

Getting Back on Track:

Aligning State Transportation Policy with Climate Change Goals



Authors

Neha Bhatt, *Smart Growth America*
Colin Peppard, *Natural Resources Defense Council*
Stephanie Potts, *Smart Growth America*



About NRDC

The Natural Resources Defense Council is an international nonprofit environmental organization with more than 1.3 million members and online activists. Since 1970, our lawyers, scientists, and other environmental specialists have worked to protect the world's natural resources, public health, and the environment. NRDC has offices in New York City, Washington, D.C., Los Angeles, San Francisco, Montana, and Beijing. Visit us at www.nrdc.org.

About Smart Growth America

Smart Growth America is the only national organization dedicated to researching, advocating for and leading coalitions to bring smart growth practices to more communities nationwide. From providing more sidewalks so people can walk to their town center to ensuring that more homes are built near public transit or that productive farms remain a part of our communities, smart growth helps make sure people across the nation can live in great neighborhoods.

Acknowledgments

This report has been generously supported by The Kresge Foundation, The Surdna Foundation, The Rockefeller Foundation, and The Oak Foundation.

The authors would like to thank the following individuals who contributed greatly to the development of this report: Nadia Akbar, Smart Growth America; Geoff Anderson, Smart Growth America; Rayla Bellis, Smart Growth America; Deron Lovaas, Natural Resources Defense Council; Kate McMahon, Friends of the Earth; Ilana Preuss, Smart Growth America; and Will Schroeer, Smart Growth America.

The authors would also like to thank David Burwell of the Carnegie Endowment for International Peace, Lilly Shoup of Transportation for America, and Steve Winkelman of the Center for Clean Air Policy for their close review of drafts of this report.

Special thanks also to the following people for their time, advice, and support at various stages: Patrick DeCorla-Souza, U.S. Department of Transportation; Angela Fogle Jacobs, Federal Highway Administration; Allen Greenberg, U.S. Department of Transportation; Dave Grossman, Green Light Group, LLC; Elizabeth Hogan, David Gardiner & Associates, LLC; Justin Horner, Natural Resources Defense Council; Michael Koontz, U.S. Department of Transportation; Kate Matice, Federal Transit Administration; Margo Pedroso, Safe Routes to School National Partnership; Stefanie Seskin, National Complete Streets Coalition; Jessie Yung, U.S. Department of Transportation

The authors are also deeply appreciate for the communications efforts of Alex Goldschmidt of Smart Growth America and Suzanne Struglinski of the Natural Resources Defense Council.

NRDC Director of Communications: Phil Gutis

NRDC Deputy Director of Communications: Lisa Goffredi

NRDC Publications Director: Anthony Clark

NRDC Publications Editor: Carlita Salazar

Production: Tanja Bos

Table of Contents

I. Executive Summary	2
II. Introduction	4
III. U.S. Transportation Emissions and Climate Change Goals	5
IV. State Policy Drives Transportation Emissions	6
A. Infrastructure Decisions Drive Travel Choices and Emissions.....	6
B. Policy and Investment Decisions Shape Transportation Infrastructure.....	6
C. States Are at the Nexus of Transportation Decisions.....	7
D. Federal Policy Influences State Actions.....	8
V. Evaluating State Transportation Policies	10
A. Methodology, Evaluation, and Analysis.....	10
1. Infrastructure Policy Criteria.....	11
2. Infrastructure Policy Evaluation and Analysis.....	14
3. Investment Decision Criteria.....	20
4. Investment Decision Evaluation and Analysis.....	23
5. Touchstone Policy Criteria.....	25
6. Touchstone Policy Evaluation and Analysis.....	27
B. Overall State by State Scores.....	44
VI. Conclusion and Policy Recommendations	31
A. Conclusion.....	31
B. State Policy Recommendations.....	31
C. Federal Policy Recommendations.....	32
D. Recommendations for Further Research.....	35
Endnotes	31
VII. Appendices	39
A. Appendix A: Methodology.....	39
1. Infrastructure Policy Criteria.....	40
2. Investment Decision Criteria.....	46
3. Touchstone Policy Criteria.....	51
B. Appendix B: Moving Cooler Strategy Chart.....	53
C. Appendix C. Analysis of State Smart Growth Laws and Policies.....	54
D. Appendix D: Co-benefits of Reducing Transportation GHG Emissions.....	61
1. Public Health Benefits.....	61
2. Additional Environmental Benefits.....	62

I. Executive Summary

With a comprehensive climate bill stalled at the federal level, many are turning to the states to make progress toward reducing carbon emissions. Are the states ready? To succeed, many sectors will need to reduce their carbon emissions. This report examines what states are doing to curb emissions caused by transportation. As such, it is the first report to look at state transportation policy as it affects greenhouse gas emissions and compare performance across the states.

