

## Air Quality and Smart Growth: Planning for Cleaner Air



*This paper was commissioned by the Funders' Network for Smart Growth and Livable Communities.\* The collaborating authors on this paper were Steve Winkelman<sup>1</sup>, Greg Dierkers, Erin Silsbe, Mac Wubben, and Shayna Stott from the Center for Clean Air Policy.\*\* This is the sixteenth in a series of translation papers published by the Funders' Network to translate the impact of sprawl and urban disinvestment upon issues of importance to our communities and environment and to suggest opportunities for progress that would be created by smarter growth policies and practices. Other issues addressed in the series of translation papers include energy, water, community development, arts, health, biodiversity, children and families, education, aging, transportation, agriculture, civic engagement, parks and open space, workforce development, and social equity.*

### Abstract

*\* The Funders' Network works to expand funders' abilities to support organizations working to build more livable communities through smarter growth policies and practices. For more information, visit [www.fundersnetwork.org](http://www.fundersnetwork.org).*

*\*\* Founded in 1985 by a bipartisan group of state governors, the Center for Clean Air Policy (CCAP) seeks to promote and implement innovative solutions to major environmental and energy problems which balance both environmental and economic interests. For more information, visit [www.ccap.org](http://www.ccap.org).*

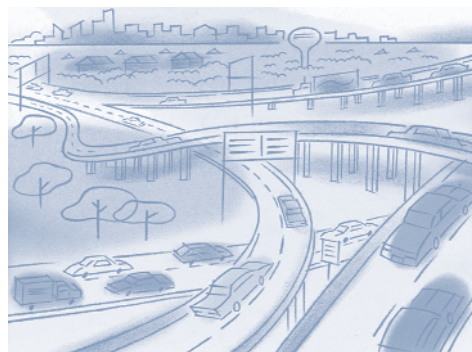
Clean air is a fundamental right and one that many take for granted. Each day as millions of people turn on their computers and coffee makers, as commuters drive to work and carry out their daily routines, the burning of fossil fuels needed to energize these activities quietly pollutes the air. Even though federal policy has been regulating air pollutants for many years, states and localities are having an increasingly difficult time reaching target levels, especially pertaining to automobile emissions. Recent data show that 159 million people—over half of the population in the United States—live in areas with poor air quality.<sup>2</sup> This failure is due in no small part to ever-expanding metropolitan regions that have to contend with increasing highway travel, including

longer commutes and leisure trips, and the resulting traffic congestion. This continued reliance on cars, light trucks, and sport utility vehicles as the primary means of transportation contributes to growing rates of asthma, cancer, and premature deaths. In

fact, although rarely talked about, poor air quality poses one of the greatest threats to public health and is particularly burdensome to children, the elderly, and those with lower incomes.

Environmental impacts of air pollutants include climate change, smog, acid rain, and ozone

depletion. This paper explores the connection between land development patterns, transportation patterns, and air pollution and how growing smarter can lead to better air quality.



## The Problem: Vehicle Emissions and Development Patterns

### Vehicle Emissions

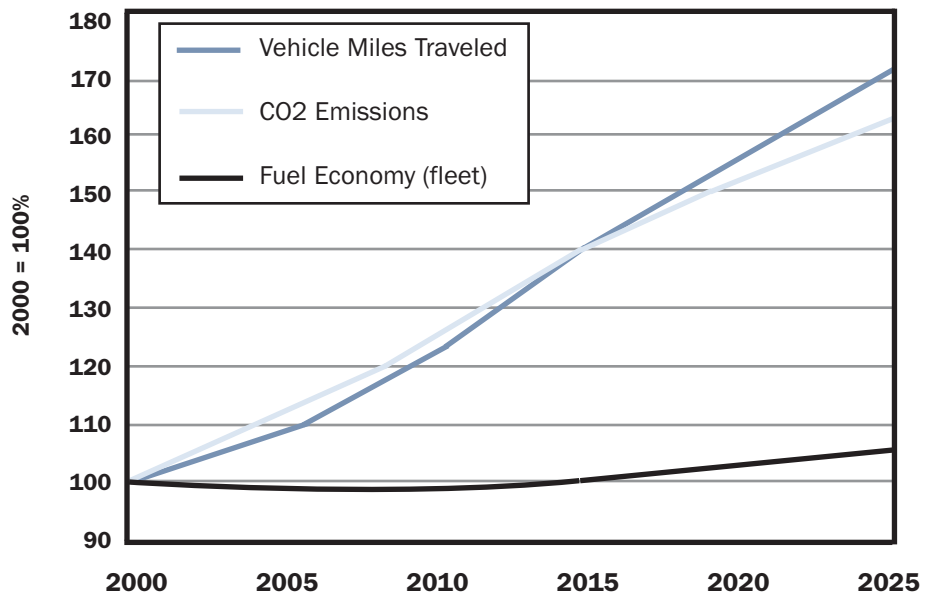
While power plants and industrial manufacturers are some of the largest polluters in the United States, the impact of mobile source emissions, especially those emanating from the tailpipes of cars, trucks, and sport utility vehicles (SUVs) is dramatically increasing. Pollutants attributable to the transportation sector include:

