Transportation Conformity: Accounting for Public Health in Transportation Decisions

Testimony of Michael Replogle, Transportation Director, Environmental Defense, 1875 Connecticut Ave. NW, Washington, DC Before the House Energy & Commerce Committee

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Mr. Chairman, my name is Michael Replogle, and I serve as Transportation Director of Environmental Defense. Environmental Defense is a leading, national, NY-based nonprofit organization, representing over 400,000 members, that links science, economics, and law to create innovative, economically viable solutions to today's environmental problems. Thank you for this opportunity to discuss suggested changes to the transportation conformity program in the Clean Air Act as proposed by H.R. 3, The Transportation Equity Act.

Progress On Clean Air Still Falls Short of Properly Protecting Public Health

We have made substantial progress as a nation in reducing air pollution over the last three decades, but half of all Americans still live in places with unhealthy levels of smog. Air pollution has a tremendous impact on public health, contributing to asthma attacks, lung cancer, heart disease, and tens of thousands of premature deaths each year. While today's vehicles are as much as 90 percent cleaner than those of the 1960s, cars and trucks emit a large portion of smog-causing pollutants: One-third of nitrogen oxides and a quarter of volatile organic compounds. Car and truck emissions also account for nearly one-third of the United States' climate-change-inducing carbon emissions. And motor vehicles will remain the leading source of air pollution for years to come in many metro areas because Americans are driving more and more. Peer

reviewed scientific research provides compelling evidence that air pollution from highways cause "adverse effects" to public health. According to the Federal Highway Administration's Report to Congress, in 1999, the adverse health effects of motor vehicle pollution cost Americans more than $40 billion each year. Conformity is an important tool for controlling emissions of the pollutants that contribute to these effects.

Why Conformity? Section 176 of the Clean Air Act requires that regional transportation plans contribute to timely attainment of health-based air quality health standards and conform to state-established air pollution limits. This transportation conformity provision of the Act was strengthened in 1990 to keep unanticipated growth in traffic and pollution from motor vehicles from causing regional air pollution control strategies to fail, as happened repeatedly in the past. Conformity has spurred broader political support for cleaner vehicles, fuels, and maintenance, and strategies to curb traffic and pollution growth with better travel choices. Conformity finally got transportation and air quality agencies to talk to one other and coordinate to cut pollution.

Proposed Changes to Conformity Would Weaken Protections for Public Health

Proposed changes to conformity threaten to undo this progress and to substantially weaken a key tool designed to help state and local air pollution officials manage vehicle emissions on a long-term basis. The result will be that air quality will deteriorate and there will be fewer options for eliminating air pollution. In the end, not only will the health of our citizens suffer, but other sources, at perhaps greater cost, may be forced to implement emissions reductions that proper transportation planning could have avoided.

We urge you not to upset the existing clean air and public health protections built into our transportation programs. Both the House and Senate bills include provisions that weaken these protections, in some cases dramatically. In most cases, the House provisions, which are the same as in this year's H.R. 3, are less damaging to clean air protections. The most preferable and protective action Congress can take is to reaffirm the existing law with no changes. But adoption of the H.R. 3 provisions would be preferable to the House taking no position on this vital matter as the transportation bill goes to conference. We also urge you to reject any efforts to add new provisions to weaken clean air protections during conference negotiations.

Planning Horizon. A Senate proposal to reduce the conformity analysis planning horizon for long range transportation plans from 20 to 10 years would allow officials to ignore until it is too late the long term growth of air pollution set in motion by developing major new highways, which often take more than 10 years to be fully manifest. Yet the U.S. Department of Transportation found that in 15 years only six metropolitan areas have faced problems meeting the twenty-year conformity horizon since 1990, and in all six cases conformity was achieved by adding long-term pollution controls or changes to transportation plans. The basis for changing the planning horizon can only be to disregard the adverse long-range emissions consequences of additional highway projects in order to transfer the costs of correcting those consequences to other source categories. H.R. 3 would continue the 20-year requirement except in areas where the metropolitan planning organization and air pollution control agency agree to reduce the horizon, which allows local needs to be taken into account and other safeguards to be adopted. This will be less damaging to clean air than the Senate proposal.

Ensuring Conformity of Plans, Not Just Projects. A Senate proposal would narrow the scope of conformity so it would apply only to regionally significant projects, rather than to the entire Transportation Improvement Program and Constrained Long Range Transportation Plan, exempting smaller projects that might otherwise trigger analysis to consider localized pollution hot-spots or that might cumulatively produce regionally significant emissions impacts that harm health. This provision would continue to allow large investments in polluting projects during a conformity lapse, which would exacerbate the violation of the SIP emissions budgets, and increase the difficulty of bringing emissions back into line with the emissions budgets needed to attain. H.R. 3 has no counterpart provision.

Ensuring Air Agency Involvement in SIP Revisions. A Senate proposal would allow transportation agencies to modify Transportation Control Measures in State Implementation Plans for air quality (SIPs) without any oversight or approval from local, state or federal environmental agencies. This would weaken the integrity of SIPs and could lead to their failure. H.R. 3 corrects some of the deficiencies in the Senate bill by at least ensuring that changes to the SIP are approved by the State.

Frequency of Conformity and Timing of Impact of Lapse. Current law requires updating of conformity for areas with unhealthful air quality every 3 years for long-range transportation plans, matching the 3-year milestone compliance demonstration requirements by which EPA can ensure timely updates to air quality plans, and it requires conforming short-term transportation funding programs to be updated every 2 years. Last year's Senate bill and H.R. 3 both propose required conformity updates every 4 years, while H.R. 3 would add to this a one-year grace period before any conformity lapse takes effect, a provision not in the Senate bill. We remain

concerned these changes will undermine timely awareness and action to correct conflicts between transportation and air quality plans, contributing to more missed clean air deadlines.

Like reducing the frequency of medical checkups for a person with a serious medical condition, or reducing the frequency of checkbook balancing for someone with a history of being overdrawn, reducing the frequency of conformity reduces the likelihood that problems will be detected and addressed in a timely way, when they are still manageable. Indeed, by a 3:1 margin, state air officials surveyed recently by the US General Accounting Office believed that reducing the frequency of conformity analysis to once every 5 years would make it more likely their area would fail to achieve healthful air quality by the deadlines established by the Clean Air Act.

Frequent checks ensure timely coordination between transportation and air quality plans when changes in conditions and assumptions show that pollution had been underestimated. It is easier and less expensive to correct problems early before they have compounded. According to the Environmental Protection Agency, only 10 percent of about 600 conformity demonstrations since 1997 have resulted in a conformity lapse and the vast majority of these delays lasted six months or less and involved areas where few or no significant road projects faced delays. The combination of a reduced planning horizon, coupled with less frequent planning, means that emissions are more likely to exceed emissions budgets, and transportation plans will bear a much more difficult burden in reducing emissions to meet emissions budgets. Ultimately a conformity lapse will be more likely, and agencies will be less able to remedy the lapse.

Real-World Conformity Success Stories Put At Risk by Proposed Changes

It is useful to consider real world stories about how transportation conformity has worked to understand why the changes proposed by road industry groups and state DOTs are inadvisable.

Denver and Charlotte Extend Their Clean Air Horizon. In 6 metro regions in the past decade where 20-year transportation plan emissions were found to exceed the air pollution plan limits this problem was readily fixed by committing to future emissions controls or by redesigning the transportation plan to reduce emissions. In Charlotte in the mid-1990s, conformity showed excess emissions in the 20-year transportation plan. This led officials to adopt a revised plan with better transit and smarter growth, trimming forecast traffic growth and pollution by almost a quarter, winning voter approval for the plan. That's a conformity success story that might not be told today if only short-term impacts are considered for conformity.

Denver was faced with terrible winter particulate pollution in the 1980s and agencies began taking action against wood burning, but particulate pollution remained well in excess of federal standards. Conformity in the 1990s prompted transportation and air quality officials to look at other sources of particulates, which led to replacing street sanding with chemical deicers and widespread road sweeping, causing particulate levels to drop by half. Conformity spurred Denver to build into regional plans enough maintenance plan measures to meet long-term health standards through 2015 and provided an incentive for developing light rail as a long-term pollution control measure, as well as a commitment by metro area governments to limit growth to a 730-square mile area, with transportation alternatives to support this goal. Travel demand management strategies in the Denver long range plan promote ridesharing and telework and are used as a safety margin in meeting the 2025 emissions budget. By 2001, Denver was one of only

a few large metro areas that had attained every national air quality standard. Reducing the time horizon and frequency for conformity, as proposed, would mean weaker incentives for such positive steps.

Reducing the time horizon and frequency for conformity, as proposed in the Senate bill, would mean that violations of emissions budgets would not be discovered until the second 10-year period becomes the current 10-year period. At that point, the plan would show violations that would force the area into a conformity lapse which would be hard to remedy. In many cases, the conformity lapse could only be cured by immediate emissions reductions because there would be no lead time to develop and implement long-term changes to the transportation system. Such immediate controls are likely to be much more expensive and more disruptive. At least H.R.3 would continue to require emissions analyses for the full 20-year time horizon, which gives planners an opportunity to avoid a conformity crisis.

Washington D.C. Learns that Conformity Balance Can Help Keep the Doctor Away. In metro Washington, DC, in 2001, a year into a two-year transportation program, regional officials updated planning assumptions to acknowledge the growing use of more highly polluting Sport Utility Vehicles (SUVs) by area drivers. They found this caused emissions to violate adopted air pollution plan limits by 8 tons per day. Over the next year, they found solutions within the transportation plan to this conformity problem with better accounting for emission strategies already underway, investing $42 million in clean buses and other measures, and trimming $800 million from road programs which cut forecast traffic growth, congestion, and pollution. If proposals for reduced conformity frequency had been law, the region would have ignored these problems for another two or three years without action. If proposals from the road lobby to

mandate the use of out-of-date planning assumptions for conformity had been law, the DC area public and elected officials would not have even learned that their air pollution plan was failing due to rising use of SUVs. If other proposals from the road lobby to provide an 18-month grace period following a conformity lapse before limiting new project approvals had been law, solutions to the problem would have been deferred, not addressed. Air quality in our nation's capital would be more harmful on more days of the year. Attainment of healthful air quality would be a more distant goal. Thanks to current law, even while the DC area remains a severe non-attainment area for ozone, it's residents can breathe a bit easier.

Conformity Lapse Helps Atlanta Get Back on Track Until FHWA Reinterprets Rules.

No region has ever lost funds due to conformity, even in the worst case of an area that was in a prolonged lapse of conformity, such as Atlanta. There, after a massive freeway construction program helped spur the region's residents to drive on average more miles per day than any other region in the world, officials failed to adopt readily available strategies for reducing air pollution even after it was apparent in 1996 that the transportation plan's projected emissions far exceeded the pollution limits adopted in the state implementation plan for air quality. Routine conformity analysis led to improved estimation of air pollution and spurred progress for clean air in Atlanta. In 1996, the area's air quality plan said the region would meet a motor vehicle emission budget of 214 tons per day (tpd) of NOx by 1999, the Clean Air Act deadline for attaining ozone health standards. In 1998, area officials wrote to EPA saying that 1999 NOx emissions would actually be 238 tpd, reflecting the use of a refined travel model and updated growth forecasts. In 1999, the same officials found that real-time NOx emissions were 264 tpd, exceeding by 50 tons the limit established as necessary to attain the national health standard. In 2001, they admitted that the region would not reach the 214 tpd motor vehicle NOx budget until 2005. This led to

significant shifts in transportation funding to help curb traffic and pollution growth - shifts that area officials would have avoided had they not been required to update a conforming transportation funding program every 2 years, with public oversight.