State transportation policy has the potential to significantly reduce greenhouse gas (GHG) emissions while also effectively meeting the nation's wide-ranging mobility needs. Few studies have specifically sought to evaluate how states' transportation policies impact GHG emissions. This report seeks to build on the work of *Moving Cooler*, a 2009 report by Cambridge Systematics, which quantified the carbon reduction benefits of various transportation strategies. The analysis here evaluates how well state-level transportation decisions are aligned with efforts to reduce GHG emissions by examining a selection of key transportation policies currently in place in the 50 states. The findings suggest that there is tremendous potential for states to make progress on reducing transportation-related carbon emissions. The report's recommendations suggest ways states can improve their climate performance while meeting their mobility needs.

“There is tremendous potential for states to make progress on reducing transportation-related carbon emissions.”

Greenhouse Gases From Transportation Are a Growing Problem

Presidents Barack Obama, George W. Bush, Bill Clinton, and George H.W. Bush have each called for reductions in GHG emissions, yet nationwide emission rates have steadily increased, rising 27 percent between 1990 and 2007. Nearly *half* of the net increase has been due to increasing emissions from the transportation sector, which today accounts for 32 percent of the country's total carbon emissions according to the U.S. Energy Information Administration. Without bringing down transportation emissions, it will be impossible to achieve the reductions scientists have deemed necessary to avoid the worst effects of climate change. Between 1977 and 2001, driving in the United States measured in vehicle miles traveled (VMT), grew by 151 percent. Average trip lengths, trips per capita and the proportion of drivers traveling alone also increased, all of which have contributed to rising emission rates.

Innovations leading to more efficient vehicles and new, cleaner fuels could mean large reductions in GHG emissions, but the projected 50 percent increase in VMT between 2005 and 2030 would undermine much of the savings these technologies would earn. Without changes to the transportation sector, it will be impossible to achieve the emissions reductions necessary to avoid the worst effects of climate change.

State Transportation Policies Do Not Manage Carbon Emissions, and Often Make Them Worse

States are in a unique position to bring down transportation-related GHG emissions, given their primary role in setting statewide transportation policy and directing large amounts of transportation funding. This report seeks to better understand the patterns and impacts of current state transportation policies and investment decisions in all 50 states.

The results of the analysis are sobering: most states use few of the available transportation policy tools to reduce GHG emissions from the transportation sector, and in most cases make decisions that will likely increase emissions. No state received a higher grade than “B-,” and most states scored lower than “D,” demonstrating a

lack of alignment between transportation and climate policies. Most states do not make any effort at all to connect transportation policy with climate change and energy goals, and some put in place systems that effectively sabotage these goals. In sum, current transportation policy in most states will likely worsen GHG emission trends in the United States.

The Transportation Sector Can Deliver Major Reductions in GHG Emissions

Because states shape transportation decisions to such a large degree, changes at the state level are critically important. Conflicts between GHG reduction goals and transportation policies at the state level will hinder progress toward reducing emissions, just as aligning these policies will encourage it. All 50 states can take individual action to better align their transportation policies with climate change goals. The following strategies can help dramatically change the trajectory of climate change while improving travel choices for Americans. States should:

- Balance state transportation investments by using state and federal resources to support robust public transportation service, prioritize highway repair and safety over new capacity, support non-motorized transportation, and ensure state fuel taxes can support all transportation modes.
- Manage traffic through congestion pricing tools and incentivize low-carbon transportation options through comprehensive commuter programs.
- Link transportation and land use in transportation plans, implement smart growth and growth management policies, and promote transit oriented development.
- Set a course to reduce emissions by setting per capita transportation GHG or VMT reduction targets.

Federal transportation policy also has a strong influence on state and local transportation decisions and current federal policies may be contributing to the lack of progress in the states. Therefore, along with reform at the state level, changes to federal transportation policy are essential. Congress and the White House must work to align transportation policy more directly with national climate and energy goals. The following policies would strengthen the country's transportation network and reduce carbon emissions. The federal government should:

- Set specific GHG emissions reduction targets for the transportation sector.
- Establish GHG emission impacts from transportation plans and projects as a criterion for receiving federal aid.
- Update transportation financing and funding formulas to reward reductions in driving, VMT, and fuel consumption, instead of rewarding increases in these areas, as is the current practice.
- Prioritize cleaner transportation modes throughout all programs and policies.
- Dedicate revenue from GHG fees to fund clean transportation investment.

While significant power to implement change rests in the hands of individual states, the results of this report show that most will not seek to curb emissions from transportation sector without federal leadership and guidance. Together, federal and state leaders can make the nation's climate and transportation goals mutually supportive, but it will require action at both levels.