- **Carbon Monoxide (CO)** is a colorless, odorless pollutant produced when fuels are not completely combusted. According to the U.S. Environmental Protection Agency (EPA), mobile sources account for over 75 percent of CO pollution.
- **Ground-level Ozone** is not directly emitted by mobile sources,<sup>3</sup> but is a product of a chemical reaction involving nitrogen oxides (NOx), volatile organic compounds (VOCs), and sunlight. Mobile sources emit 30 to 50 percent 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 percent of PM emissions with diesel engines accounting for over half of that total.<sup>4</sup>
- **Greenhouse Gases (GHGs)** are heat trapping gases responsible for global warming. The transportation sector produces multiple GHGs including *carbon dioxide (CO<sub>2</sub>)*, *methane (CH<sub>4</sub>)*, and *nitrous oxide (NOx)*. Carbon dioxide, which constitutes the bulk of GHG emissions from the transportation sector, is a product of combustion and is thus inherently linked to automobile use. The transportation sector accounted for almost one-third of all U.S. GHGs with on-road transportation sources contributing two-thirds of all transportation GHG emissions.<sup>5</sup>

Figure 1: Growth in Travel Outstripping Vehicle Efficiency Improvements



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 NO<sub>x</sub>, VOCs, and CO (with the exception of CO<sub>2</sub>). Yet rapid growth in the amount of driving is offsetting these reductions, especially in some fast-growing regions. In the case of CO<sub>2</sub> per vehicle, fleet-wide vehicle emission rates have been essentially stagnant since 1991 while VMT grew 25 percent 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<sub>2</sub> emission standards (if they survive legal challenge), will result in fleet-wide savings of 27 percent in 2030—still not enough to keep up with VMT growth. Thus, progress must continue to be made on vehicle technologies and fuels—and policies to implement them—while the extent to which growth in VMT can be mitigated must also be assessed.

### Development Patterns and Vehicle Miles Traveled

The dramatic increase in VMT seen over the past 50 years is largely due to a pattern of land development that took hold after the Second World War and included a boom in detached single-family homes and massive road building projects. Located at the urban fringe, this pattern of suburban development is typically dominated by housing-only enclaves consisting of single family homes with two-car garages and a hierarchical road system (with one way in and out) where land use functions are isolated (residential, commercial, employment), origins and destinations are farther apart, infrastructure design is oriented toward the automobile, and low population densities are not conducive to public transportation.

A study that analyzed U.S. Census Bureau data found that in 1950, 69 million people lived in 157 urbanized areas covering

12,715 square miles.<sup>6</sup> By 2000, those same 157 urbanized areas covered 52,388 square miles and contained 155 million people.<sup>7</sup> In other words, today, slightly more than double the number of people live on over four times the amount of land. This translates to a reduction in population density by almost half; from 5,391 people per square mile to 2,949 people per square mile. Central cities were the most dramatically impacted by this trend; in 1950, 34 cities contained 10,000 people per square mile, but by 2000 only 14 cities had 10,000 people per square mile. In fact, all U.S. cities, except for New York City, have lost density over the last 50 years.<sup>8</sup> While some of this migration to the suburbs—and now to the exurbs beyond—was in part due to consumer choice, federal tax policy, and education policies, it was federal transportation funding, through investments in highways, roadways, and transit along with local zoning regulations that have played the central role in the development of our communities.

Unlike more traditional patterns of development, the policies that create sprawling development patterns segregate land uses into different zones of the city. This separation of work, home, shopping, schooling, and recreation has heavily contributed to the stark changes in urban form post-1950 and the resulting dramatic increase in VMT. The transportation network is a key determinant for trip mode choice, trip length, and number of trips taken and the disconnected road system of typical suburban development typically renders local public transit economically impractical, leaving residents with no choice but to drive.

Recent studies quantify the relationship between land use and VMT. An analysis of 83 metropolitan regions around the country by Ewing et al. (2002) 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.<sup>9</sup> On a household-basis, Frank (2000) concluded that households located in the most interconnected areas of Seattle

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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.<sup>10</sup> Holtzclaw et al. (2002) 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.<sup>11</sup>

With millions of commuters hitting the road daily and cities sprawling further and further into the countryside, the resulting pressure on highways and roads has led to a significant strain on road capacity. The latest annual update of a well-cited study from the Texas Transportation Institute states that in major cities this strain, otherwise known as traffic congestion, has increased significantly over the past two decades and the extra time needed for rush hour travel alone has tripled. The national average for a rush hour trip took 39 percent longer than a non-rush hour trip compared with 1982 and the cost of congestion in 2001 was \$69.5 billion in wasted fuel (5.7 billion gallons) and 3.5 billion hours of lost productivity.<sup>12</sup>

Traffic congestion is something that we have traditionally tried to build ourselves out of by adding miles and miles of new roads, usually without considering the long-term consequences of congestion and resulting air pollution. Recent studies have shown, “if you build it, they will come.” In other words, adding new roads and new lanes results in induced demand where due to the new capacity, the new road lanes are used by the same people who may have otherwise taken transit or carpooled. Further, the new lanes may also open up land for greenfield development, thus creating new destinations. Studies from EPA show that new roads may contribute to a 10 to 45 percent increase in new urban VMT.<sup>13</sup> Traffic congestion is, however, only a minor inconvenience of VMT growth when compared to some of the more harmful impacts of air pollution.

The following section provides a brief overview of some of the main health and environmental impacts associated with air pollution.

## The Impacts of Transportation Pollutants on Health and the Environment

Until recently, the correlation between land use and air pollution is one that was rarely thought about. A number of new studies researched the links among sprawling development patterns, air pollution, and health.<sup>14</sup> One recent report highlighted a common theme in these studies, which is the fact that people living in sprawling metropolitan areas are more likely to develop chronic health problems than residents of more compact cities. The reason: people who live in the sprawling areas are more likely to drive than those in more compact cities.<sup>15</sup> The health problems associated with this fact are in part due to inactive lifestyles and the high level of vehicle emissions.