A transportation conformity lapse between 1999 and 2001 spurred Atlanta area officials to redirect over $300 million from road projects that would have further increased pollution, traffic, and sprawl into highway safety, transit, sidewalks, bikepaths, HOV lanes, maintenance, and bridge reconstruction projects that would reduce air pollution or at least not boost pollution. Transportation conformity limits on new road project approvals spurred adoption of governance reforms, leading to establishment of a new Georgia Regional Transportation Authority to better coordinate transportation, land use, and air quality policies in the state. Atlanta demonstrated how improving transportation choices can cut traffic, pollution, and health harms to children. By adding 1000 buses and encouraging alternative modes, area officials cut morning traffic by 23 percent during the 1996 Olympics, reducing ozone levels and resulting in nearly 20 percent fewer hospitalizations of children for asthma.

But in 2001, FHWA allowed Atlanta to begin approving new roads again, even though its emissions remained well above the 1999 adopted air pollution State Implementation Plan (SIP) limits, construing EPA's conformity rule as requiring only one emissions analysis for the end of each ten-year period once the attainment date for an area is passed. In other words, FHWA is saying transportation emissions are not required to comply with the SIP after the attainment date and that conformity is met by showing only that emissions are likely to comply ten years in the future. So if an area chooses the strategy adopted in Atlanta, it can skip the obligation to comply in the attainment year by going into a conformity lapse for a year, and then re-establish its

conformity status by showing that it will comply ten years later without ever reducing emissions to the level required for attainment. As proposed, the 10-year conformity horizon together with FHWA's application of the conformity rule would no longer require emissions to actually meet the level established by the State as necessary for attainment. There will be no year when motor vehicle emissions must actually comply with the limit on vehicle emissions in the SIP, likely causing the air pollution control plan to fail.

A recent paper produced by the Center for Clean Air Policy, *Atlanta's Experience with Smart Growth and Air Quality,* provides further detail on this important case study in how conformity has operated in the larger context of transportation and air quality planning. It is included in this testimony for the record as Attachment 1.

New Research Shows Serious Health Effects of Transportation on Public Health

In the face of recent peer-reviewed scientific research that provides some of the most compelling evidence ever that showing that transportation can have serious adverse health impacts on children and others in our communities, Congress should resist pressure from industry groups to weaken clean air and public health protections. Conformity is an important tool for controlling emissions of the pollutants that contribute to these health effects. We summarize below some of the recent studies that support the need for better enforcement of existing clean air laws.

Cancer Risk. In 2000, the South Coast Air Quality Management District in California made a major contribution to the research showing the link between cancer and mobile source pollution. The final Multiple Air Toxics Exposure Study (MATES-II) measured exposures to 30 toxic air

pollutants at 22 locations in the Los Angeles air basin.[1] Using estimates of cancer risk developed for toxic air pollutants by the U.S. Environmental Protection Agency (EPA) and the California Air Resources Board, MATES-II found that cancer risk from the 30 air pollutants averages 1.4 cancers per 1,000 residents. Apportioning air pollution-related cancer risk by pollutant, MATES-II demonstrated that emissions from mobile sources account for 90% of the overall cancer risk attributable to toxic air pollutants in the five-county air district. Id., p. ES-3 ¶1, Fig. ES-2. The total cancer risk from all sources, including traffic ("on-road mobile"), non-road mobile and stationary sources, averaged across the region was found to be 1400 per million. Id., p. ES-3. On-road vehicle emissions account for half of this risk, or 700 per million. Id., Fig. 4-2. This equates to about 1 cancer for each 1450 exposed people.

MATES-II also demonstrated that higher levels of risk occur near highways. The study found that the range of cancer risks varied significantly across the region, from 1,120 in a million in the cleanest neighborhoods to about 1,740 in a million in the most polluted. Id., p. ES-3 ¶2. The Report found the greatest risk levels at locations where "the dominance of mobile sources is even greater than at other sites." Id., p. ES-5 ¶3. It also found that "model results, which are more complete in describing risk levels…than is possible with the monitored data, show that the higher risk levels occur… near freeways." Id., ¶B.2. "Results show that the higher pollutant concentrations generally occur near their emission sources." Id., ¶4. These findings provide further evidence that neighborhoods near highways would experience higher concentrations than the regional averages. Based on all these observations, MATES-II concluded that "[f]or mobile source compounds such as benzene, 1-3 butadiene, and particulates associated with diesel fuels, higher concentration levels are seen along freeways and freeway junctions." Id., p. 5-4 ¶5.3.

[1] South Coast Air Quality Management District, Multiple Air Toxics Exposure Study-II (Mar. 2000),

Thus the cancer risks to populations in close proximity to a major freeway will be substantially greater than the regional cancer risks attributable to motor vehicle emissions.

Risks to Sensitive Populations. Particularly important for assessing the adverse health impacts of emissions from highways located near school buildings and residential areas are recent research reports that have focused on the links between motor vehicle emissions and adverse health effects suffered by children.

A new study designed to determine whether the proximity of 10 middle schools to major freeways in California's East Bay caused adverse health effects among school children aged 10 to 12 found a statistically significant greater prevalence of diagnosed asthma and bronchitis among students at the four schools most affected by motor vehicle emissions.[2] At each school, the study monitored concentrations of a number of motor vehicle-related pollutants, showing that $PM_{2.5}$ was 25% higher in a school yard 60 meters from a freeway than at monitors located a mile from the freeways.[3] Black carbon, a component of diesel exhaust measured at the schools, was also shown to increase with proximity of the school to a major highway. Carbons levels were 55% higher at the school closest to a freeway compared to schools that were more than a mile distant from a freeway. Air quality at every school complied with national ambient air quality standards (NAAQS).

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available at http://www.aqmd.gov/matesiidf/matestoc.htm.

[2] Janice J. Kim et al., *Traffic-Related Air Pollution Near Busy Roads: The East Bay Children's Respiratory Health Study*, 170 <BI>Am. J. Respiratory & Critical Care Med.<D> 520 (2004).

[3] *Id.*, tbl. 2 (average $PM_{2.5}$ measured at school closest to a freeway was 15 micrometers per cubic meter ($\mu g/m^3$) compared to 12 $\mu g/m^3$ at regional air district monitors).

A study in the Bronx, New York, investigated truck traffic, particulate matter and carbon concentrations in the neighborhood around the Hunts Point terminal where one in three children have asthma (compared to one-in-five nationally), and the hospitalization rate for asthma is 12 times the national average.[4] The reported carbon levels used as a surrogate for diesel emissions ranged at six sites from more than two to nearly seven times greater than the levels reported at the school site in the East Bay Children's Respiratory Health Study with the highest levels.[5] Carbon concentrations were found to correlate strongly with daily diesel truck traffic on the streets nearest the monitor.

The data from both the East Bay and the Hunts Point studies strongly suggest that carbon levels associated with diesel emissions may be directly responsible for inducing the allergic response that is asthma, or they are a surrogate measure of the mix of chemicals in diesel exhaust that initiate asthma. According to the President's Task Force on Environmental Health Risks and Safety Risks to Children, America is in the midst of an asthma epidemic.[6]

EPA has observed, once asthma is induced in a child, "asthma cannot be cured, only controlled."[7] Since the East Bay study suggests that the numbers of children diagnosed with asthma appear to increase during the few years children are in middle schools located near highways, the greater number of years that young children will be exposed during the elementary years at Swansea Elementary School threatens to impair the health of these children for the remainder of their lifetimes.

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[4] T. Suvendrini Lena et al., *Elemental Carbon and PM2.5 Levels in an Urban Community Heavily Impacted by Truck Traffic*, 110 <BI>Envtl. Health Persp.<D> 1009 (Oct. 2002).
[5] *Compare id*. tbl. 4 *with* Kim et al., *supra* note 9, tbl. 2.
[6] Asthma and the Environment: A Strategy to Protect Children, President's Task Force on Environmental Health Risks and Safety Risks to Children, January 28, 1999, Revised May, 2000.

Another study assessed the impact of pollution levels on lung development from the ages of 10 to 18. Measurements of lung function in large cohorts of school children who were followed for eight years in 12 California communities demonstrate large deficits in three measures of lung function among students living in the communities with the highest pollutant concentrations compared with comparably aged students in communities with the lowest pollutant concentrations.[8] By age 18, when most lung growth has been completed, these reductions in lung function were expected to remain throughout the lifetime and contribute to future health complications.[9] The motor vehicle-related pollutants elemental carbon and NO2 were two of the three pollutants most strongly correlated with this adverse health outcome. In the most polluted community in the study, the eight-year elemental carbon concentration was comparable to the carbon level reported in the school yard closest to a freeway in the East Bay Children's Respiratory Health study, and more than five times lower than the highest carbon levels measured in the Hunts Point neighborhoods adjacent to truck routes. These studies demonstrate that children in neighborhoods exposed to the pollutants emitted from freeways and major truck routes are at significantly greater risk of life-long health impairment from reduced lung function as well as asthma.

New research aimed at attempting to find an explanation for children who die of cancers before age 16 also found a strong correlation between the proximity of the residence of the mother to highways (less than one kilometer) during fetal development and the first months following

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[7] 66 Fed. Reg. 5001, 5013 (January 18, 2001).
[8] J.W. Gauderman et al., *The Effect of Air Pollution on Lung Development from 10 to 18 Years of Age*, 351 <BI>New Eng. J. Med.<D> 1057 (Sept. 9, 2004).
[9] *Id.* at 1063.

birth.[10] Another study identified increased chromosome aberrations in newborns who were exposed to PAHs found in diesel exhaust during pregnancy as a result of the mother living in neighborhoods in Upper Manhattan and the South Bronx.[11] These chromosome aberrations are often a precursor to the development of cancer. This provides a plausible mechanism to explain why children die of cancer before age 16. Exposure to diesel exhaust in the womb may be one of the most harmful effects of vehicle-related emissions. Together, these studies suggest that fetuses may be the population most vulnerable to the adverse health effects of motor vehicle-related pollutants.

These and other recent field research demonstrate that the emissions control programs adopted under the CAA for gasoline and diesel vehicles do not protect against adverse health effects attributable to motor vehicle emissions from large numbers of vehicles such as occur on heavily trafficked highways, interchanges, truck and bus terminals, airports, or seaports. The American Pediatric Association, the national association of physicians specializing in children's health, highlighted the threats to children in a new Policy Statement issued in 2004.[12] The APA Policy Statement made recommendations to protect children from the harmful effects of air pollution, including expanded efforts to control vehicle emissions and a policy that schools not be located near highways.

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[10] E.G. Knox, *Childhood Cancers and Atmospheric Carcinogens*, 59 <BI>J. Epidemiology Community Health<D> 101 (Jan. 2005).

[11] Bocskay, Kirsti A., et al., "Chromosomal Aberrations In Cord Blood Are Associated With Prenatal Exposure To Carcinogenic Polycyclic Aromatic Hydrocarbons," *Cancer Epidemiology Biomarkers and Prevention* (in press), available at http://cebp.aacrjournals.org.

[12] "Ambient Air Pollution: Health Hazards to Children," Committee on Environmental Health, Pediatrics 2004;114;1699-1707.

Clean Air and Smart Growth

Conformity has fallen short in achieving one of its original goals as framed in the 1990 Clean Air Act Amendments, to encourage efforts by local, regional, and state officials to design transportation plans that would contribute to more timely attainment of healthful air quality. But some regions have made progress towards this end and are finding ways to reduce pollution at no cost at all through better community designs that respond to citizen and market demands. Vision planning initiatives in Salt Lake City and Sacramento have recently built on the early success of Portland, Oregon, in helping citizens and elected officials define new regional plans that accommodate new job and housing growth with less traffic growth. A recent paper produced by the Center for Clean Air Policy, *Two for the Price of One: Clean Air and Smart Growth,* does a good job of summarizing best practices in this area and possible pathways for further progress, and is included in this testimony for the record as Attachment 2.

Conclusion

The story today is simple. Across much of America we have serious transportation related air quality problems that harm our health. The tools to fix that problem are in place, but some want to blunt these tools, leading to more dirty air and harm to the health of millions of Americans.

Congress should protect accountability for air quality in the federal transportation bill and double funding for clean air, metropolitan and state planning, and transit programs. Gutting clean air laws will undermine public support for transportation funding. Protecting those laws and providing more resources can help replicate these success stories across America and ensure that transportation contributes to improved public health and clean air.

