uses, and EPA had conducted only a limited number of workshops and did not plan to offer additional training. We also found that the level of support across EPA’s regions for these types of initiatives varied and that unless EPA better coordinated its efforts through a more comprehensive strategic plan, it would not be able to effectively leverage its resources and achieve more widespread results. We recommended that EPA devise such a strategy, and the agency expects to have this completed by the fall of this year.

Planners Identified Additional Ways the Federal Government Could Help Them Further Limit Transportation's Impacts on Air Quality

The planners responding to our survey identified the following actions the Congress and the federal government could take to remove some of the barriers to assessing and limiting the adverse impacts of land use on air quality.

- **Financial incentives.** Federal funding could be allocated to help promote a more collaborative working relationship among transportation, environmental, and land use planners so that they can develop ways to improve air quality. For example, federal funding could be targeted more to those transportation projects that were designed through a collaborative effort.
- **Technical assistance.** Federal agencies could provide additional tools to promote greater consideration of how transportation, air quality, and land use interact, including (1) access to technical staff, (2) examples of communities or regions that successfully demonstrated how changes in land use have affected vehicle miles traveled, and (3) improved models, such as those that can measure the emissions of small projects, like bicycle and pedestrian facilities.
- **Public outreach.** Federal agencies could undertake additional efforts to educate the public and local officials on how their land use and transportation decisions affect air quality, which could help to promote collaboration among all of these parties on ways to limit these effects.

Conclusions

Using the federal clean air and transportation laws, the nation has significantly reduced harmful vehicle emissions, thereby helping to protect public health and the environment. Technological advances will also continue to produce cleaner vehicles and fuels, further reducing harmful emissions. But for some communities, these advances may not be enough to compensate for rapid growth and the associated growth in miles driven. These communities may still need help to guide their growth and design their future transportation systems to limit pollution. However, the current clean air and surface transportation requirements and programs do not directly encourage communities to

consider more innovative transportation projects or alternative land development strategies as a means to reduce emissions. Nor do they encourage communities to take action that will preserve the clean air that they still enjoy.

With the upcoming reauthorization of surface transportation programs, the Congress has an opportunity to strengthen its past efforts and create new initiatives to promote transportation and growth that protects public health and the environment. We would like to bring to your attention to, as well as reaffirm, a number of recommendations we made in our 2001 report to help transportation planners and communities in assessing, preventing, or limiting harmful vehicle emissions. These recommendations included the following:

- The Secretary of Transportation should request all transportation planners to assess the emissions impacts of their proposals and use the results of these assessments to help educate local decisionmakers about the consequences of their transportation and land use decisions. This would encourage all parties to collaborate and take a broader, more regional approach to solving air quality concerns.
- The Administrator, EPA, should target available financial incentives in ways that encourage transportation planners, environmental officials, and local decisionmakers to collaboratively consider the impacts of transportation and land use on air quality.
- Both the Secretary and Administrator should provide more access to technical tools, such as staff and user-friendly models that integrate transportation, environmental protection, and land use, and better market these tools to transportation and local decisionmakers.
- The Administrator, EPA, should take more action to educate the public and local decisionmakers about the air quality impacts of their transportation and land use choices.

Our report also suggested ways that the Congress, as it reauthorizes the surface transportation laws, could help assist those states and localities that want to limit the air quality impacts of their land use and transportation decisions by

- adding the requirement that planners consider the environmental impacts of different land use strategies as a step in the transportation planning process;
- continuing but modifying funding programs designed to link transportation and air quality so that they also take into consideration alternative land uses, where appropriate, or create new programs to make this link;
- providing funding to states and localities, when possible, to help them obtain technical expertise, data, and analyses to assess land use impacts and mitigate adverse effects; and
- providing federal agencies with greater discretion over a portion of their transportation or environmental funds to encourage assessment and mitigation of land use impacts on the environment.

Contacts and Acknowledgments

For further information, please contact John Stephenson at (202) 512-6225. Individuals making key contributions to this testimony include Eileen Larence, Elizabeth Erdmann, and Cindy Steinfink.