### Human Health Impacts

A recent report by the American Lung Association found that air pollution in urban regions has resulted in a proliferation of respiratory illnesses, contributing to the death of over 70,000 people annually.<sup>16</sup> Some of the other health impacts that have been proven to be directly linked to transportation related air pollutants include: cancer, premature death, heart or respiratory disease, high blood pressure, arthritis, headaches, nausea, asthma, and breathing difficulties.<sup>17</sup> Researchers also find that children, the elderly, minorities, and those with weakened immune systems are most likely to feel the brunt of health complications associated with poor air quality. In fact, particulate matter has been



linked to a higher risk of infant mortality. Further, low-income children living in urban areas and minorities also have an increased risk of developing asthma due in part to high rates of exposure to diesel exhaust from truck traffic.<sup>18</sup>

### Impacts on the Physical Environment

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. While federal and state regulations are in place to mitigate the first three, climate change related to the release

of carbon dioxide into the atmosphere goes largely unabated. Projected and real impacts of climate change include increasing global temperatures, rising sea levels, increased severity and frequency of severe weather events (e.g., droughts, floods, violent storms, hurricanes, and wildfires), loss of biodiversity, fluctuation in ecosystem boundaries, etc.<sup>19</sup> In addition, nitrogen oxides derived in part from vehicle exhaust contribute to acid rain and excess nitrogen loading to aquatic and terrestrial ecosystems which can cause substantial degradation in biodiversity.<sup>20</sup>

## The Federal Legislative Framework

There are two federal laws that play a central role in the regulation of vehicle emissions—the Clean Air Act (CAA) and the U.S. federal transportation law, TEA-21. Following is a brief discussion of each, including key provisions as well as a discussion of how the shortcomings of each have contributed to the state of urban air pollution today.

### 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. Under the Clean Air Act, states are expected to develop and implement air pollution control plans called State Implementation Plans (SIPs). Through their SIPs, states demonstrate either attainment with NAAQS or show how they will meet federal air quality requirements for stationary and mobile source emissions. In 1990, the Clean Act Amendments (1990 CAAA) set new standards for NAAQS according to five levels of non-attainment based on severity. The levels are: extreme, severe, serious, moderate, and marginal. While each category comes with a different set of requirements and deadlines for improving air quality, those in higher non-

attainment categories, several and extreme, can be subject to conformity.

**Conformity & the Clean Air Act.** Under the 1990 CAAA, a metropolitan region that has exceeded the emission standards for one or more of the pollutant standards must show that the region's transportation plan, programs, and projects will contribute to the timely attainment of healthful air quality and thus conform to the CAA air pollution emission targets. In other words, at a minimum, the region needs to show that the transportation projects would not cause air quality to worsen, and ideally would improve the quality of the air.

**The Role of Transportation Planning.** In urban areas over 50,000 people, federally designated local bodies known as Metropolitan Planning Organizations (MPOs) set regional planning standards and choose transportation projects. The MPOs must demonstrate at least once every three years that their region's 20-year transportation plan conforms to the SIP and other applicable requirements. At least once every two years, MPOs must update their transportation improvement program (TIP) which identifies the highway and transit projects the area will undertake. Since many MPOs update TIPs even more frequently than required in order to add new projects, transportation conformity

helps ensure timely accounting and continued consistency between the plans and regional air quality control strategy.<sup>21</sup>

### Transportation Equity Act for the 21<sup>st</sup> Century (TEA-21)

In 1991, the 102<sup>nd</sup> Congress passed the Intermodal Surface Transportation Equity Act (ISTEA), which was renewed in 1998 as the Transportation Equity Act for the 21st Century. These ground-breaking pieces of legislation represented a new and improved way to fund the nation's transportation programs and provided a framework for the 1990 CAAA conformity requirements. TEA-21 provides states, MPOs, and local groups funding flexibility to meet local planning needs. It requires public involvement in the planning process with access to information about the performance of the proposed transportation spending plan and program. 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 air quality improvement programs, such as the Congestion Mitigation and Air Quality Improvement Program (CMAQ).

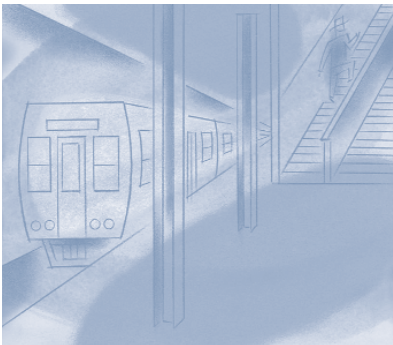
**The Role of CMAQ Funding.** One of the more promising aspects of TEA-21 has been the CMAQ funding that was created for projects that have measurable air quality benefits. Under TEA-21, CMAQ provided \$8.1 billion over six years to help states meet standards for NO<sub>x</sub>, CO, PM, etc.<sup>22</sup> Despite some questionable projects for congestion reductions, including lane and intersection widening, the federal program has been well-received by MPOs and has funded projects with clear and lasting air quality benefits, including transit, freight rail and commuter trains, as well as alternative fuel vehicles and infrastructure, ferries, bicycle/pedestrian and clean diesel fuel programs.<sup>23</sup> There is a concern, however, 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.<sup>24</sup>

**Transportation & Clean Air Conformity.** The primary intersection of the Clean Air Act and transportation law is conformity. If a region's TIP has expired without adopting a new TIP projected to stay within 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.<sup>25</sup> 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.<sup>26</sup> While there have been 63 areas in the United States that have suffered a conformity lapse, the most well-known conformity lapse occurred in Atlanta, and lasted from 1998 to 2000. This led to formation of the Georgia Regional Transportation Authority, revised and significant funding for measures to reduce air pollution, and improved technical tools.<sup>27</sup>

Atlanta notwithstanding, achieving conformity for many states is about to get a lot harder as new regulations and pending changes in air quality regulations and technical tools start to become law. Some of these changes include:

- New standards (e.g., new "8-hour ozone standard"<sup>28</sup>) will kick many metro areas into non-attainment status, meaning that many local MPOs will be faced with understanding the new (and often complex) conformity regulations;<sup>29</sup>
- New project level emissions analyses for PM<sub>10</sub><sup>30</sup> and CO will be required that will entail the use of new models and/or analytical techniques (which will require more work for modelers);<sup>31</sup> and



- The continual updates to new, more rigorous modeling is likely to shed light on ‘new’ emissions, presenting more challenges for MPOs in meeting their targets.