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Attachment 1:

Atlanta's Experience with Smart Growth and Air Quality

Population Growth and Land Use in the Atlanta Region

The Atlanta Urbanized Area is the 11th largest in the United States with a population of over four million people. The region grew by 1.1 million residents through the 1990s and created an additional 631,000 jobs during the same period.[13] The 18 counties that comprise the Atlanta regional MPO include three of the ten fastest growing counties in the country.

Traditionally, the urbanized area has accommodated this growth in population through the proliferation of low density development patterns. Since 1990, the region's population has increased by roughly 13 percent, but the amount of developed land has grown by 50 percent. The region ranks third in land area and 272nd in population density. At 1,783 people per square mile Atlanta is the region with more than one million people to have a population density below 2,000 per square mile.[14] Population densities experienced in Atlanta today are half of those recorded in the 1970s.

Due in large part to sprawling development patterns and limited transportation choices, Atlantans drive more than 100 million miles per day – equivalent to a trip to the sun and part of the way back. Atlanta has also been ranked with the fifth worst traffic congestion in the country with annual average delays per traveler of 60 hours, costing the region about $1.7 billion annually.[15, 16]

Air Quality History

The 13-county Atlanta region has the worst ozone pollution of any major city in the Southeast. Since the Clean Air Act was overhauled in 1977, Atlanta has never been in compliance with ozone standards. For 69 days during the summer of 1999, ozone pollution violated air quality health standards. On bad air days there is a 35 percent increase in emergency room visits for respiratory-related illnesses (mainly children and the elderly). During the 1996 Olympics, when fewer people used cars and more people used transit, emergency room visits by children with asthma dropped by as much as 45 percent.

Conformity Lapse, 1998-2000

In 1998, the Atlanta Regional Commission (ARC) was unable to develop a Transportation Improvement Plan (TIP) that demonstrated conformity to the adopted and approved 1999 attainment year motor vehicle emission budget as required under the Clean Air Act. The conformity lapse lasted from 1998-2000 and restrictedAtlanta's state and local agencies from approving funding for new regionally significant transportation projects other than pollution reducing transportation control measures and conformity exempt projects.

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[13] Atlanta Regional Commission (2004), "Mobility 2030 Regional Transportation Plan, Volume I"

[14] Ibid.

[15] http://mobility.tamu.edu/ums/congestion_data/tables/national/table_1.pdf

[16] http://mobility.tamu.edu/ums/congestion_data/tables/atlanta.pdf

Federal, state, and local governments were barred from funding new regionally significant conformity non-exempt transportation projects due to the 1998 conformity lapse, but the local and state governments used a grandfathering loophole in the EPA conformity regulation to exempt from the conformity requirements roughly $1 billion in road projects, arguing that because they had been included in a previously conforming transportation plan and program, they should be allowed to advance to construction even though they might increase air pollution emissions. This interpretation of the law was challenged by Environmental Defense in a suit which overturned the regulatory exemption through a March 1999 DC Circuit Court ruling. In the wake of that action, four environmental groups (the Sierra Club, the Georgia Conservancy, Georgians for Transportation Alternatives and the Southern Environmental Law Center) won a June 1999 settlement a lawsuit against USDOT, Georgia DOT and the ARC agreeing to allow 17 Atlanta-area road projects to proceed while terminating further action to advance 44 others until they might be included in a new conforming transportation plan.[17]

Atlanta area transportation agencies were encouraged to reallocate their transportation funding during the conformity lapse to fund emission-reducing or emission-neutral projects. This resulted in redirection of over $300 million in federal, state, and local funds towards transit, transportation demand management, high occupancy vehicle, highway safety, traffic signal, pedestrian/bicycle, and bridge reconstruction projects that do not negatively impact air quality and are exempt from conformity. The conformity lapse served as a wake up call for the region's public and private institutions, spurring on initiatives to identify and address the interrelated issues of air quality, transportation, quality of life and land use.

Atlantic Station Infill Development Project

The Atlantic Station project, in downtown Atlanta, is an effort to transform the former Atlantic Steel site, a 138-acre brownfield, into a model of mixed-use development that would emphasize residential and business uses, and include an auto and transit bridge connecting the site to the Midtown neighborhood. The EPA analyzed the likely effects of locating a development of the same scale and mix of uses in various 'greenfield' settings. Estimated VMT reductions ranged between 14 and 52 percent when compared to similar-size suburban and urban greenfield lots with less transit and pedestrian accessibility.[18] The conformity lapse created a unique situation where the Atlantic Station development was shaped as a Transportation Control Measure.

Political and Institutional Responses

Formation of the Georgia Regional Transportation Authority (GRTA) [19]

The Georgia Regional Transportation Authority was brought to fruition in 1999, after being passed through the state legislature with bipartisan support. The Authority emerged from the recommendations of the Metropolitan Atlanta Transportation Initiative (MATI), a response by Metro Atlanta Chamber of Commerce to growing concerns about Atlanta's air quality and

[17] http://edition.cnn.com/NATURE/9906/21/clean.air.settlement/
[18] http://www.epa.gov/projectxl/atlantic/020199.htm
[19] Georgia Regional Transportation Authority (2004), http://www.grta.org/

transportation problems. The Authority was given control over both transportation and land use planning in the region and is charged with combating air pollution, traffic congestion and poorly planned development in the Atlanta region. GRTA has the ability to issue $1 billion in revenue and $1 billion in general obligation bonds, in addition to providing assistance to local governments in financing mass transit and other projects that offer air quality benefits. Local land use and transportation plans in the region require the approval of the GRTA board to ensure consistency with regional air quality and transportation initiatives. In addition, the board reviews all major developments that may have regional impacts on the transportation network such as subdivisions and large commercial developments.

GRTA air quality improvement programs include an enhanced regional express bus that services 11 of the Atlanta Metropolitan counties. GRTA has also partnered with the Atlanta Regional Commission and the Georgia Department of Transportation in the planning of a future high-speed rail corridor linking Atlanta and Chattanooga. GRTA has often been viewed as an innovative regional institution that has been designed to fill gaps in the planning process that are unable to address the interrelated issues surrounding transportation and air quality in Atlanta. GRTA has also faced challenges including limited transit improvements and local officials opposition to intervention in land use decisions.[20]

Conforming 2025 Regional Transportation Plan

The ARC responded to the conformity challenge in early 2000, by developing a long-range transportation plan (RTP) that conformed to state air quality implementation plans (SIPs). The 2025 Regional Transportation Plan identified approximately $39.8 billion in transportation projects to be funded through until 2025.[21] This plan included a greater emphasis on bicycle paths, pedestrian infrastructure, transit service improvements, transportation demand management, emission reduction strategies and highway system preservation. In addition to investment reallocations, the plan made provisions for significant changes in land use, called for increased densities, directed growth and development into transportation corridors, town centers and activity centers**,** and facilitated greater use of transit in the region.

Concerns were raised by federal officials and citizens groups regarding commitments for transit funding and the implementation of land use targets outlined in the RTP. The ARC and the GRTA responded with the development of a joint land use strategy that specified eight initiatives that would provide greater integration of land use and transportation planning.[22] Consequently, the US Department of Transportation issued a conformity determination on the 2025 RTP on July 25, 2000, indicating that the plan would meet regional air quality requirements.

This conformity determination was challenged in a lawsuit brought by environmental and civil rights groups on several grounds. One of their key arguments was that ARC's analysis of the RTP/TIP showed emissions from transportation would until 2004 remain well above limits established in the approved 1999 Attainment SIP mobile source emission budget, even though

[20] http://www.realtor.org/SG3.nsf/files/grtareport.pdf/$FILE/grtareport.pdf
[21] Atlanta Regional Commission (2002), "Overview of the 2025 Regional Transportation Plan"
[22] Atlanta Regional Commission (2003), "Implementing the ARC/GRTA Joint Land Use Strategy"

the funding in the TIP would be fully expended by 2003. Environmental groups argued this would hence contribute to further violations of and delay in attainment of the national ambient air quality standards, violating the Clean Air Act's statutory requirements and congressional intent. The 1999 Attainment SIP emission budget remained in force despite EPA's extension of the Atlanta attainment deadline to 2004, which relied on an attainment date extension policy proposed by EPA in 1998. The conformity approval was made by Georgia authorities and the Federal Highway Administration with the understanding that once the 1999 attainment year had passed, EPA's conformity regulation required that the 2001-03 TIP and 2025 RTP conform to the emission budget only by the time of the next SIP milestone year, deemed to be 2004, with no requirement to consider mobile source emissions in the 2000-03 period.

A district court ruling upheld the July 2000 Atlanta conformity approval, ruling on the basis of its reading of EPA's conformity regulation and the considerable discretion given to federal agencies to interpret regulations. The court chose not to consider plaintiff arguments based on a reading of the Clean Air Act statute or expressions of congressional intent, saying such arguments should be brought in the DC Circuit Court. The 11th Circuit Court of Appeals upheld the district court ruling in a rare unpublished opinion that, because it is unpublished, can be neither appealed nor cited as precedent, even within the 11th Circuit.

EPA's attainment date extension policy was itself challenged by environmental groups and overturned in four federal courts, leading EPA to withdraw the policy in Atlanta and elsewhere in 2003. That caused EPA to bump-up to "Severe" Atlanta's non-attainment designation under the 1-hour ozone standard, triggering new emission SIP and emission reduction obligations. By this time the approved Atlanta 2001-03 TIP and 20205 RTP had already been used to expend hundreds of millions of dollars on new sprawl, traffic, and emission inducing highways, making moot the challenges raised by environmental plaintiffs in their 2001.

Atlanta Regional Commission (ARC) Efforts

Livable Centers Initiative (LCI)[23]

The Livable Centers Initiative is an effort by the ARC to promote residential development, mixed uses, greater connectivity and expanding transportation and options within the region's towns and activity centers. The program developed from initial provisions within the 2025 RTP proposal to fund planning studies and transportation projects in these centers, and has been extended to include corridors and emerging centers in the 2030 RTP.

Initial funding for the LCI program included $1 million annually over five years to fund planning studies, and $350 million for transportation projects resulting from LCI studies. The LCI program has become a nationally recognized model for supporting smart growth policies through the use of transportation funds. Provisions for the continuation of LCI studies and projects are included in both the 2030 RTP and the 2005-2010 TIP; however they are contingent upon receiving a conformity determination.

[23] Atlanta Regional Commission (2004), "Livable Centers Initiative" http://www.atlantaregional.com/qualitygrowth/programsummary.html

A recently completed study undertaken by the Georgia Institute of Technology, supports the notion that higher levels of land-use mix, residential density, employer density and street connectivity are associated with reduced VMT and air pollution emissions and increases in physical activity and transit use. The Strategies for Metropolitan Atlanta's Regional Transportation and Air Quality (SMARTRAQ)[24] study validates regional planning efforts, such as the promotion of LCI projects that ensure greater transit use and increased pedestrian activity. Three communities included in the study were recipients of LCI grants, and results indicated that following through on LCI plans could result in improvements in air quality.

Regional Development Plan (RDP)

In May of 1999 the ARC adopted updated polices for the Regional Development Plan. These policies significantly influenced the land use assumptions that were used to develop the 2025 Regional Transportation Plan that brought the region back into conformity with air quality regulations. RDP policy areas included:

- Transit Station Areas and Corridors
- Town Centers
- Activity Centers
- Commuter Rail Stations and Corridors
- Small Water Supply Watersheds
- Airport Noise Zone

Policies outlined in the RDP are recommended to local governments for implementation, however it remains up to the individual jurisdictions if and how the will be implemented. Under the ARC-GRTA Joint Land Use Strategy an implementation and monitoring program was put into place to encourage local jurisdictions to adopt land use planning policies that support the RDP and RTP.