II. Introduction

In recent years, two important and related trends have emerged with respect to U.S. transportation infrastructure policy. First, transportation policy experts from across the political spectrum have generally come to agree that the nation's transportation policies must become more performance-based and outcome-oriented. Second, it has become clear that there is an important link between transportation infrastructure decisions and the emission of the greenhouse gases (GHG) that cause climate change. Since reducing GHG emissions is an important national objective and nearly one third of the country's GHG emissions come from the transportation sector, energy use and GHG emissions should be among the metrics used to evaluate overall transportation performance.

Implementing a performance-based transportation policy that supports GHG reduction goals will require regular assessment of emissions trends and the major factors that drive them. This information would help state decision-makers and transportation officials to adopt policies and practices that meet both mobility and climate change goals. States should know which tools offer the best mobility and GHG reduction benefits and thus contribute to high system performance. This requires understanding how well current policies of state transportation departments perform with respect to GHG emissions.

While transportation performance and transportation GHG emissions have been the subject of much study and debate, relatively little has been done to connect these two issues through actual evaluation of state transportation policy with respect to climate change. This report seeks to bridge that gap by evaluating the 50 states based on the degree to which they have implemented policy and investment decisions that have been shown to reduce transportation-based GHG emissions.

This report assesses the extent to which each state's transportation policy framework supports reduction of GHG emissions. Seventeen policy and investment criteria are evaluated to collectively provide an indicator of state performance with respect to the likely impact of state transportation decisions on GHG emissions. The results indicate which states are making transportation decisions that are likely to reduce GHG emissions, offering a method of assessing each state's relative performance in achieving such an objective. For the purpose of this report, a state's transportation policy is understood to be the collection of executive, legislative, and administrative decisions that together define what transportation projects are built, how they are designed, and how they are managed to provide mobility options to residents and other travelers.

It is important to note that this report does not suggest that GHG emissions trends are the only metric that should define transportation performance. On the contrary, efforts to reduce GHG emissions through transportation strategies must be balanced with other important goals such as mobility, access, connectivity, economic development, congestion, public health, and other environmental impacts. The policies evaluated in this report have been shown contribute to these other goals as well. (For a review of such benefits, see Appendix D. For a thorough discussion of the economic benefits of these strategies, see the Center for Clean Air Policy 2009 report *Cost-Effective GHG Reductions through Smart Growth & Improved Transportation Choices* or the forthcoming CCAP report *Growing Wealthier: Smart Growth, Climate Change and American Prosperity*).

Further, it is important to recognize that, in the course of evaluating many heterogeneous states in a consistent way, this report makes certain generalizations and assumptions that do not incorporate some of the unique geographic, demographic, and economic characteristics of certain areas. Different transportation strategies will achieve varying degrees of success in reducing emissions based on the characteristics of a state, such as population growth rate, the extent and nature of its existing built environment, rate of development, economic profile, and the size of its urban, suburban, and rural areas.

III. U.S. Transportation Emissions and Climate Change Goals

Reducing greenhouse gas (GHG) emissions in the transportation sector is an important path to meeting national climate change and energy independence goals. Currently, 32 percent of the country's carbon dioxide emissions—the main greenhouse gas—originate from the transportation sector, making it the nation's second largest end-use source, after electricity generation.^{1,2} The U.S. transportation sector's share of global GHG emissions is larger than the *overall* emissions of any nation, with the exception of China and Russia.³ In order to meet the emissions reduction targets that scientists call for to avoid the worst impacts of global warming, it is necessary to achieve significant GHG reductions in the transportation sector.

Unfortunately, the current policy framework guiding the development of U.S. surface transportation infrastructure fails to take GHG emissions into account. As a result, transportation accounted for 47 percent of the net increase in total U.S. emissions since 1990, making it the fastest growing source of emissions through 2007.⁴ Poor traffic and congestion management, underinvestment in efficient transportation options, and failure to coordinate transportation plans with local land use are just some of the policy failures that produce significant inefficiencies in our transportation system.⁵ Endemic congestion in metropolitan areas and along freight corridors exacerbates this inefficiency. As a result, petroleum consumption by personal vehicles accounts for 60 percent of transportation-related GHG emissions in the United States, with an additional 20 percent coming from freight trucks.⁶

Projections show emissions from the transportation rising further in coming decades, consistent with past trends. Between 1977 and 2001, the U.S. population grew by 30 percent; driving rates, measured in vehicle-miles traveled (VMT), grew by 151 percent.⁷ In this same time period, average trip lengths, trips per capita, and the proportion of drivers traveling alone each increased.⁸ While such growth trends have abated somewhat in recent years, they are still pronounced: between 1990 and 2007 VMT in the United States rose twice as fast as its population. National VMT is projected to increase by 50 percent between 2005 and 2030.⁹ The corresponding increase in GHG emissions would undermine the emissions savings achieved through improved vehicle efficiency and transitions to cleaner transportation fuels.¹⁰