### Shortcomings Within the Federal Legislative Framework

While new air quality standards and conformity regulations will make things much more difficult for states, they still will not put a dent in air pollution until land use policy is better addressed. Too often the political process ascribes a higher priority to other goals, such as promoting economic development and new investments in transportation. Further, governance structures often work at cross purposes, with land use under local government control and transportation investment often controlled by powerful agencies that do not quickly respond to environmental program demands. Institutional capacity and interest

at MPOs and departments of transportation (DOTs) in pursuing more integrated planning, analysis, and decision-making that considers transportation, land use, air quality, and other resource protections is often lacking.

Another significant issue with the regulatory framework is the lack of regulation of greenhouse gases at the federal level. And while a number of states have voluntarily developed GHG reduction plans, few are supporting full implementation of the state climate plans or of the regional smart growth projects and plans that were used to quantify the statewide GHGs reductions. Moreover, existing state air quality and transportation policies and programs are often hampered by federal transportation funding decisions, the complexity of the clean air rules, and a lack of financial support by states to improve modeling capacity and tools.

## Moving Toward Cleaner Air: Signs of Progress

Expanded cooperation between federal air and transportation agencies is key to improved long-range air quality planning in the United States. Yet this cooperation needs to extend beyond air and transportation agencies and bring agencies that work on land use issues to the table. Progress that is currently underway in this regard includes the continued merging of air and transportation policies as well as the recognition of the benefits of smarter growth policies as a clean air strategy. Both of these are discussed in more detail below.

### Merging Air Quality, Land Use, and Transportation Priorities

Further integrating federal air policy to transportation policy is the first step toward a cleaner air strategy. This integration needs to occur at the policy level as well as in the associated funding programs; while it is a slow process, it is nonetheless, an essential effort.

### Enhancement of Regulatory Framework

The idea of including land use in the federal regulatory framework has already begun to take hold. In 2001, the federal government wrote guidance on improving air quality through land use. While the EPA currently allows SIP credit for land use and infill,<sup>32</sup> to date this formal guidance has rarely been used by MPOs.<sup>33</sup>

A report prepared by the U.S. Government Accountability Office (GAO)<sup>34</sup> may provide some insight as to potential reasons for the lack of implementation of land use projects.<sup>35</sup> In October 2001, Congress asked GAO to survey state and local transportation planners on the issue of land use and air and water quality. What they found and what they in turn recommended to the EPA and DOT through the ensuing report was that state and local officials wanted the federal government to provide:

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- “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; and
- Public education on the environmental impacts of land use and transportation decisions.”<sup>36</sup>

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.

### Growing Smarter as a Clean Air Strategy

Smart growth, new urbanism, and sustainable city planning are all terms that describe a bundle of strategies and approaches that would increase the amount of development that adheres to a more traditional pattern of built form that is more livable and walkable and that does not require its citizens to depend on the automobile for a trip to the local store, park, office, or school. Increasing the walkability of neighborhoods is a central feature of this type of planning; in order to effectively reduce vehicle trips, pedestrian-oriented design features need to be repeated throughout an entire region. In other words, the creation of more walkable urban and suburban environments requires both larger scale and regional planning efforts to promote higher density, a mix of land uses and transit-oriented communities, as well as site-level urban design features that promote safety and access to local services on foot.<sup>37</sup>

Strategies that aid in this endeavor include:

- Concentrating development in activity centers;
- Increasing density near transit stations;
- Interconnecting travel networks;
- Designing for the pedestrian (e.g., sidewalks, benches, street lighting, signage, crosswalks, etc.);
- Mixing land uses;
- Ensuring diversity in housing sizes; and
- Improving parking management.

Reductions in VMT resulting from building more walkable places are gained from reducing short-distance vehicles trips by eliminating the need or desire to drive. The result is a reduction in criteria air pollutant emissions as well as greenhouse gas emissions. Some of the other benefits of walkable neighborhoods (that are discussed in more detail in many of the other Funders’ Network translation papers)<sup>38</sup> include, but are not limited to:

- Reduced pedestrian-motor vehicle accidents, injuries, and fatalities;
- Decreased need for additional transportation infrastructure (i.e., roads and parking lots);
- Improved overall public health through more active lifestyles;
- Improved livability of a community;
- Greater mobility choices for all members of the community (i.e. seniors, children, and low-income households);<sup>39</sup>
- Increased property values in walkable neighborhoods;
- More attractive destinations for tourists; and
- Increased sales for local businesses.<sup>40</sup>

### Thinking Big: The Need for Regional Land Use Planning

If only implemented locally, smart growth strategies are not enough to curb the increase in VMT and subsequent transportation emissions. What is needed are regional plans that integrate land use and transportation planning over entire metropolitan areas or, even better, over entire urban air sheds. A comprehensive regional plan developed with serious and inclusive public involvement is a fundamental first step; however, without a means for implementation a good plan is little more than pretty maps and drawings. Some tools/methods that are currently used to implement regional planning efforts include:

- Effective public participation and public education;
- Scenario planning that engages the public in visioning the future of their region over the next 20 or 30 years;

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- Finding champions in the community, from either the private and public sector, who are able to rally support; and
- The use of interdisciplinary teams of professionals including urban planners, transportation planners, engineers, architects, air quality managers, health professionals, etc.