Quality Growth Task Force

The Metropolitan Atlanta Chamber of Commerce has been an active participant in the region's transportation, land use and air quality debate for several years. In 2003 the Chamber undertook the challenge of developing a set of strategies to identify how future growth could be successfully accommodated and to identify policies and implementation tools to achieve these strategies. Modeling exercises illustrated that growth could be accommodated in the region while at the same time reducing congestion delays and conserving over 100,000 acres of open space. This could be achieved by allowing more housing closer to jobs, and creating a transportation network designed for such land use patterns. In May 2004, the task force released a series of objectives and recommendations.. The Quality Growth Task Force concluded that land use must be seriously addressed in order to address the problems of the regional transportation system. [25]

[24] Georgia Institute of Technology (2004), http://gtresearchnews.gatech.edu/newsrelease/smartgrowth.htm
[25] Metropolitan Atlanta Chamber of Commerce (2004), "Metro Atlanta Quality Growth Task Force Consolidated Final Recommendations": http://www.metroatlantachamber.com/macoc/initiatives/img/quality_recommendationsl.pdf

Assessment of 2025 RTP Implementation

Land Use Efforts

The 2025 RTP made aggressive land use assumptions to bring the region back into conformity in 2000, however the plan has been often criticized for its lack of progress in its implementation. The Livable Centers Initiative has been a successful program that requires further investment to increase the development of transportation and land use linkages in target areas. Despite providing strong incentives, funds dedicated to the LCI program account for less than one percent of transportation funding under the RTP. The expansion of the program to include corridor level transportation projects will require a greater funding commitment.[26]

Transit Funding

Transit systems in the Atlanta Region have been forced to cut services in recent months at a time when the system is needed to expand to address congestion and air quality concerns. The Metropolitan Atlanta Rapid Transit Authority (MARTA) is the largest transit agency in the state carrying over 500,000 people daily. Questions of funding for both service expansion and operating costs have affected the long term planning of the region's core transit system. The Governor's Fast Forward transportation program calls for $500 million in state bond financing for two bus rapid transit routes, that will carry about a quarter of current MARTA ridership, State funding to MARTA, however is only $2 million for the new $190 million fare collection system that assists suburban buses feed into the MARTA system. Suburban bus systems will also face funding problems when federal start-up grants run out. More funding support for transit is likely to be needed at both the local and state level if transportation and air quality goals are to be met.[27]

2030 Regional Transportation Plan

The ARC board will take action on the region's most recent Regional Transportation Plan, "Mobility 2030" on December 1st. The new RTP is designed to satisfy federal requirements for a transportation plan to conform with the region's air quality plan.[28] The plan has four goals: 1) improve accessibility and mobility options for all people and goods, 2) maintain and improve system performance and preservation, 3) protect and improve the environment and the quality of life, 4) increase the safety and security of the transportation system. The ARC Board indicated that priority should be given to projects that: support Regional Development Plan policies, establish and maintain a connected system that improves connectivity between and within Activity Centers, Livable Center Initiative areas, and transit station areas, and reduced traffic congestion in the most congested corridors based on the congestion management monitoring network with specific consideration given to duration of congestion. The draft plan has been criticized by environmental groups on the grounds that it provided insufficient linkages between transportation and land use and insufficient funding for transportation alternatives.[29] The current

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[26] Ibid.

[27] M. Saporta, "Mass Transit in Atlanta is Disgraceful," *Atlanta Journal Constitution, October 17, 1004.* *http*://www.ajc.com/business/content/business/saporta/1004/18saporta.html

[28] Atlanta Regional Commission (2004), "Mobility 2030 Regional Transportation Plan": http://www.atlreg.com/transportationair/v1all.pdf

[29] for example, see letter from Southern Environmental Law Center and Environmental Defense to Atlanta Regional Commission, Comments on Mobility 2030 Regional Transportation Plan, October 15, 2004.

draft RTP devotes less than 10% of the transportation budget to the "transit" category; the vast majority of the projects identified are road-focused. This is a sharp departure from the 2025 RTP, where over 50% of the entire budget was devoted to "transit strategy" and only 30% of the budget was set aside for roadway strategy. Few of the air quality-improving and mobility-improving transit projects the 2025 plan and TIP promoted and promised were achieved. For example, the region was promised two commuter rail lines partially open to service by 2003, with full service operational by 2005, but these have yet to be constructed.

Stationary Source Issues

Deciding how large a geographic area to designate as nonattainment was an issue for the Georgia EPD. The perception of stakeholders was that a nonattainment designation would stop or slow economic development in the outlying counties. This resulted in strong resistance by local area officials in those counties to expansion of the size of the area to be designated as nonattainment. Because of constraints established in state law, the Georgia EPD could not expand some programs, including the vehicle inspection and maintenance program, which is a very cost-effective control program for both VOC and NOx, into the outlying counties unless they had been designated nonattainment. Also, without nonattainment designations, it was hard to convince people in those counties on the edge of the nonattainment area, even those directly upwind, that they were a part of Atlanta's air quality problem and that the significant sources within those counties needed to be controlled.

Although point sources produce only about 20% of total NOx emissions in Atlanta's 13-county nonattainment area, they comprise 37% of total NOx emissions in a 45-county area that includes the nonattainment area and 43% of total NOx in a larger domain that includes all of north Georgia and some parts of Alabama, Tennessee, North Carolina and South Carolina. Georgia EPD imposed emission reductions on and claimed credit for those sources, primarily power plants but including other large industrial sources, in the larger 45-county area of influence because it was necessary to show attainment with 1-hour ozone standard as a "serious" nonattainment area and to show compliance with RFP requirements once bumped up to a "severe" area. The Southern Environmental Law Center contends that these out of area reductions are ineffective for addressing air pollution in the Atlanta region because some of the plants are downwind of Atlanta and because the air is stagnant on the worst ozone days, so pollution from outside the region is not a big factor. SELC also claims that these reductions are inconsistent with current legal requirements (the "rate of progress" in the 13-county area) and that the out of area reductions have allowed EPD to increase the mobile source budget by 50%.[30] SELC and Environmental Defense have raised concerns that this may delay Atlanta's attainment of the national ambient air quality standards and questioned the use of VMT growth rates in the last SIP of 1-2% when estimating the emissions for the state, noting that ARC has documented an annual VMT growth rate of 2.4 to 3%. As a relevant September 2004 report from the EPA Inspector General noted,

> *EPA and States encountered numerous difficulties in developing and implementing adequate emission control plans for reducing ozone precursor emissions by 3 percent*

[30] http://www.selcga.org/Newsroom/2003/12-17_atlanta.shtml

annually by the dates mandated in the Act. In addition, States may have used inaccurate data, assumptions, and projections of emission growth, resulting in fewer reductions planned than appropriate. For example, the ozone emissions reduction plan for the Atlanta metropolitan area assumed a growth rate that was about half of the population growth rate that the Atlanta metropolitan area experienced from 1980 to 2000, and about one-third of Atlanta's growth rate for employment. The Act requires emission reductions of at least 3 percent annually over and above an area's growth. Limited EPA oversight of the development and implementation of emission control plans contributed to the difficulties States encountered in reducing emissions by the required 3 percent annually. Additionally, a 1997 EPA policy allowing nonattainment areas to claim emission reductions from selected sources outside of the nonattainment areas allows for potential double-counting and does not ensure that reductions do more than just offset growth.[31]

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Selected Resources

Atlanta Regional Commission: http://www.atlantaregional.com/

ARC Livable Centers Initiative: http://www.atlantaregional.com/qualitygrowth/lci.html

Atlanta Regional Commission, *Implementing ARC/GRTA Joint Land Use Strategy*, June 2003. http://www.atlantaregional.com/qualitygrowth/JointLandUseStrategy.pdf

Brookings Institution, *Moving Beyond Sprawl: the Challenge for Metropolitan Atlanta,* 2000. http://www.brook.edu/dybdocroot/es/urban/atlanta/atlanta.pdf

Georgia DOT: http://www.dot.state.ga.us/dot/communications/publicawareness/airquality.shtml

GRTA*: http://www.grta.org/default.asp*

Metro Atlanta Chamber of Commerce, *Metro Atlanta Quality Growth Task Force Consolidated Final Recommendation,* May 2004.
http://www.qualitygrowthatlanta.org/images/quality_recommendationsl.pdf

Metro Atlanta Chamber of Commerce *Trends, Implications &Strategies for Balanced Growth in the Atlanta Region,* 2001.
http://www.metroatlantachamber.com/macoc/img/logo_LandUseDevelopment.pdf

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[31] U.S. Environmental Protection Agency, *EPA and States Not Making Sufficient Progress in Reducing Ozone Precursor Emissions In Some Major Metropolitan Areas*, September 29, 2004, quoting from "Results in Brief"

SMARTRAQ: http://www.smartraq.net

Trelstad, B. *Georgia Regional Transportation Authority: A Case Study of an Innovative Regional Planning Institution.* Berkley Planning Journal 14 (2000): 23-45

Two for the Price of One: Clean Air and Smart Growth

December 1-2, 2004 Sacramento, CA

*** FINAL PRIMER ***

Attachment 2:

OVERVIEW

The Local Government Commission (LGC) and the Center for Clear Air Policy (CCAP), under a cooperative agreement with the U.S. Environmental Protection Agency (EPA), are bringing together a cross section of high-level professionals for two intensive days of facilitated discussions, informative presentations and group problem solving. The goal of this forum is to provide concrete recommendations to the EPA and other federal, state and local entities on how to improve clean air programs, policies and processes in a way that will support both sustainable land use and emission reduction goals.

A growing awareness among air pollution experts and transportation and land use planners is that suburban sprawl is a significant contributor to poor air quality. Understanding this connection and, more specifically, what role air regulations play in influencing land development can lead to innovative policy solutions.

This primer provides background information on the core issue areas that we will discuss at the forum: 1) Clean Air Act structure and the federal policy framework as it relates to the implementation of smart growth and other state and federal air quality and transportation policies and programs, 2) Transportation planning and emissions modeling, and 3) Implementing land use and air quality policies and programs. We look forward to further discussing these important topics in Sacramento, California on December 1 and 2, 2004.

INTRODUCTION: VEHICLE EMISSIONS AND SPRAWL

A recent U.S. Environmental Protection Agency (USEPA) report notes that 159 million people – over half of the population of the United States - live in areas with poor air quality.[32] Asthma, cancer, heart disease, and premature deaths are just some of the health impacts that have been linked to air pollutants, while environmental impacts include smog, acid rain ozone depletion and climate change. States and localities are having an increasingly difficult time at reaching air quality targets, due in no small part to the rapid growth in driving in our ever-sprawling metropolitan regions.

While power plants and industrial manufacturers are some of the largest polluters in the United States, the impact of mobile source emissions, especially those emanating from the tailpipes of cars and SUVs is the fastest-growing source of CO_2 emissions and continues to be a major source of other emissions. Pollutants attributable to the transportation sector include the following.

- *Carbon Monoxide (CO)* is a colorless, odorless pollutant produced when fuels are not completely combusted. According to the EPA, mobile sources account for over 75% of CO pollution in urban areas.
- *Ground-level Ozone* is not directly emitted by mobile sources, but is a product of a chemical reaction involving nitrogen oxides (NOx), volatile organic compounds (VOCs)

[32] EPA, Office of Inspector General, *EPA and States Not Making Sufficient Progress in Reducing Ozone Precursor Emissions In Some Major Metropolitan Areas*, September 2004.

and sunlight. Mobile sources contribute 30-50% of all NOx and VOC emissions, depending on the area.

- *Particulate Matter (PM)* is the term for airborne solid or liquid emissions. Mobile sources account for approximately 30% of PM emissions with diesel engines accounting for over half of that total.[33]
- *Greenhouse Gases (GHGs)* are heat trapping gases responsible for global warming. The transportation sector produces multiple GHGs including carbon dioxide (CO_2), methane, and nitrous oxide. The transportation sector accounts for almost one-third of U.S. CO_2 emissions.[34]

The health and environmental impacts of air pollution and sprawl have been increasingly well documented.[35] A report by the American Lung Association found that air pollution in urban regions has resulted in the proliferation of respiratory illnesses that has contributed to death of over 70,000 people annually.[36] Other health impacts linked to air pollution include: cancer, premature death, high blood pressure, arthritis, headaches, and breathing difficulties. Researchers also find children, the elderly, minorities living in urban areas, and those with weakened immune systems are most likely to feel the brunt of health complications associated with poor air quality. Smog, acid rain, ozone depletion and climate change are just a few of the environmental impacts associated with the release of vehicle emissions into the atmosphere.