These trends are not inevitable, and in part result from policy choices made at the federal, state, and local levels. The 2007 study, *Growing Cooler: The Evidence on Urban Development and Climate Change*, published by the Urban Land Institute, surveyed decades' worth of data to examine the relationship between transportation, land development patterns, and GHG emissions. *Growing Cooler* found that more efficient, compact developments allow residents to drive 20 to 40 percent less, which could result in significant GHG reductions.¹¹

The 2009 companion study, *Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions*, produced by leading transportation experts at the consulting firm Cambridge Systematics, evaluated the effectiveness of a broad suite of transportation strategies to reduce transportation sector emissions nationwide, and found significant potential. The report found that a comprehensive set of transportation policy tools deployed at the maximum level could reduce transportation emission from the projected baseline levels by 24 percent by 2050, many with a net economic benefit. Further, the report showed that many of these policies would be even more effective when coupled with an economy-wide cap or limit on GHG emissions, which has been the subject of recent national and Congressional debate. When paired with a carbon price, the maximum emissions reduction potential of the transportation policies studied in *Moving Cooler* more than doubles to 52 percent.¹²

IV. State Policy Drives Transportation Emissions

A. Infrastructure Decisions Drive Travel Choices and Emissions

Where and how we invest in transportation infrastructure has a significant impact on regional travel patterns and associated emissions. For example, detailed modeling has shown that a six-lane, 18-mile, tolled outer beltway being built in suburban Maryland north of Washington D.C. will increase GHG emissions in the entire Washington metropolitan area by 11 percent in 2030. By comparison, a proposed alternative to the facility involving public transportation and land use measures could have cut emissions 5 percent below the baseline level.¹ Although the new highway was intended to relieve congestion on local roads, it will actually create more traffic by triggering sizable changes in the local travel demand patterns. *Moving Cooler* reinforces these findings: analysis showed that eliminating traffic bottlenecks with new road capacity yields short-term emissions reductions, but increases in traffic on and around the facility will eventually overtake these benefits by a phenomenon known as induced demand.²

Transportation investments can also be leveraged to drive significant growth and development without associated increases in auto use and resulting emissions, as demonstrated in Arlington County, Virginia. When the Washington-area Metro subway was first being built, Arlington chose to route the Orange Line along its main business arterial, rather than along the adjacent interstate highway, as was originally proposed. Officials zoned for mixed-use development along the new Metro corridor and other public transit lines, improved the quality of other travel choices and information, and expanded transportation demand management programs. Commercial, office, and residential development increased over the next few years and have continued decades later. Despite steady population growth, with more people able to ride transit, bike, or walk for some of their trips, there is actually less traffic volume on many roads in the county than in there was in 1996.³ Arlington County made strategic infrastructure decisions that expanded choices, mobility, access and economic development, and also minimized carbon emissions. Today, Arlington is a desirable community providing several successful commercial corridors and housing options ranging from single-family homes and row houses to condos and apartments.

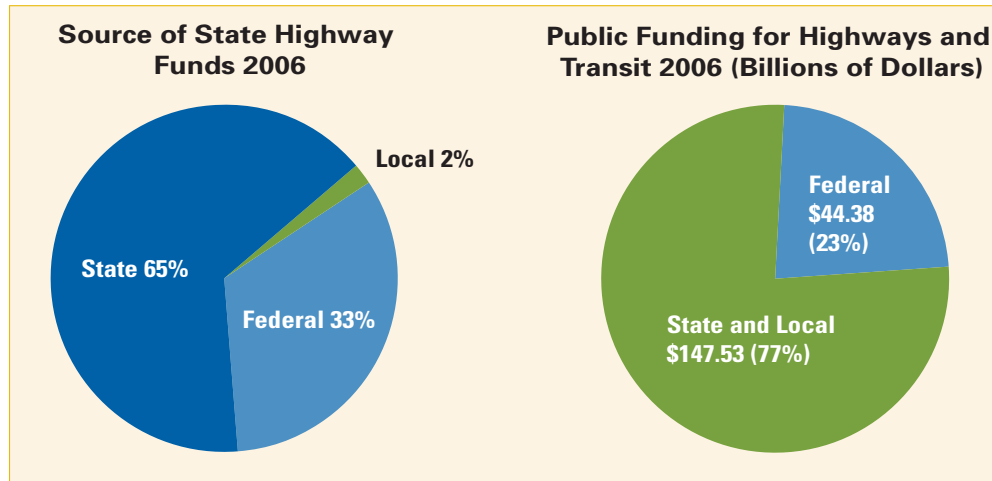
B. Policy and Investment Decisions Shape Transportation Infrastructure