Comprehensive regional smart growth style planning strategies that include transit are projected to reduce regional VMT from anywhere between 3 to 25 percent (see Table 1) with even higher reductions in VMT possible when these are implemented in combination with complementary policies such as open space protection and measures (including in some cases, congestion pricing, zoning, etc).<sup>41</sup>

Table 1: Regional VMT Reductions from Smart Growth and Transit<sup>42</sup>

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

Source: Information from several analyses and reports. Please contact CCAP for specific details.

## Case Studies

Following is an overview of several case studies of regions from across the country that are making progress in the area of regional land use planning and in integrating land use and transportation.

### Proactive Government and Early Action Compacts (EACs)<sup>43</sup> Chattanooga, Tenn.

Sustainable development helped transform the city of Chattanooga, Tenn., from a city with the worst air pollution in the United States in the 1960s into a clean, economically vibrant city. Due to the devastating impact air pollution had on the health and economic viability of Chattanooga in the 1960s, the Chamber of Commerce created the Air Pollution

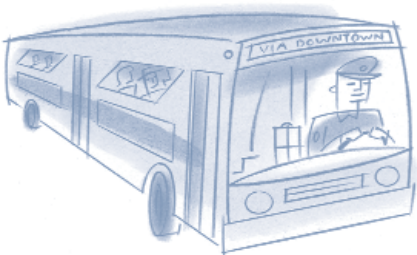
Control Board. Within three years, regulatory action the board initiated achieved an impressive reversal in local air quality trends. The cornerstone of the city's smart growth activity in the 1980s was one of the country's first community visioning projects. The Lyndhurst Foundation and the newly established nonprofit organization Chattanooga Venture led the project, entitled "Vision 2000," with the goal to improve livability and attract new investment. The community identified concerns and developed a list of 40 long-range goals to improve the local quality of life. Proposed solutions included the research and development of emissions free electric buses for the public transportation system, mixed-use redevelopment projects,

and the rehabilitation of the city's downtown core.

Although Chattanooga is often referred to as one of nation's most livable cities, the region is threatened with a non-attainment designation for exceeding the 8-hour standard for ozone levels under more stringent air quality regulations. Chattanooga represents an example of an urban area being proactive in addressing its air quality issues for many decades. The city's projects have demonstrated that economic development and sustainable development can be one in the same, and thus have generated support from all segments of the community. Yet lack of collaborative state action in Tennessee has hampered Chattanooga's efforts to make progress on air quality issues at broader regional scale. To help mitigate this, the counties of the Chattanooga region have entered into an Early Action Compact (EAC) to voluntarily meet federal ozone standards and achieve attainment by 2007. This project requires the participation of all stakeholders in the selection of measures to achieve air quality improvements. Some of the measures under consideration include the retrofitting of diesel equipment, bike trails and bike racks on buses, pedestrian greenways, lower truck speed limits on interstate highways, and the adoption of intelligent transportation systems.

#### **Office for Commonwealth Development<sup>44</sup> State of Massachusetts**

The Office of Commonwealth Development (OCD)—formed in 2003—was created to safeguard both built and natural environments through the integration of state level policies, programs, and regulations to achieve sustainable development goals. The OCD includes the agencies responsible for environmental affairs, transportation and construction, housing and community development, and energy resources. The office aims to promote the coordination and cooperation of all agencies to achieve efficient and effective state investment in smart growth guided by ten principles of sustainable development.



Among the focal points of OCD initiatives is the Commonwealth Capital policy, which strives to coordinate capital spending programs to ensure consistency between development projects and the sustainable development principles. Commonwealth Capital serves as a tool to influence municipal land use practices by rewarding municipalities engaged in smart growth planning. The state has also introduced a Fix-It-First policy placing the maintenance of existing infrastructure as a priority over new construction. Fix-It-First extends to policy directing highway and municipal roadway decisions.

During its first year, the Office of Commonwealth Development partnered with transit agencies to begin the implementation of a transit-oriented development program. The pilot program is focused on four initial communities and will bring high quality mixed use development on land near transit stations owned by the Massachusetts Bay Transit Authority (MBTA).

Coordinating policy and funding mechanisms has been an important step to ensure state leadership on smart growth strategies. Yet there have been implementation challenges associated with the creation of a new office including: coordination and transparent communication with stakeholders when establishing sustainable development and other goals; lack of progress on integrating transportation policies and investments with smart growth objectives; reduced state investment in open space acquisition; and legislature rejection of the full reorganization of energy, environment, transportation, and housing agencies into a single entity.<sup>45</sup>

#### **Land Use Transportation and Air Quality Initiative (LUTRAQ) Portland, Ore.**

The Land Use Transportation and Air Quality (LUTRAQ) initiative was launched in the early 1990s to identify and evaluate land use and transportation strategies that could serve as an alternative to building the Western Bypass freeway around the west

side of metropolitan Portland. This groundbreaking process assessed the potential impacts of five alternative development scenarios including “no build,” the Western Bypass, and the LUTRAQ alternative. The LUTRAQ alternative, ultimately adopted by the Oregon DOT, included new light rail lines, enhancements to pedestrian and bicycle infrastructure, and local zoning changes. This program was the only alternative to “no build” that conformed to federal air quality requirements. Advanced transportation modeling of these integrated land use and transportation measures indicated VMT reductions ranging from 6 to 8 percent. The air quality implications of the LUTRAQ scenario include emissions reductions in greenhouse gases by 7.9 percent, hydrocarbons by 6 percent, nitrogen oxide by 8.7 percent, and carbon monoxide by 6 percent. The LUTRAQ initiative laid the foundation for longer-term regional plans that foster integration of transit and land use development.