Transportation emissions are the result of three main factors; vehicle technology, fuel characteristics and vehicle miles traveled (VMT). Dramatic progress in emissions control technology and fuel quality has reduced emissions over the past 30 years *per mile* for NOx, VOCs and CO (but not for CO_2). But rapid growth in the amount of driving is offseting these reductions, especially in some fast-growing regions. In the case of CO_2 per vehicle, fleet-wide vehicle emission rates have been essentially stagnant since 1991while VMT grew 25% over the same period.

As seen in Figure 1, long-term growth in driving is expected to outpace the emissions benefits of vehicle technology improvements.

The new California CO_2 emission standards (if they survive likely legal challenge), will result in fleet-wide savings of 27% in 2030 – still not enough to keep up with VMT growth. Thus, while we must continue to make progress on vehicle technologies and fuels – and policies to implement them – we must also assess the extent to which we can mitigate growth in VMT.

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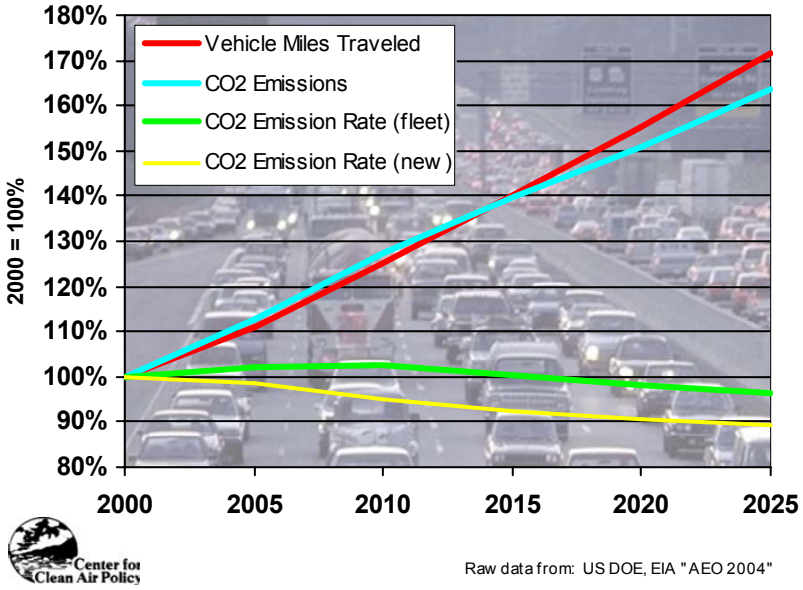
[33] US EPA, Air Emissions Trends - Continued Progress Through 2003. See, http://www.epa.gov/airtrends/econ-emissions.html.

[34] *US EPA,* Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2002. *See,* *http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterPublicationsGHGEmissions.html*

[35] For a good overview see: Frumkin, H., Frank, L. and R. Jackson, *Urban Sprawl and Public Health: Designing, Planning and Building for Healthy Communities*, 2004.

[36] American Lung Association
http://www.lungusa.org/atf/cf/%7B7A8D42C2-FCCA-4604-8ADE-7F5D5E762256%7D/key_air.pdf

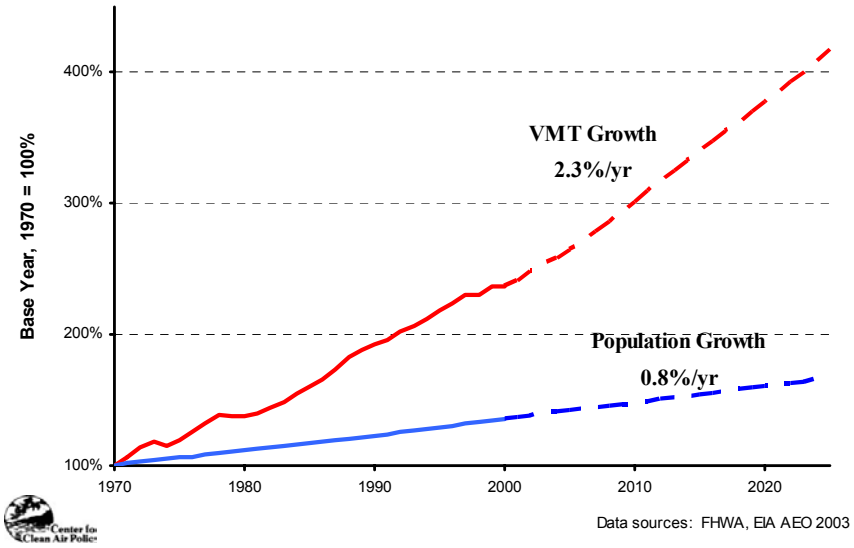
Figure 1. Growth in Travel Outstripping Vehicle Emission Improvements



Urban Development and Vehicle Emissions

What is driving this rapid growth in VMT? In 1992, a U.S. Department of Transportation (USDOT) study indicated that population growth was responsible for only 13% of the increase in VMT.[37] This is reinforced by recent studies that forecast VMT growth continuing to outstrip population growth, as seen in Figure 2 below.

Figure 2. Growth in Travel Outstripping Population Growth



[37] USDOT, 1992. *Travel Behavior Issues in the 90's.*

Other factors contributing to growth in driving that were highlighted in the 1992 USDOT report include: increase in trip lengths, increase in trips taken, decrease in vehicle occupancy, and switch to driving (from other modes of travel). Other studies have attributed historical VMT growth to factors such as economic growth, increasing ratio of drivers to population, rapid suburbanization and dispersed development, and the Federal Highway Act of 1956. Road capacity expansion can also increase VMT through induced travel, and by easing access to more distant locations.

It has become increasingly evident that land development and location patterns contribute to growth in VMT. The underlying reasons are intuitive. In typical suburban development patterns, origins and destinations are farther apart, land use functions are isolated (residential, commercial, employment), infrastructure design is oriented toward the automobile, and low population densities are not conducive to public transportation.

But we can move beyond intuition. Recent studies quantify the relationship between land use and VMT. An analysis of 83 metropolitan regions around the country by Ewing et. al concluded that the degree of sprawl was the strongest influence on vehicle-miles traveled per person – more than metropolitan population growth and per capita income.[38] On a household-basis, Frank concluded that households located in the most interconnected areas of Seattle generated less than half the VMT of households located in the least connected areas of the region, and that the findings hold true after controlling for household size, income, and vehicle ownership.[39] Holtzclaw et al. found that increased accessibility correlates with decreased vehicle use and ownership based on a study of six million households in Chicago, San Francisco, and Los Angeles.[40]

Based on these studies, it is clear that people generally drive less in areas that incorporate the principles of smart growth: higher residential density; a mix of jobs, stores and housing; high-quality transit service; transit-oriented development; good street connectivity that makes neighborhoods pedestrian friendly; and strong activity centers where destinations are close together. Two questions then arise. 1) What impact can smart growth policies have on VMT? 2) Do we have the policy tools to retrofit existing communities according to smart growth principles and target new development into efficient, well-designed locations? We answer the first question below and explore the second question in the implementation section of the paper.

How Much Can We Slow VMT Growth?

Depending on scale, individual projects can generate significant benefits. For example, the Atlantic Station infill redevelopment project uses mixed-use, transit-oriented development and is projected to result in 14 to 52 percent lower VMT than had the development occurred in a suburban location with conventional density, mix of uses and design. Figure 3 highlights

[38] Ewing, R., Pendall, R., and D. Chen. *Measuring Sprawl And Its Impact Volume I*. October 2002.
[39] L. Frank, "Land Use Impacts on Travel Choice and Vehicle Emissions in the Central Puget Sound: Methodology and Findings," *Transportation Research - Part D., March 2000*.
[40] Holtzclaw, J., Clear, R., Dittmar, H., Goldstein, D, and P. Haas, "Location Efficiency: Neighborhood and Socioeconomic Characteristics Determine Auto Ownership and Use – Studies In Chicago, Los Angeles And San Francisco," *Transportation Planning and Technology*, 2002, Vol. 25, pp. 1–27.

projected VMT reductions (and associated air quality benefits) from urban infill projects vs. comparable greenfield sites.

Figure 3. Site-Level VMT and Air Quality Benefits:
Infill vs. 'Greenfield' Developments[41]

Location	Description of TOD / infill site	VMT Reduction	Emissions Reduction
Atlanta, GA	138-acre brownfield, mixed-use development project	14 - 52%	37 - 81% NOx 293 - 316% VOC
Baltimore, MD	400 households and 800 jobs on waterfront infill development	55%	36% VOCs 40% NOx
Dallas, TX	400 housing units and 1500 jobs located 0.1 miles from the Dallas Area Rapid Transit (DART)	38%	43% VOC 48% NOx
Montgomery County, MD	Infill site near major transit center	42%	31% NOx
San Diego, CA	Infill development project	52%	42% NOx
West Palm Beach, FL	Auto-dependent infill project	39%	28% NOx

MPO studies from around the country show potential regional and statewide VMT reductions ranging from 3-20 percent, as seen in Figure 4. The VMT savings from these analyses are a result of a combination of transit improvements, land use modifications and complementary policies such as open space protection and measures (including in some cases, congestion pricing, zoning, etc).

Despite these promising figures, as long as suburban development continues to segregate our homes from every other aspect of daily life and continues to be built at densities unsuitable for effective and efficient transit service, the rate of VMT will continue to climb. Compounding the situation is the traditional approach of building new roads in order to alleviate traffic congestion. These new roads and new lanes result in induced demand where more drivers fill up the space and there is more driving overall. This phenomenon is largely due to the new roadways opening up access for new development, and consequently new destinations and increased driving distances. Various studies show that each 10 percent increase in metropolitan-area lane-miles leads to a 4- to 9-percent increase in travel demand over the long-term.[42]

[41] Data from: U.S. EPA. *Comparing Methodologies to Assess Transportation and Air Quality Impacts of Brownfields and Infill Development.* August 2001.

[42] *Working Together to Address Induced Demand*. Eno Transportation Foundation, Washington, D.C., 2002 p. 16.

Figure 4. Regional VMT Reductions from Smart Growth and Transit[43]

Study Location	Regional VMT Reduction	Timeframe
Albany	**7 - 14%**	2000 – 2015
California	**3 - 10%**	2000 – 2020
Portland	**6 - 8%**	1995 – 2010
Puget Sound	**10 – 20%**	2000 – 2020
Sacramento	**25%**	2005 – 2050
Salt Lake City	**3%**	2000 – 2020

THE FEDERAL REGULATORY AND LEGISLATIVE FRAMEWORK

The Clean Air Act and the Transportation Equity Act for the 21st Century plays a significant role in influencing mobile source emissions.

The Clean Air Act (CAA)

Developed in 1963 to combat air pollution, with important amendments in 1970 and 1990, the Clean Air Act required the EPA to set National Ambient Air Quality Standards (NAAQS) for all major criteria pollutants at limits for pollution deemed necessary to protect public health and welfare. All states were expected to develop and implement air pollution control plans called State Implementation Plans (SIPs). Through the SIPs, those not meeting the NAAQS need to demonstrate either attainment with NAAQS or a path to attainment – i.e., each state must assess its current air quality and then design a plan that shows how it will meet federal air quality requirements for stationary and mobile source emissions. The CAA requires each state to adopt and submit a plan that would "implement, maintain, and enforce" primary standards within three years after the promulgation of the NAAQS and subsequent area designations.[44]

The 1970 Clean Air Act amendments underwent major revisions in 1990 after Congress recognized the inadequacy of the CAA to fully account for mobile source emissions. The 1990 Clean Act Amendments set new standards for NAAQS and categorized the level of non-attainment with NAAQS based on severity. The levels are: extreme, severe, serious, moderate and, the least severe, marginal. Each category comes with a different set of requirements and deadlines for improving air quality. For nonattainment areas, SIPs must specify local, state, regional and federal regulations necessary for the area to demonstrate attainment of the NAAQS.