The examples above show how infrastructure decisions can influence transportation-related GHG emissions. Such individual infrastructure decisions are influenced by broader transportation policy and investment decisions. These two factors play major roles in the selection, design, and location of transportation projects. Transportation policy decisions primarily influence the modal selection, design, location, and scope of a transportation project. Transportation investment decisions further influence project location and design. More importantly though, these investment decisions also determine the priority of any particular project relative to other projects, which are typically competing for funding, as well as the overall emphasis a state puts on particular transportation strategies or modes.

Together these elements—policy and investment decisions—have a major influence on a state’s portfolio of transportation projects, and will in large part determine what projects will be planned and built in the future. By surveying each state’s transportation policy and investment decisions, this report seeks to evaluate whether existing and future transportation infrastructure decisions are likely to result in the reduction of transportation-related GHG emissions.

C. States are at the Nexus of the Nation's Transportation Decisions

Federal, state, and local governments all play a role making transportation policy and investment decisions. The federal government distributes funding to states, subject to federal planning requirements, through various transportation programs. Municipalities make decisions on the regional and local scale, customizing transportation networks to meet their specific community, economic, and geographically needs.



Source: FHWA 2008 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance

However, states have a variety of unique roles and responsibilities that place them at the nexus of this joint responsibility. States play the lead role in establishing and administering overarching goals, standards, and policies for their regions and municipalities. States receive tens of billions of dollars in annual federal transportation grants. Combined with revenue from state fuel taxes, states oversee and distribute a greater amount of transportation funds than any other level government. States determine how these funds will be allocated geographically and prioritize infrastructure options, modes, and facilities, which in turn trigger different local infrastructure decisions and land development patterns. Each state has an executive agency or department that has responsibility for transportation planning, programs (including maintenance, safety, and environmental review), project implementation and construction, and in some cases operations, for multiple modes of transportation. The state departments of transportation (DOT) also collaborate with other transportation authorities, including tolling authorities, transit agencies, ports, and local governments (including specially designated districts), each of which are responsible for different portions of the transportation network. State transportation departments often have the lead responsibility for major infrastructure planning decisions, as well as the task of overseeing the design, review, and construction of a project, and ensuring compliance with any applicable federal standards or policies.

These powers and responsibilities position states as the dominant players in the transportation policy and investment decision-making process, determining the trajectory of the transportation system, land development, and transportation-related GHG emissions.

STATE OFFICIALS DERAIL NEW YORK CITY'S CONGESTION PRICING INITIATIVE

New York City Mayor Michael Bloomberg unveiled a comprehensive city-wide sustainability plan called PlaNYC in April of 2007. The plan included a set of transportation initiatives to improve air quality, reduce congestion, and invest in needed public transportation, pedestrian, and bicycle improvements. The most notable and potentially transforming initiative was a congestion pricing program for downtown Manhattan, modeled from downtown London's successful "congestion charging" zone, which resulted in a 15 percent reduction in traffic and 30 percent reduction in travel time within the zone.

NYC's proposed congestion pricing program would have charged drivers entering the Manhattan Central Business District a fee of \$8 during the most congested part of the day, between 6 a.m. and 6 p.m. Analysis showed that the policy would loosen gridlock by deterring unnecessary driving. The funds generated from this program would have been dedicated to repairing and improving the city's public transportation service. The program's implementation would have allowed the city to receive more than \$300 million in discretionary funding under the Bush Administration's Urban Partnership Agreement and Congestion Reduction Demonstration Program.

The New York City Council approved the program in April 2008, but the state legislature killed the program by refusing to bring the proposal up for a vote. Unable to forward with the program, the city lost the promising mobility and GHG reduction benefits, as well as the sizable federal grant available for implementation.

The New York State Legislature's failure to allow New York City to implement congestion pricing is just one example of state action inhibiting innovative local and regional greenhouse gas reduction policies.

D. Federal Policy Influences State Actions

Despite the dominant role that states play in the transportation decision-making process, federal policy also has substantial influence on such transportation decisions. Federal dollars have always been a significant source of funding for major transportation projects and initiatives. Since the 1950s, the federal contribution to capital investment, operations, and maintenance of U.S. highways has been on average about 25 percent.⁴ Many individual projects have a much larger federal share.