The integration of the LUTRAQ alternative into the Metro 2040 growth concept is a contributing factor in the proliferation of transit-oriented developments and in increased regional transit ridership.<sup>46</sup> Performance reports have indicated that over the period 1990—2000 *per capita* vehicle miles traveled have stabilized, and transit ridership has increased by 49 percent. Air quality in the Portland region has improved in the years following its reclassification as an attainment zone in 1997. In 2003, Portland did not exceed the federal 1-hour or 8-hour ozone standard and the region has maintained good to moderate levels of air quality in recent years.<sup>47</sup>

#### **Sacramento Region Blueprint Transportation-Land Use Study and PLACE3S<sup>48</sup>**

##### **Sacramento Area Council of Governments (SACOG)**

Similar to other regions across California, Sacramento will face the challenges associated with a rapidly expanding population, as 1.7 million new residents are expected over the next 50 years. Compounding the problem is the region’s

poor air quality status. The Sacramento region is currently classified a “severe” non-attainment area for ozone with a target date for attainment of 2005. Despite recent improvements, the region continues to exceed federal air quality standards. The Sacramento Area Council of Governments (SACOG) is undertaking the preparation of a revision to its transportation plan that was adopted in 1994.<sup>49</sup>

The Sacramento Region Blueprint Transportation-Land Use Study assesses how and where growth should occur in the region, the impact on transportation networks, and the environmental implications of various decisions. The Blueprint project 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. PLACE3S is an interactive software application that allows community members and planners to visualize the impact of local planning decisions on the greater region’s quality of life. 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 will determine a preferred growth strategy that is anticipated to be voted on by the end of 2004 in order to guide development in the Sacramento region. As the local MPO, SACOG will utilize the technical data, strategies, and principles developed in the Blueprint project to update the regional transportation plan. Importantly, SACOG has also allocated \$500 million in funds over the next 25 years to smart growth projects through the Community Design Incentive Program.

#### **Southern California Compass Growth Vision Report<sup>50</sup>**

##### **Southern California Area of Governments (SCAG)**

The six counties represented by the Southern California Area of Governments (SCAG) face the challenge of

accommodating an additional six million residents in the region by 2030. Despite improvements in air quality in Southern California in recent decades, the region continues to exceed federal standards for ozone, PM<sub>10</sub>, and carbon monoxide. The heavily populated Southern Coast Air Basin exceeded federal standards for 1-hour ozone measurements on 49 days in 2002, an increase from 36 days in 2001. In an attempt to avoid the severe impacts on air quality and traffic congestion associated with the anticipated growth, SCAG has developed a vision to guide future regional development. The *Southern California Compass Growth Vision Report* released in June 2004, concentrates mixed-use, higher-density pedestrian- and transit-oriented development in urban areas and along transit corridors. The project was funded jointly by the California State Department of Transportation, the Federal Highway Administration, and the Federal Transit Administration. Federal funding was included under provisions of the Transportation Equity Act for the 21<sup>st</sup> Century.

The Compass process began in 2002 with the selection of Fregonese-Calthorpe Associates (FCA), known for their innovative approach to visioning that had become part of projects such as Envision Utah (profiled in the next case study). The process integrated advanced technical modeling to understand the dynamics of the region's development with a series of regional and sub-regional hands-on workshops to assess community values and vision. The community workshops served as the core of the public participation process and were used to formulate alternative growth scenarios from which a preferred growth strategy emerged. The resultant growth strategy that emerged from the Compass process provides a comprehensive framework vision that can direct future local land use and transportation decisions to mitigate the regional impacts of growth. Vehicle miles traveled per capita are 5 percent lower under the growth vision compared to those experienced under current conditions.

### **Envision Utah—Community Visioning Process<sup>51</sup>** **State of Utah**

Envision Utah was initiated in 1996 as a public-private community partnership with the mandate to assess the implications of the region's predicted growth and to develop strategies to preserve the quality of life in the state. Funding for the project initially was centered on grants provided by the Eccles Foundation, which provided both the seed money and a \$1.5 million matching-challenge grant upon the project's inception. Envision Utah has been awarded federal grants from the EPA and the Federal Highway Administration; however it continues to rely on private funders for support.

The process adopted by Envision Utah included extensive public participation in the form of community workshops to provide participants with hands-on experience regarding balancing population growth, community preservation, and open space protection. Four growth management scenarios were constructed and presented for public evaluation through surveys and public meetings. The scenarios represented a range of density and transportation options, supported by in-depth modeling of emissions, growth, and infrastructure costs.<sup>52</sup>

The result of the three year process was a "Quality Growth Strategy" based on public support for the second highest-density scenario which emphasized transit-oriented development and infill redevelopment on unused or underutilized lands. This growth strategy is expected to save \$4.5 billion in infrastructure costs, preserve 171 square miles of land, and result in a 7 percent reduction in mobile source emissions.

Envision Utah has developed a successful process that builds community support and credibility for smart growth measures aimed at the principles embodied in the "Quality Growth Strategy." The process builds on the strength of partnerships between public and private stakeholders to provide guidance to local governments and planning organizations for transportation and land use decisions.

## Cleaning the Air: Opportunities for Change

Improving air quality requires comprehensive policies that can slow growth in vehicle use and associated emissions by providing rich transportation choices with supportive land use patterns. Several themes emerged from the case study examples as important issues where funders can help provide future support. These include: 1) improved funding for planning, including visioning, scenario development, and modeling; 2) expanded implementation of state and regional comprehensive transportation and land use plans; and 3) supporting funding approaches for transportation alternatives. A special section on “Preserving and Strengthening the Current Federal Regulatory Structure” is also included as a sidebar (beginning on page 15). These categories each require strong education components to ensure that federal and state decision-makers—especially at the MPO and DOT levels—recognize the need for new and improved policies to reduce VMT, support land use and transportation alternatives, and better recognize the air quality benefits from such activities.