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[43] Capital District Transportation Committee, *New Visions 2021*, Draft approved October 2000.
Cambridge Systematics, Inc. and Parsons, Brinckerhoff, Quade & Douglas. *Making the Land Use Transportation Air Quality Connection: Analysis of Alternatives*. Vol. 5. Prepared for Thousand Friends of Oregon. May, 1996.
Parsons Brinckerhoff, for the California Energy Commission, *California MPO Smart Growth Energy Savings MPO Survey Findings*. September, 2001. Apogee/ Hagler Bailly, for the US EPA, *The Effects of Urban Form on Travel and Emissions: A Review and Synthesis of the Literature*. April 1998.

[44] CAA § 110.

Another key feature of the 1990 Amendments is that it, along with subsequent transportation legislation, required air quality and transportation officials to work together through a process known as conformity.

Conformity

Under the 1990 CAA Amendments, a metropolitan region that has exceeded the emission standards for one or more of the pollutants must show that the region's transportation plan will conform to applicable SIPs and contribute to timely attainment of the NAAQS. According to the regulations, a proposed project or program must not produce new air quality violations, worsen existing violations, or delay timely attainment of the NAAQS.[45] The metropolitan planning organizations (MPOs) must demonstrate this conformity through their transportation plans and transportation improvement programs (TIPs) – which identify major highway and transit projects the area will undertake over a 20-25 year period. A conformity determination must be updated at least every 3 years, and typically is undertaken more frequently on a voluntary basis when MPOs update their TIPs, which must be updated at least every 2 years. Conformity is required to ensure continued consistency between transportation plans and the emissions budget established in the SIP.[46] Projects that do not conform cannot be approved, funded or advanced through the planning process, nor can they be implemented unless the emissions budget in the SIP is revised. MPOs in search of additional SIP-eligible or conformity eligible emissions reductions have often changed modeling assumptions or modified/expanded their Transportation Control Measures or other projects included the TIP.[47] Since under current law the Regional Transportation Plan (RTP) review process must be repeated at least every three years, conformity is a key strategy to periodically relate the SIP emission limits to the funding plan in the TIP/RTP, helping to ensure continued progress for cleaner air. This 3-year review cycle matches the requirement in the Clean Air Act that every 3-years non-attainment areas update their pollution emission inventories, which should support periodically required SIP compliance demonstrations. Unfortunately, EPA has failed to issue SIP compliance demonstration guidance as also required by the Clean Air Act.[48]

If a region's TIP has expired without adopting a new TIP projected to stay within the the motor vehicle emissions budget in the SIP, the area faces what is known as a conformity lapse. During this period, the MPO cannot approve funding for new transportation projects or new phases of previously funded transportation projects except for those projects that are adopted as Transportation Control Measures in the SIP or are otherwise exempt from conformity as air quality neutral activities.[49] If an area fails to submit a required SIP by a deadline, it may face a "conformity freeze", in which it cannot approve any new projects until this deficiency is remedied, and if this failure is prolonged, can face the ultimate sanction of losing federal transportation funding. For some metropolitan areas, this potential loss of transportation funds

[45] U.S. EPA, "Transportation Conformity Rule Amendments: Flexibility and Streamlining," Final Rule, 62 Federal Register 43780, August 15, 1997.

[46] New projects and plans cannot, under the conformity provisions of the 1990 CAAA "increase the frequency or severity of any existing violations" or "delay timely attainment of any air quality standard."

[47] Congressional Research Service, Report for Congress, *Transportation Conformity Under the Clean Air Act: In Need of Reform?* Updated April 23, 2004 by James E. McCarthy.

[48] EPA, Office of Inspector General, *op cit.*

[49] The list includes 20 categories of highway safety projects, rehabilitation and reconstruction of transit facilities, purchase of replacement buses and rail cars, noise attenuation projects, and pedestrian and bicycle facilities.

can be more than $100 million per year.[50] While conformity problems can be temporarily disruptive to agency work programs, according to testimony by Jeff Holmstead, the EPA Associate Administrator, to the Senate Environment and Public Works Committee in 2002, no state or region has ever lost federal transportation funds as a result of a conformity lapse, freeze, or sanctions. While there have been 63 areas in the US that have suffered a conformity lapse, the most well-known occurred in Atlanta, GA and lasted from 1998-2000. This served as a wake up call for the region's public and private institutions, spurring on initiatives to identify and address the interrelated issues of air quality, transportation, quality of life and land use.

New Standards and Requirements

The new 8-hour ozone standard shifted 31 areas into nonattainment status for the first time.[51] The MPOs for those areas are learning new and often complex conformity regulations, making the issue of SIP and TIP conformity more relevant than ever for MPOs (and in rural areas without and MPO, the state DOTs).[52] In addition new project level emissions analyses for $PM_{2.5}$ and CO will be required, including the use of new models and/or analytical techniques.[53]

> *Environmental groups have raised concerns about the potential for backsliding on existing clean air protections in the transition to the new NAAQS. EPA is revoking the existing 1-hour ozone standard designations in April 2004 years in advance of the time when attainment SIPs will be in place under the new 8-hour ozone standard. Due to long delays in the regulatory process implementing the 1990 Clean Air Act, it is only since 2000 that most of the more seriously polluted metropolitan areas have had in place motor vehicle emission budgets drawn from attainment SIPs for the 1-hour ozone standard and these have been increasingly effective in focusing attention of transportation officials on the air quality consequences of transportation plans and programs. Environmental groups are concerned that the transition to the 8-hour standard is being used to create opportunities for many seriously polluted regions to substantially loosen the limits on transportation emissions, allowing approval of massive sprawl, traffic, and pollution inducing highways between now and the deadline for new 8-hour ozone SIP submissions in 2007. Environmental groups have raised concerns that EPA's conformity rule would allow MPOs in some circumstances to set aside the motor vehicle emission budgets established in current SIPs and to substitute a less rigorous build/no-build test for demonstrating conformity that could allow motor vehicle emissions to increase in fast-growing regions.*
>
> *EPA's revised conformity rule does not adopt criteria and procedures for determining whether a new transportation facility such as a bus or truck terminal or an expanded freeway or interchange will cause the NAAQS for PM2.5 to be violated in neighborhoods*

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[50] Air Quality Management in the United States, Committee on Air Quality Management in the United States Board on Environmental Studies and Toxicology, Board on Atmospheric Sciences and Climate Division on Earth and Life Studies, National Research Council of the National Academies, January 2004.

[51] From http://www.epa.gov/ttn/oarpg/t1/fact_sheets/o3fact.pdf "Fact Sheet: EPA's Revised Ozone Standard"

[52] Once designations and classifications take effect on June 15, 2004, states and communities must prepare a plan to reduce ground-level ozone. See map, http://www.epa.gov/ozonedesignations/nonattaingreen.htm

[53] Replogle M., Dr. John Balbus, M.D., and Tracy Freuder, "Proposed EPA Conformity Rule Would Allow Increased Pollution From Highways, Threatening Public Health: A Review of Impacts in 12 Cities," Dec 2003.

adjacent to the facility, although the agency has suggested further rules may address this issue. This is an issue of growing concern to health and environmental groups in the wake of recent studies showing that those living close to such facilities often experience health-threatening exposures to air pollution. EPA's guidance on siting PM2.5 monitors explicitly calls for such monitors not to be located in close proximity to PM2.5 line and point sources, raising concerns among environmental and health groups about the degree to which PM2.5 non-attainment area designations and SIP design values will account for population exposures to PM2.5 hot spots.

And environmental groups are concerned that EPA has not addressed problems raised by FHWA's interpretation of the conformity rule in Atlanta, where an area's transportation program and plan was found to conform even though its motor vehicle emissions exceeded the adopted attainment SIP emission budget after the attainment year following a prolonged conformity lapse that had not been remedied, exacerbating an ongoing violation of the NAAQS. If this is not remedied, environmental groups believe, the ability of the conformity process to ensure that the spending program in the TIP and RTP will not lead to the failure of the SIP will be severely compromised, harming public health and delaying timely attainment of the NAAQS.

Transportation Equity Act for The 21st Century (TEA-21)

In 1991, the 102nd Congress passed the Intermodal Surface Transportation Equity Act (ISTEA), which was renewed in 1998 as Transportation Equity Act for the 21st Century. These ground-breaking pieces of legislation were a new and improved way to fund the nation's transportation programs, and provided a framework for the transportation conformity requirements in the 1990 CAA Amendments. The legislation allows states, metropolitan planning organizations and local groups to obtain federal funds to meet their local planning needs and to better mitigate air pollution. Further, along with assigning timelines and providing flexible funding for transportation plans – including guarantees for transit spending – specific pools of dedicated funding were directed to various programs including Congestion Mitigation and Air Quality Improvement Program (CMAQ).

Congestion Mitigation and Air Quality (CMAQ)

One important aspect of TEA-21 has been the CMAQ funding which was created for projects that have measurable air quality benefits. Under TEA-21 CMAQ provided $8.1 billion over six years to help states meet the NAAQS.[54] CMAQ funds cannot be spent on highway capacity-increasing projects for single occupant vehicles. The federal program has been well-received by MPOs and has funded some projects with clear and lasting air quality benefits, including transit, freight rail and commuter trains, as well as alternatively fueled vehicles and refueling sites, ferries and clean diesel fuel programs, and pedestrian/bicycle improvements.[55] Despite this long list of measures, the US DOT notes that, "the most effective CMAQ funding projects tend to be large in scope and those that directly affect vehicle emissions, for example, Inspection and Maintenance."[56]

[54] CMAQ Final Implementation Guidance 23 USC, 315; sec 1110 *Federal Register*, Vol. 65, No. 36, Feb 23, 2000.
[55] http://www.ampo.org/policy/pdfs/REVISEDapril3-TestimonialsfromtheMPOCommunity.pdf
[56] The Congestion Mitigation And Air Quality Improvement Program, US DOT, FHWA-EP-00-020

There is a concern that many states have failed to take full advantage of the CMAQ program. Nationally, over the first ten years of the program, only 81 percent of the funds apportioned to the states have been obligated to CMAQ; at the same time, many states actually overspend on traditional highway programs.[57]

Federal Transportation Funding Formulas

Federal transportation funding formulas offer a perverse incentive that rewards sprawl and encourages vehicle emissions, as they are based upon state VMT, fuel sales and lane-miles. In effect, the more driving that occurs in a state, the more federal highway money it is likely to receive.[58]

Flexible Transportation Funds

In the first four years of ISTEA authorization, most states that flexed funds for transit contained the largest urban areas; these included: California, $410 million; Massachusetts, $127 million; New York, $580 million; and Pennsylvania, $263 million. Further, after reauthorization of ISTEA to TEA- 21, states and local authorities flexed $8.5 billion from highways to transit and only $40 million from transit to highways.[59] However, according to a 2000 STPP report, most states spend most of their "flexible" federal transportation funds on roads, with less than seven percent going toward transit, bikeways, or sidewalks.[60] A 2003 Brookings Institution analysis concluded that metropolitan areas are more likely flex money to transit than are state DOTs, and recommended that more federal transportation funding be directly allocated at the metropolitan level.[61]

Potential Changes from Reauthorization

A number of proposals have been floated in the House and Senate debates on the latest version of the federal transportation funding bill (SAFETEA) that would impact and potentially weaken the conformity process. For example, a proposal to require conformity determinations to be made every 5 years instead of the current 3 years would reduce the level of coordination between MPO officials and air quality regulators. Another proposal would reduce the planning horizon for long range transportation plans from 20 to 10 years. A concern here is that this shorter time frame would miss the development impacts from, for example, outer beltways, which can take more than 10 years to fully manifest and would thus not be captured in the plan.