Federal funding also supports capital expansion and maintenance of public transportation systems. Since 1988, about 18 percent of federal surface transportation funds have gone to transit projects.⁵ However, the amount of state or local matching funds required for transit projects is notably higher than the match required for highway projects. For example, until very recently, to qualify for funding allocated under the New Starts program, the Federal Transit Administration required a 50 percent local match on new public transportation investments.⁶ By comparison, Federal-Aid highway funds, which provide assistance to the states for the construction, reconstruction, and improvement of eligible highways and bridges, generally require a only 20 percent local match.

Federal policies like these encourage states and municipalities to build transportation modes that are relatively more carbon-intensive by influencing infrastructure investment decisions. This creates a disincentive for states to develop public transportation options, which would support climate change and energy goals. Another such example can be found in the formulas used to allocate federal transportation funds to the states. A large portion of federal-aid funding is distributed to states according to formulas based on three factors: VMT, fuel consumption, and highway lane miles. If any of these factors increases, it will result in more federal dollars for the state, even though the state

would be increasing its carbon emissions. Such a formula rewards states for increases in these metrics, each of which is at odds with sound climate change policy.⁷

While the following section evaluates state transportation policy and investment decisions, which have the largest degree of influence over transportation decisions, the influence that federal transportation policy has in shaping a state's decisions must not be underestimated.

V. Evaluating State Transportation Policies

Methodology, Evaluation, and Analysis

This report evaluates each state based on 17 policy and spending criteria that have been shown by expert analysis to achieve transportation sector GHG reductions. States can also implement these criteria independent of local or federal action and each criterion has successfully been adopted in one or more states. The selected evaluation criteria fall into three categories:

- **Infrastructure Policies**—These are policies that result in specific changes to transportation infrastructure projects and associated land use patterns, or that change the way people use infrastructure through pricing and other incentives. This category evaluates a state’s *overall* policy framework, including how it uses innovative policy tools to improve transportation system efficiency while reducing its climate impact.
- **Investments Decisions**—This category of evaluation criteria tests the degree to which states support their overall policy intentions with corresponding investment decisions. Do states direct their transportation dollars in ways that support and promote low-carbon transportation? The investment criteria look at such things as whether a state takes advantage of the programmatic flexibility of federal funds, uses state funds to invest in cleaner transportation projects, and maintains its existing assets in a state of good repair. These criteria are used to evaluate the state’s overall performance in *implementation and support* of lower carbon transportation policies.
- **Touchstone Policies**—These policies show the depth of a state’s intention to reduce transportation sector emissions. Examples of touchstone policies include establishing a statewide VMT reduction target or adopting stringent carbon emission standards for vehicles. Having these policies on their own may not directly reduce GHG emissions or affect infrastructure decisions, but they are important indicators of the level of recognition by a state that transportation policies affect GHG emissions, and the commitment of the state to reducing emissions from transportation.

For both the Infrastructure Policy and Investment Decisions categories, a state earned points based on how well it met each of the individual evaluation criterion. The criteria within each category were weighted based on their estimated impact on GHG emissions as determined by the *Moving Cooler* analysis.¹ Criteria in the Touchstone Policies do not lead directly to GHG reductions, but do signal the state’s commitment to reducing emissions via other policy decisions. Therefore each state meeting these criteria was allocated bonus points on top of its base Policy and Investment scores. This bonus aims to recognize clear intentions of state policymakers to reduce transportation-related carbon emission. Each state’s final score was calculated by the averaging the Policy and Investment scores and adding earned Touchstone bonus points to that average.

The criteria in each category are described below. A more thorough discussion of each of the criteria selected and how it was evaluated in the report can be found in Appendix A.

1. INFRASTRUCTURE POLICY CRITERIA

States were evaluated under the following criteria to determine their Infrastructure Policy score. These criteria can be grouped into three sub-categories. The first set includes policies that expand transportation options by changing the physical infrastructure of the transportation network to increase lower-carbon transportation facilities. The next sub-category includes policies that provide consumer incentives for cleaner transportation options. The final sub-category includes policies intended to link land use and transportation decisions, in terms of both on the planning and project implementation. Figure 1 describes the points allocated to each of the Infrastructure Policy criteria.

Table 1 summarizes how each state scored in the Infrastructure Policies category.

Description and Justification of Infrastructure Policy Criteria

The Infrastructure Policy criteria included in the report are described below.

Increasing Transportation Options

- ***Complete Streets Design Policy***

A Complete Streets Design policy ensures that road and street projects are designed and built with all users in mind, requiring planners and engineers to consider how and when to incorporate facilities like sidewalks, bike lanes, wheelchair ramps, and bus pull-offs. This approach results in streets and roads that provide safe and convenient travel for drivers, transit users, pedestrians, and bicyclists, as well as for seniors, children, and people with disabilities. According to the most recent National Household Transportation Survey, completed in 2001, half of all trips in metropolitan areas are three miles or less (within easy biking distance) and one-quarter are one mile or less (within easy walking distance). Yet 65 percent of very short trips (under one mile) are made by automobile, often due to the lack of convenient, safe, and adequate infrastructure for walking, biking, or taking transit.² Complete Streets policies would allow more of these short trips to be made on foot or bike, expand the reach of transit systems, cut down on automobile trips, and provide air quality benefits and carbon reductions.