### 1) Improve Regional, State, and Local Planning

The need to integrate transportation and land use planning relates to an improved understanding of the true implications of urban growth and development. Formally integrating land use and transportation into federal and state investment decisions must also be coupled with public education on how transportation choices and investments impact land use, air pollution, and quality of life. There are a number of avenues funders can take to support regional planning:

- **Improve modeling tools and practices.** Traditional transportation modeling approaches omit key emissions benefits of smarter growth policies due to cursory treatment of land use, exclusion of pedestrian and bicycle trips, and traffic increases from induced demand resulting from new roads and development around new interchanges. Moreover, improvements

to the pedestrian environment are excluded, such as sidewalks and lighting, and the economic and social value of thoughtful design, such as construction of a higher-density community rich with shopping and restaurants within walking distance from homes and apartments. Since the vast majority of MPOs lack both the technical tools and staff time and expertise to obtain and properly utilize cutting-edge transportation and land use models. *A strategic opportunity for funder support would be enhancement of the capacity of MPO staff and boards and other key governmental and civic stakeholders to understand, adopt, and apply best practices and respond to the challenges of modeling the emissions benefits of smart growth and alternative transportation policies. This might also include training sessions to help develop new and improved leadership at the MPO and DOT staff level that can work together to share knowledge on new tools and techniques to foster land use change.*

- **Expand use of visualization tools and practices.** Once planners and transportation modelers have a better understanding of the emissions benefits of smarter growth policies, they must communicate their findings in a manner that effectively engages the public. Visualization scenarios including, for example, charrettes, board games, and computer simulations, are proven methods to effectively engage the public in the planning process and help them explicitly understand how increased density in their community can add to the bottom line while improving the quality of life for their community. *Funder support for market research would help sell visioning efforts by favorably linking them to local politically viable issues such as taxes, economic development, and job creation.*

### 2) Support Efforts to Help Implement Smart Growth Plans

A comprehensive regional plan developed without a strong implementation plan is worth little more than the paper it is

Several themes emerged from the case study examples as important issues where funders can help provide future support. These include:

1) improved funding for planning, including visioning, scenario development, and modeling;

2) expanded implementation of state and regional comprehensive transportation and land use plans; and

3) supporting funding approaches for transportation alternatives.

*In an era of increasingly scarce public sector resources, market incentive strategies are likely to play a growing role in managing transportation system resources more efficiently while generating revenues that can support expanded transportation options to encourage smarter growth.*

printed on. Targeted funding, political support, and regulatory authority are essential to ensure implementation of increasingly sophisticated long-term plans for the future of urban and rural communities. Following are examples of ideas to help refine where funders might best employ resources. These include:

- **Target Infrastructure Funding.** States invest billions of dollars of federal and state money each year on transportation and other key infrastructure (e.g., schools, sewers, utilities). By applying the ‘power of the purse,’ states can fund alternatives and limit or withhold funding from projects that do not meet good planning and air quality goals. Yet for this to happen, it will require significant education and coordination between state and local governments, including technical and legal assistance for localities that are faced with development pressures. *Funders might sponsor meetings between interested stakeholders, including state officials, legislators, and advocacy groups, to help advance education, design approaches, and legal scholarship on how such innovative policies might become reality. This might include, for example, a forum or stakeholder dialogue aimed at drawing lessons from the multi-issue government or institutional structures, such as those in Massachusetts, California, or New Jersey.*

- **Foster Political Leadership.** Strong political leadership is essential to make anything happen, especially when it comes to transportation investment and system management decisions. Good communication between planners who understand how a region’s investment and system management decisions can impact long-term economic growth, air quality, and quality of life must be matched with government and short-term political needs that often appear to be in conflict. In an era of increasingly scarce public sector resources, market incentive strategies are likely to play a growing role in managing transportation system resources more

efficiently while generating revenues that can support expanded transportation options to encourage smarter growth. *Funder support for high-level educational efforts through institutions such as the National Governors Association (NGA), U.S. Conference of Mayors, and other such organizations would be useful to ensure continued capacity building so governors, mayors, and key legislators understand the full benefits of regional smart growth.*

- **Track and Monitor Transportation Emissions.** To better understand the air quality impacts of transportation investment and system management decisions it will be necessary to track progress and identify areas in need of improvement. Clearly it is very important to track VMT at both the regional and local level as well as from different modes of transportation (e.g., road, bike, transit, walk). It is also crucial to track levels of transportation funding by sources and mode in order to understand the share of financing that is spent on each mode, especially the more efficient modes. *Funders might consider financing proposals to help MPOs track VMT, criteria pollutant, and GHG implications of transportation and land use projects and plans.*

### **3) Fund Transportation Alternatives<sup>53</sup>**

Currently, U.S. federal and most state funding formulae offer a perverse incentive that rewards sprawl and encourages vehicle emissions. Revenue allotments are based on a state’s total VMT, fuel sales, and lane-miles meaning—in effect—the more driving that occurs in a state, the more federal highway money it is likely to receive. A clearer understanding of how this funding allocation works (or fails to work) might help galvanize support for reforming how the federal government distributes highway monies. *One way to do this would be for funders to support an analysis of alternative funding formulae that reduce the perverse incentive and reward smarter growth strategies and environmentally-friendly transportation projects.*