Another proposal would cause conformity to apply only to regionally significant projects, rather than to the entire TIP and RTP, exempting smaller projects that might otherwise trigger hot-spot analysis requirements or that might cumulatively produce regionally significant emissions impacts. Yet another proposal would allow transportation agencies to modify Transportation

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[57] Surface Transportation Policy Project, "The CMAQ Program: Funding Cleaner Air: More than $2 Billion of Unused Potential," January 2003. http://www.transact.org/library/cmaq.asp

[58] Center for Clean Air Policy, Center for Neighborhood Technology, Surface Transportation Policy Project, *Climate Matters: The Case for Addressing Greenhouse Gas Reduction In Federal Transportation Policy*, 2003.

[59] http://www.cts.umn.edu/events/oberstarforum/2003/2003oberstarspeech.html

[60] Surface Transportation Policy Project, *Changing Direction: Federal Transportation Funding in the 1990s*.," , March 2000. http://www.transact.org/PDFs/changing_direction.pdf

[61] Brookings Institution, *Improving Metropolitan Decision Making in Transportation: Greater Funding and Devolution for Greater Accountability*, October 2003. http://brookings.edu/dybdocroot/es/urban/publications/200310_Puentes.pdf

Control Measures in SIPs without any oversight or approval from local, state or federal environmental agencies.

A proposal to fast-track environmental reviews would empower the Federal Highway Administration to ignore transportation, land use, and air quality plans adopted by metropolitan planning organizations, state and local elected officials, when selecting alternatives for consideration in the environmental review process under the National Environmental Policy Act (NEPA). That proposal could also sharply curtail consideration of alternatives to new highways in the NEPA process if these do not fully satisfy narrowly written purpose and need statements adopted by highway project sponsors, thereby excluding consideration of Smart Growth options, increased investment in transit and other alternative modes, and improved traffic operations and management through pricing of existing highway lanes or improvements to existing highways.

LINKING LAND USE AND AIR QUALITY

The idea of including land use in the federal regulatory framework has already begun to take hold. Land use assumptions are used to help estimate regional travel demand and emissions for TIPs, SIPs and conformity determinations. However, MPOs generally assess a single land use scenario and seldom analyze the potential benefits of alternative development patterns. In 2001, the US EPA issued guidance titled, Improving Air Quality through Land Use Activities, to assist states in formally obtaining SIP credit for sustainable land use policies including brownfields and infill development.[62] The only two examples to date are the state of Maryland, which has quantified the benefits of their smart growth efforts near Baltimore and included them in their SIP,[63] and Texas, which has obtained limited credit for land use measures in the Houston-Galveston area.

A report prepared by the U.S. General Accounting Office (GAO) may offer some insight as to potential reasons for the lack of interest in approaching land use as a strategy to control emissions.[64] In October 2001, Congress asked the U.S. GAO to survey state and local transportation planners on the issue of land use and air and water quality. Survey results prompted the GAO to report that state and local officials wanted the federal government to provide the following:

- Financial incentives for transportation, environmental and land use officials to collaborate on more protective land use strategies
- Technical assistance to assess and mitigate land use impacts
- Public education on the environmental impacts of land use and transportation decisions[65]

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[62] US EPA, *Final Policy Guidance: Improving Air Quality through Land Use Activities*. EPA420-R-01-001 Transportation and Regional Programs Division, Office of Transportation and Air Quality January 2001 U.S. EPA http://www.epa.gov/otaq/transp/conform/policy.htm#landuse, January 2001. Please also see, www.epa.gov/otaq/transp/landguid.htm. This formal guidance has rarely been used by MPOs, who cite modeling complexities, enforcement uncertainties and low-emission impacts for small scale projects as barriers.

63 Liu, Feng, "Quantifying Travel and Air Quality Benefits of Smart Growth in State Implementation Plans." Transportation Research Board Annual Meeting, January 2003.

64 GAO, *Federal Incentives Could Help Promote Land Use That Protects Air and Water Quality*, Oct. 2001

65 Ibid. (p.1)

The GAO report is significant because it acknowledges that cleaner cars and fuels will only improve air quality so far and that in congested and growing areas, land use alternatives will need to be considered to reduce the reliance on cars.

Nonattainment Area Designations Impacts on Land Use and Stationary Emissions
An important question to be considered is what impact do New Source Review and nonattainment designation policies in the CAA have on land use? U.S. States must designate as nonattainment those geographical areas that monitor violations of one or more of the six NAAQS or contribute to violations in other areas. Especially in the case of ozone, the number of control measures that apply are based on the severity of the air quality violation. Because of the more stringent requirements in nonattainment areas, local elected officials and organizations, such as chambers of commerce, are often concerned about the adverse impact that a nonattainment designation has on economic growth, such as the need for and availability of new manufacturing sources to obtain emissions offsets, and the potential delay of highway funds for improvement projects that can result when an area cannot demonstrate conformity with state air quality improvement plans.

Specifically, local organizations worry that owners of new manufacturing facilities will choose to locate in areas just outside of the nonattainment boundary where the environmental requirements are less costly, thereby creating new jobs outside of the urban core rather than in it. Because of these concerns, there is often pressure to make the size of the nonattainment area as small as possible. Some have argued that nonattainment boundaries indirectly contribute to sprawl. Their reasoning is that if large new employers locate their new facilities outside of nonattainment boundaries, the new jobs created will lead to increased residential and commercial development, including more roads. Hence, this means more sprawl. A greenfield site in a rural area, costing less and with lower taxes, can be an attractive option for a company trying to decide where to locate a new major stationary source. Add to that the difference between offsets, which a major source must obtain to offset emissions increases, the increased costs of more stringent air pollution control equipment required by the Clean Air Act's New Source Review program, and possible costs associated with cleaning up a brownfields site, then in total the costs for locating on a brownfields or grayfields site, instead of a rural area, may be more.

Though it may be more economical to locate in a rural setting, the cost to the community of a greenfield site can be high. Greenfield sites may not have the infrastructure to support the needs of a commuting population that suddenly needs to get to a rural workplace. The land may not be zoned to allow mixed-use development near the new site, requiring workers to commute long distances to get to their jobs. On the other hand, sources that locate inside the nonattainment area, particularly within the urban core, are tapping into the roads, transit, sewer and water lines that already exist or can be improved, as needed. Using existing infrastructure is cost-effective because using resources that are already there saves scarce tax dollars. If one of the goals of smart growth is to get sources to locate in nonattainment areas, particularly in the urban core where jobs are needed and the infrastructure is already there to support development, then incentives are needed to make this as attractive as possible to those wanting to build a new major source of air pollution

TRANSPORTATION PLANNING AND EMISSIONS MODELING

Accounting for Land Use in the Travel Modeling Process

When doing regional planning and conformity analyses, most MPOs use regional transportation models known as travel demand models (or forecasting models). These complex tools use a series of mathematical equations to represent the supply and demand for regional travel. The most widely used methodology for this analysis is often called "the four-step model", which encompasses trip generation, trip distribution, mode choice, and trip assignment. The first three of these steps estimate the demand for travel and the fourth step then allocates the demand for travel with the supply of travel (i.e., road or transit network).

An increasing number of metro areas are shifting to a new generation of more policy-sensitive models that also account for how changes in transportation services, facilities, and operations influence the time-of-day-of-travel, the distribution of jobs and housing, motor vehicle ownership and vehicle choice, and other factors. While the 4-step models, in use since the 1960s, focus on zone-based aggregate analysis of travel behavior, many of these more advanced models seek to account for travel behavior at the individual and household level for at least a portion of the analysis process, capturing the dynamics of journey tours, the allocation of time to different activities in households, interactions between household members, and factors influencing real estate markets and investment decisions. Recent developments such as the TRANSIMS program and advanced versions of commercial applications software like TransCAD and VSIM are creating the capability to also simulate the operation of individual vehicles on highways at the corridor and regional level, which may prove fruitful in coming years for refined evaluation of transportation system operations and performance, including emissions analysis.

To produce estimates of motor vehicle emissions, the outputs of the travel modeling process are typically linked to a post-processor program which produces estimates of vehicle miles traveled by road way link and speed by time-of-day. This in turn is linked to the US EPA's Mobile model (or EMFAC model in the case of California) which contains complex mobile source emissions factors that calculate the resulting NOx, PM, VOCs and other criteria pollutant emissions for the MPO region. EPA has under development a newer more disaggregate emissions model, MOVES, that is designed to take advantage of information produced by the more advanced travel models, potentially linking to traffic microsimulation models in the future.

There is a growing recognition of the need to better account for land use within the travel modeling process, in part to better estimate regional transportation emissions on account of conformity. In 4-step models, land use is an exogenously assumed basic input, developed by local planning officials through a process of negotiation. This approach often reflects the land use outcomes *desired* by local politicians, while discounting other factors that are known to influence development patterns, such as travel accessibility and traffic congestion. There are a number of models that address this shortcoming through integrated modeling of both transportation and land use, although they are thought to be used in fewer than twenty metropolitan areas. [66, 67]

[66] These include UrbanSim, TRANUS, MEPLAN, DRAM-EMPAL, METROSIM, PECAS and MetroScope.

Specific Local Limitations of Travel Models

Beyond the broad focus of accounting for regional land use patterns, there are several areas where today's travel models have several areas where they are unable to estimate local travel choices or land use patterns. These include:

- **Localized travel patterns.** Regional forecasting models do a poor job of accounting for localized travel and land use patterns, including mixed use development and local transit services. This is primarily due to the spatial scope of these models. Travel demand models divide regions into hundreds or thousands of geographic units called transportation analysis zones (TAZs). Thus, travel demand models are designed to forecast trips length and type between TAZs but are less able to account for shorter trips taken within TAZs.
- **Non-motorized trips.** The spatial limitations cited above mean that travel demand models are also extremely limited when it comes to accounting for nonmotorized trips (i.e., walking or biking). For example, in Atlanta, GA a mixed-used, infill development called Atlantic Station has received accolades for its travel and emissions benefits; site-specific studies have found half the VMT and significant reductions in NOx and VOCs vs. a comparable greenfield site.[68] However, a typical regional travel model would likely fail to estimate the full richness of benefits from an Atlantic Station-type development by not accounting for newly generated walking and biking trips taken within the TAZ, which are created in part from the mixed-use element of the site.[69]
- **Local site and roadway design.** Travel demand models fail to capture other local aspects of so-called smart growth development, such as traffic calming (especially in and around intersections), building site design (again mixed-use characteristics), the differences in traffic capacity of dense interconnected grid street networks vs. more hierarchical cul-de-sac and arterial networks, and other road characteristics of smart growth neighborhoods.
- **Induced Demand.** Building a new road often reduces travel time, which can cause people to travel further and lead to further regional decentralization. This phenomenon, known as induced travel, is only partially represented in most travel demand models – despite evidence that it significantly contributes to growth in VMT and emissions. More advanced tour and activity based models linked to land use models have a greater potential capability to represent the full array of behavior linkages that together contribute to induced travel.

So while travel models are the best tools we have for forecasting travel patterns on a regional scale, it is clear from the examples cited that they also may fail to capture some VMT reductions (and emissions benefits) from local smart growth developments. Independent appraisals of MPO traffic models by environmental groups have also suggested that technical shortcomings of some

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[67] It's also worth noting that land use projections from these models are not typically "official," and are generally revised by local planning officials.

[68] http://www.epa.gov/smartgrowth/topics/atlantic_steel.htm

[69] The Atlanta Regional Council's (the local MPO) travel demand model included some adjustments as well as off-line analyses to estimate the VMT and emission benefits from the Atlantic Station development. Other less-high profile projects are less likely to see this time and effort.

of these models may also lead them to overestimate the benefits of sprawl and road system expansion.

Microscale Sketch Models
In part to fill the gaps inherent in regional modeling, planners and developers have built computer-based tools to simulate the travel and emissions impacts of small scale, site-specific developments. While more simplistic than regional 4-step models, these 'local' models give a rough sense of how local land use impacts emissions by capturing such elements as: site design; local transit service; mix of uses; and other characteristics typically associated with smart-growth style developments. This is important because such developments may support densities that will ultimately bolster transit, walking and biking options locally and which, long-term, may even provide regional benefits (e.g., reduced congestion) from more diverse, sustainable transportation networks. Further, these tools often allow the public to visualize the design, density and environmental impact of local planning decisions.