- ***State Safe Routes to School Program***

Safe routes to school programs improve the safety and connectivity of pedestrian and bicycle networks around schools and educate and encourage children to walk and bike to school. Many parents drive their children to school each day, even for short distances. In one generation, the percent of children walking to school dropped significantly—from about 50 percent in 1969 to just 15 percent in 2001.³ Studies show that if the country returned to the 1969 level of walking and bicycling to school, VMT would be reduced by 3.2 billion miles, which translates to an annual savings of 1.5 million tons of carbon dioxide, the equivalent of taking more than 250,000 cars off the road for a year.⁴

- ***Bicycle and Pedestrian Master Plans***

Bicycle and pedestrian master plans indicate whether the state department of transportation is evaluating and planning for the needs of non-motorized users. Master plans are also important in prioritizing infrastructure investments and ensuring there are uninterrupted networks of walkable, bikable streets. While *ad hoc* improvements may be useful on a granular scale, walking and bicycling do not become real options for people unless there are reliable, safe, and completed networks in place.

Incentives for Cleaner Transportation

■ *Pay-As-You-Drive (PAYD) Insurance*

Currently, those who drive 300 miles a month pay about the same insurance rates as those who drive 3,000 miles even though the costs to society and corresponding emissions are 10 times higher. Mileage- or usage-based insurance programs reward more efficient travel habits by tying the cost of an auto insurance policy to the frequency, timing and overall amount of driving of the covered vehicle. This empowers drivers to control their insurance costs by leveraging different travel choices and rewards those who consolidate errands or decrease their overall driving. The Brookings Institution estimates that if all motorists bought accident insurance based on miles driven, rather than conventional lump-sum insurance, driving would decline by 8 percent nationwide, reducing total U.S. carbon emissions by 2 percent and oil consumption by about 4 percent in a short period of time.⁵

■ *Variable Road Pricing*

Variable road pricing is a dynamic pricing system that charges based on time of day or congestion level as opposed to applying the same flat fee regardless of the rate of demand or time of day. Also known as *congestion pricing* or *demand-based pricing*, it promotes more efficient use of existing road capacity by deterring discretionary drivers during peak hours and encouraging the use of other transportation options. Variable pricing is one of the most powerful tools for managing traffic and breaking gridlock. Several states have implemented variable pricing on major highways. Tolling is an effective way to manage demand on heavily used roadways, and it is even more powerful when the revenues are directed toward increasing other transportation options such as carpool programs, commuter buses and other forms of public transportation.

■ *Commuter Incentives*

Incentives or programs that encourage commuting to work using alternatives to driving alone are effective transportation policy options that reduce greenhouse gas emissions, oil consumption, and traffic congestion. States have a wide range of programs that promote alternatives to driving alone to work. These range from tax incentives for telecommuting to ride-matching programs to support of employer based commute trip reduction programs.

Linking Transportation and Land Use

■ *Smart Growth and Growth Management Policies*

Smart growth and growth management policies are put in place to promote compact development, provide housing and transportation options, and protect open space. These policies facilitate development that allows people to lower their transportation carbon footprint by living closer to work, school, services, and businesses and having easy access to many clean transportation choices such as public transit, walking and biking. Policies included in this category range from urban growth boundaries to state planning efforts to open space protection. A detailed summary of state smart growth programs is available in Appendix C.

■ *Transit Oriented Development Incentives*

Capitalizing on public transportation by concentrating commercial and residential development around transit stations reduces VMT, creates jobs, spurs development, and increases transit ridership. States policies include economic development grants, investment zones, and special TOD financing mechanisms.