### Preserving and Strengthening the Current Regulatory Structure

Efforts are underway in Congress to undermine the current conformity process. The latest version of the federal surface transportation funding bill that would replace TEA-21—known at the time of this printing as SAFETEA—contains provisions to reduce the planning horizon for long-range transportation (LRTPs) plans from 20 to ten years, require conformity determinations to be made less frequently, and would combine long-range transportation plans and TIPs into a single document. Such actions would require *less* coordination between MPO officials and air quality regulators, when in fact more coordination is likely needed. These actions are troublesome given that development impacts from, for example, new outer beltways, can take more than ten years to be fully manifest and would thus not be captured in by MPO planning processes until it was too late, forcing other pollution sources to clean up the mess created by the sprawl they induce. *A change that could strengthen the conformity process would be to oblige MPOs to develop regional alternative scenario analyses. Currently within a TIP only individual projects are required to show alternative scenario developments; if MPOs were required to generate alternative scenarios at the regional scale, the benefits of better and more comprehensive planning would be readily apparent.*

At the federal level, the Federal Highway Administration (FHWA) and EPA often provide a very weak review of transportation and land use assumptions in MPO transportation plans, in spite of the fact that these assumptions have a major influence on whether the plans conform to state air quality implementation plans. *Funders could support analysis to shed light on this glaring loophole in the process and to develop recommendations on how to address it (e.g., requiring implementation demonstrations).*

Beyond ensuring proper planning horizons and their implications, there are legal and technical needs that must be met from planning/conformity changes. This includes responding to legal challenges and ensuring proper review and oversight of current local efforts to promote better travel choices. Documents such as EPA's SIP Land Use Guidance and programs like CMAQ have a clear role to play but such information may or may not get directly to those who might use it. *Funders might support training for MPOs—be it through fact sheets, reports, or meetings—to help them understand the human, technical, and legal implications of the new federal transportation bill.*

### Enhancement of Existing Funding Programs

A key challenge is to ensure that successful programs such as CMAQ move forward in a direction that funds projects—including land use projects—which offer the most cost-effective, lasting air quality improvements. This could include for example, allowing public-private partnerships that can result in more funding for public transportation and other programs that promote, biking, and walking. A more direct way to implement land use measures using CMAQ would be to allow MPOs to apply for CMAQ funding directly, as long as the projects awarded address the impacts of land use and transportation. This would allow to progressive MPOs to receive funds for transit or maintenance programs and limit access to state DOTs who have a propensity to use money to fund highway/road building projects. *Funders could address this by working with a small subset of progressive MPOs and DOTs to explore, through case studies or face-to-face meetings, such approaches to funding smarter growth strategies.*

### New National Ambient Air Quality Standards

The EPA is in the process of revoking the existing 1-hour ozone standard designations years in advance of the time when attainment SIPs will be in place under the new 8-hour ozone standard. The new 8-hour ozone standard shifted 31 areas into non-attainment status for the first time.<sup>54</sup> The MPOs for these areas are learning new and often complex conformity regulations, making the issue of SIP and TIP conformity more relevant than ever for MPOs and state DOTs.<sup>55,56</sup>

Environmental groups have raised concerns about the potential for backsliding on existing clean air protections in the transition to the new NAAQS. 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. *Funders might consider funding initiatives to ensure that there is minimal backsliding on existing pollution control strategies in the transition to the new air quality standards and to educate the public and MPO stakeholders about how best practices in emission monitoring and control can be applied to promote more timely attainment of new air quality standards and protection of public health.*

## Conclusion

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The EPA inspector general released a report in the fall of 2004 highlighting the lack of progress by states on smog reductions.<sup>57</sup>

The report states that, “many of the most polluted metropolitan areas are still struggling to attain the EPA’s 1-hour ozone standard established over 25 years ago.”<sup>58</sup>

Given that the more stringent 8-hour standard will come into effect soon, states are going to have even more trouble meeting their targets. The new standards, coupled with the growth of driving that shows no signs of slowing as public policies and investments encourage land development to continue its unabated growth into the countryside, means that air quality is going to become an even more pressing issue in the coming decade. The business-as-usual approach to reducing

vehicle emissions and to land use planning is incapable of mitigating the health and environmental impacts of air pollution.

Planning that integrates land uses, requires building at densities sufficient for effective public transit, includes greater use of market incentives (such as pay-as-you-drive insurance and electronically collected time-of-day-tolls to manage existing and new highways more efficiently), and favors non-motorized trips over vehicle trips is what is needed to reduce vehicle miles traveled and to make a real improvement in air quality. To achieve this end goal, federal and state policy, funding programs, and regional and local land use and transportation plans all need to be integrated to improve and reflect the connections among air quality, land use, and transportation.



## Endnotes

1. The authors hold the following positions at the Center for Clean Air Policy (CCAP): Steve Winkelman, manager of transportation; Greg Diekers, policy analyst; Erin Silsbe, consultant; Mac Wubben, policy associate; and Shayna Stott, planning intern. Special thanks to those who provided peer review, including: Michael Replogle, Environmental Defense; Trip Pollard, Southern Environmental Law Center; Steve Dunn, U.S. EPA Office of Atmospheric Programs; and Jon Jensen, The George Gund Foundation.
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50. <http://www.socalcompass.org/about/report/pdf/fullreport.pdf>.
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*Community Development and Smart Growth: Stopping Sprawl at its Source*, August 2003.  
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*Health and Smart Growth: Building Health, Promoting Active Communities*, February 2003.  
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*Opportunities for Smarter Growth: Social Equity and the Smart Growth Movement*, December 1999.

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*Environmentalism and Smart Growth: Forging a New Consensus*, April 2003.  
*Community Organizing: A Populist Base for Social Equity and Smart Growth*, November 2002.



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