Two examples of this type of tool are PLACE3S and Smart Growth Index. Both of these desktop models allow planners to look at different types of densities (housing and jobs), transit service and other land use characteristics like street design. The use of scenario-based tools can also help educate the public by letting them "see" the impact of land use changes. It is no coincidence that these tools estimate the travel and emissions benefits that the larger models miss. These microscale models can fall short, however, when it comes to capturing the VMT or emissions impacts from either changes in regional location or adjustments to regional transit service (i.e., LOS changes or inter-TAZ route adjustments). While these computer simulations are not perfect, using them in conjunction with regional travel models can help MPOs better illustrate the benefits of local land use decisions. For example, SACOG is utilizing PLACE3S to link local land use patterns with its regional travel demand model.

Regional Visioning Scenarios
While public participation is an important part of planning, the public participation component of the transportation planning process has often been an after thought – meaning that the details of the planning process are still typically complex and mysterious to the general public. However, recent advances in visualization techniques including charrettes, board games, and computer simulations have helped engage the public early by allowing them to see how increased density in their community can in fact improve their quality of life by provide housing and retail diversity while adding to the community's bottom line by reducing spending on new infrastructure (i.e., sewer and water lines).

The Blueprint project in Sacramento, California, for example, has been recognized for its use of state-of-the-art Geographic Information Systems (GIS) and web based modeling techniques to provide data on the effects of current and future land use decisions. Participants in community workshops are able to examine the impact of growth scenarios on indicators such as traffic congestion, air pollution, employment, housing availability and open space in order to help design a community vision. This process has determined a preferred growth strategy that will guide development in the Sacramento region and ultimately be integrated into the region's

LRTP. Initial quantified estimates of Blueprint's preferred growth alternative show reductions of up to 25 percent in per capita VMT and 15 percent of criteria pollutants.

Another example of good public participation is Envision Utah, which was an award-winning public-private partnership with a mandate to address the implications of rapid predicated growth surrounding Salt Lake City. This effort provided a group of public stakeholders with a series of visual scenarios to help them better see expected growth patterns and decide on how to best allocate population and employment patterns (with supportive transit services) over the next 30 years. The result of this effort was that residents chose the second densest development scenario (out of four separate alternatives provided by planners) that included strong transit and land use components.[70] In addition to environmental benefits, this scenario was projected to save $4.5 billion in infrastructure costs through 2020. This process demonstrates that people are not fearful of density when they are able to visualize where and how density can impact the region's environmental and economic bottom line. Such visualization planning process may ultimately benefit air quality and planning interactions.

The Need for Regional Scenario Analyses

Most transportation planners agree that good planning requires a proper regional perspective coupled with strong public input, as seen in the examples above. However, planners are required to analyze alternatives only for specific projects with the TIP but not to the full TIP. The problem with this is that at the local project scale the likelihood of detecting any discernible land-use impact is small. So while federal law (i.e., NEPA) has long required environmental reviews (i.e., consideration of secondary and cumulative impacts) for individual TIP-listed projects, such as a new road or bus route, the full suite of TIP projects is only questioned in the conformity process, as opposed to being considered at an earlier stage in the planning process. Indeed, environmental impact studies, even for mega-projects such as outer beltways, typically fail to consider the impacts of these proposed investments on regional criteria pollutants, such as ozone. Instead, they point to the inclusion of the project in a conforming RTP as evidence that it has no adverse air quality impact, even in cases when the MPO has failed to evaluate the relative impact of the mega-project on air quality compared to a no-build scenario. A change that could fix this, and in turn strengthen the current conformity process, would be (federal legislation) requiring MPOs to include regional alternative scenario analysis in their TIP and RTP updates. If MPOs were required to generate alternative scenarios at the regional scale to help officials consider various planning factors and opportunities to avoid or minimize various adverse impacts of project and plan investments while maximizing satisfaction of regional and federal objectives, the benefits of comprehensive smart growth planning would be readily apparent.

The FHWA metropolitan planning rules, 23 CFR 450.316(a)(13), require that the regional transportation plan -

> explicitly consider, analyze as appropriate, and reflect in the planning product:
>
> *(13) the overall social, economic, energy, and environmental effects of transportation decisions (including consideration of the effects and impacts of the plan on the human, natural and man-*

[70] For more information on the individual scenarios, see http://www.envisionutah.org/index.php?id=NDk5

> *made environment such as housing, employment and community development, consultation with appropriate resource and permit agencies to ensure early and continued coordination with environmental resource protection and management plans, and appropriate emphasis on transportation-related air quality problems in support of the requirements of 23 USC 109(h), and section 14 of Federal Transit Act (49 USC 1610), section 4(f) of the DOT Act (49 USC 303) and section 174(b) of the Clean Air Act (42 USC 7504(b).*

23 USC 109(h) requires that before a project is approved by the Secretary, it must have been analyzed to determine whether it is in "the best overall public interest" taking into account the costs of mitigating the adverse impacts on the environment and the mobility benefits. The Act specifically requires "the possible adverse effects" of "air pollution" to be included in the analysis.

In a case brought by Sierra Club alleging FHWA's failure to address the adverse impacts on public health of emissions from a highway expansion project in Las Vegas, FHWA filed a brief arguing that FHWA was not required to perform this analysis or make this best public interest determination because it had passed the obligation on to the MPOs through this requirement of the metropolitan planning rules. However, it appears that guidance to MPOs on this matter has not been issued and MPOs are doing little to address this matter in their transportation plan revisions or otherwise in the planning process.

Section 134(a)(1) establishes the purposes of the metropolitan planning process and (a)(2) states that MPO plans are to "accomplish" these purposes. However, there is little evidence of MPO RTPs discussing how the purposes related to minimizing fuel consumption and air pollution are accomplished in their respective metropolitan areas. This may be a fruitful area for DOT and EPA cooperation to develop new guidance or rules that encourage consideration of alternatives.

IMPLEMENTING SMART GROWTH AS A CLEAN AIR STRATEGY

Improving air quality through smart growth policies requires comprehensive approaches that can slow growth in vehicle use and associated emissions by providing numerous transportation choices with supportive land use patterns. A comprehensive regional plan developed with serious and inclusive public involvement is a fundamental first step. Without a strong implementation follow-through however, a good plan is little more than pretty maps and drawings. Strong political leadership and adequate funding are especially important to help ensure that good plans go from paper to reality. Below we provide a brief overview of key elements needed to successfully implement smart growth policies.

- Comprehensive regional planning
- Regional cooperation
- Funding for efficient transportation alternatives
- Targeted infrastructure spending
- Incentives to redevelop the center city
- Elimination of regulatory or financial disincentives that encourage sprawl

Comprehensive Regional Planning

Local infill and TOD projects are important elements of smart growth, but controlling regional air pollution requires a comprehensive smart growth approach that addresses land use and

transportation planning over an entire metropolitan area, or even better over an entire urban air shed. As noted above, comprehensive regional smart growth strategies are projected to reduce regional VMT from anywhere between 3-20%.[71]

Regional Cooperation

One of the well-known barriers to efficient land use development is competition among municipalities for tax revenue ("ratables") e.g., from shopping malls or other commercial and industrial operations. For example, local political leaders may fill TIPs with pet projects, often designed to generate constituent-pleasing municipal and local tax revenue, without an eye toward regional impacts. An additional challenge is that responsibility and authority for transportation, land use and air quality are spread across multiple entities and jurisdictions. Visioning processes can help local stakeholders understand the regional impacts of their individual development decisions and can serve as a starting place for coordination among local government officials. More formal coordination at the regional level is likely necessary for full implementation of smart growth plans. While few regions have the appetite for an actual regional government, as in Portland, Oregon, there are other options in between full regulatory control and no coordination. For example, since 1971, the Twin Cities region has had a fiscal-revenue sharing program such that growth outside of the city contributes back to the inner city development. Under Minnesota's Fiscal Disparity program, forty percent of the property tax revenue from new commercial and industrial growth within the seven counties and 187 jurisdictions around the Twin Cities goes into a pot - worth about $400 million a year - that is redistributed on the basis of per capita wealth. The program has slowed the race for new development - a race that too often means moving jobs from one community to another; promoted more orderly growth; and saved as much as $30 billion in infrastructure costs in the Twin Cities area.[72]

Funding for Efficient Transportation Alternatives

Transit is typically an essential component of regional smart growth plans. System expansion and improvement require significant funding. Transit funding can come from federal, state and local sources as the result of legislation (e.g., TEA-21), voter referenda, local initiatives, etc. Just with the recent election voters in several cities approved a sales tax increase to fund transit (and, in some cases, road) projects (Phoenix, Denver, Sacramento, San Diego). Perhaps the most important unknown is what Congress will do with TEA-21 re-authorization. Given multiple competing needs for government funds, a coordinated regional approach is needed to pool resources and build a convincing case for funding. It is important for state governments to assess the land use and air quality impacts of how they disburse transportation and infrastructure, as discussed below.

Targeting Infrastructure Funding

States invest billions of dollars of federal and state money on transportation and other key infrastructure (schools, sewers, utilities). A primary opportunity for reducing transportation emissions entails reorienting of transportation funding toward efficient alternatives (transit, bike, walk) and focusing infrastructure spending in efficient locations (core cities with existing

[71] S.Winkelman, G. Dierkers, A.Mackie & E.Silsbe. Center for Clean Air Policy. *State and Local Leadership on Transportation Climate Change*, January 2003 (updated April 2004).
[72] http://www.newrules.org/environment/taxbasesharing.html

infrastructure, transit-accessible, pedestrian-friendly, mixed-use locations). By applying this 'power of the purse' states can prioritize spending in efficient locations and limit or withhold funding from projects that do not meet smart growth and air quality goals. For this to happen however, it will require significant coordination between state and local governments including technical and legal assistance for localities that are faced with development pressure.

The State of Maryland was the first to move on this concept of limiting state infrastructure funding to "Priority Funding Areas" that local governments designate for growth, and withholds state funds for development outside of these areas -- including funding for transportation, water infrastructure, schools, etc. In 2002, New Jersey Governor James McGreevey issued Executive Order 4, which created the New Jersey Smart Growth Council which is responsible for and empowered to ensure that state transportation and infrastructure spending, regulation, incentives, school construction initiatives, or other funding issued to promote economic activity or otherwise by any agency are consistent with the principles of smart growth and the State Plan.

California and Massachusetts have institutional structures that can facilitate coordination of infrastructure, transportation and environmental concerns. The California Business, Transportation and Housing Agency, with a collective budget of $12.4 billion is in a remarkable position to promote efficient integration of transportation and infrastructure planning, and has a great interest in efficient land use development. The Massachusetts Office of Commonwealth Development (OCD) formed in 2003, includes the agencies responsible for environmental affairs, transportation and construction, housing and community development and energy resources.

CONCLUSIONS

In 2004 the EPA inspector general released a report highlighting the lack of progress by states on smog reductions. The report states that, "many of the most polluted metropolitan areas are still struggling to attain EPA's 1-hour ozone standard established over 25 years ago."[73] Given that the more stringent 8-hour standard is in effect, it is likely that some areas will encounter difficulty demonstrating and reaching attainment. The new standards, coupled with the growth in VMT that shows no signs of slowing as urban regions continue to expand into the countryside, means that air quality is going to become an even more pressing issue as more regions move into non-attainment. Mitigating the health and environmental impacts of air pollution will likely require new approaches to transportation and land use planning. Smart growth planning that integrates land uses, encourages building at densities sufficient for effective public transit, and that promotes non-motorized trips will help slow growth in VMT and make real improvements in the quality of our air.

We look forward to your participation at the Two for the Price of One forum. The recommendations we develop will help US EPA in its efforts to foster environmentally sustainable land development, and provide transportation guidance at the national level that can

[73] EPA, Office of Inspector General, *op cit.*.

create incentives for states, regions and localities to develop and implement transportation and land use policies that reduce emissions and improve the quality of life for their citizens.