FIGURE 1: POINT ALLOCATIONS - INFRASTRUCTURE POLICIES		
Policy	Max. Points	Point Allocation
Increasing Transportation Options		
<i>Complete Streets Design Policy</i>	17	A state receives 17 points for having a law in place requiring Complete Streets Design. A state receives 15 points for having an administrative or agency-level Complete Streets design policy.
<i>State Safe Routes to School Program</i>	5	A state receives 5 points for providing additional non-federal funding to a state-level Safe Routes to School program.
<i>Bicycle and Pedestrian Master Plan</i>	3	A state receives 3 points for having a bicycle and pedestrian master plan.
Incentives for Cleaner Transportation		
<i>Pay-As-You-Drive (PAYD) Insurance</i>	15	A state receives 15 points for allowing insurance companies to offer a PAYD insurance option.
<i>Variable Road Pricing</i>	6	A state receives 6 points for having at least one existing or planned road facility with variable pricing.
<i>Commuter Incentives</i>	24	A state can receive a maximum of 24 points for its commuter programs. A state can receive: 8 points for programs that applied to several transportation modes and 4 points or those limited to one mode; 8 points for statewide policies or 4 points for policies that were limited to certain regions or otherwise restricted by area; 8 points for direct subsidies or services or 4 points for tax incentives.
Linking Transportation and Land Use		
<i>Smart Growth and Growth Management Policies</i>	20	A state can receive a maximum of 20 points for having a Smart Growth or growth management policy in place. A state with a comprehensive, well-implemented policy in place receives 20 points. A state receives 15 points for having a moderately effective or partially implemented policy in place. A state receives 10 points for having a policy with limited effectiveness or implementation. (See appendix for evaluation of state policy effectiveness/ implementation)
<i>Transit Oriented Development Incentives</i>	10	A state receives 10 points for having a program in place to promote transit-oriented development.

2. INFRASTRUCTURE POLICY EVALUATION AND ANALYSIS

TABLE 1: INFRASTRUCTURE POLICY SCORES													
		INCREASING TRANSPORTATION OPTIONS				INCENTIVES FOR CLEANER TRANSPORTATION				LINKING TRANSPORTATION AND LAND USE			Policy Score
		Complete Street	Safe Routes to School	Bike/Pedestrian Master Plans	Subtotal	Pay-As-You-Drive Insurance	Variable Road Pricing	Commuter Incentives	Subtotal	Smart Growth/Growth Mgmt. Policies	Transit Oriented Development Incentives	Subtotal	
1	NJ	15	5	3	23	15	6	24	45	15	10	25	93
2	MD	17	0	3	20	15	6	24	45	15	10	25	90
3	OR	17	0	0	17	15	0	24	39	20	10	30	86
4	CA	17	5	0	22	15	6	12	33	20	10	30	85
5	MA	17	5	3	25	15	4	20	39	10	10	20	84
6	CT	17	0	3	20	15	0	20	35	10	10	20	75
7	MN	17	0	3	20	15	6	20	41	10	0	10	71
8	IL	17	0	0	17	15	6	20	41	10	0	10	68
9	WA	0	5	0	5	15	4	24	43	20	0	20	68
10	VA	15	0	0	15	15	6	16	37	15	0	15	67
11	WI	17	0	3	20	15	0	24	39	0	0	0	59
12	VT	17	0	3	20	15	4	0	19	15	0	15	54
13	HI	17	0	3	20	15	0	0	15	15	0	15	50
14	RI	17	0	3	20	15	4	0	19	10	0	10	49
15	AZ	0	5	3	8	15	0	24	39	0	0	0	47
16	DE	15	5	3	23	0	4	20	24	0	0	0	47
17	PA	15	0	3	18	15	4	0	19	0	10	10	47
18	FL	17	0	0	17	15	4	0	19	10	0	10	46
19	GA	0	0	3	3	15	4	24	43	0	0	0	46
20	NV	0	5	3	8	15	4	0	19	15	0	15	42
21	KY	15	5	0	20	15	4	0	19	0	0	0	39
22	CO	17	0	0	17	15	6	0	21	0	0	0	38
23	NM	0	0	3	3	15	0	20	35	0	0	0	38
24	LA	15	0	3	18	15	4	0	19	0	0	0	37
25	SC	15	0	3	18	15	4	0	19	0	0	0	37
26	MI	17	0	0	17	15	4	0	19	0	0	0	36
27	TN	15	0	3	18	15	0	0	15	0	0	0	33
28	KS	0	5	3	8	15	4	0	19	0	0	0	27
29	ME	0	5	3	8	15	4	0	19	0	0	0	27
30	OK	0	5	3	8	15	4	0	19	0	0	0	27
31	TX	0	5	0	5	15	6	0	21	0	0	0	26
32	UT	0	0	3	3	15	6	0	21	0	0	0	24
33	ID	0	5	3	8	15	0	0	15	0	0	0	23
34	AK	0	0	3	3	15	4	0	19	0	0	0	22
35	NH	0	0	3	3	15	4	0	19	0	0	0	22

TABLE 1: INFRASTRUCTURE POLICY SCORES (CONTINUED)

		TABLE 1: INFRASTRUCTURE POLICY SCORES (CONTINUED)											Policy Score
		INCREASING TRANSPORTATION OPTIONS				INCENTIVES FOR CLEANER TRANSPORTATION				LINKING TRANSPORTATION AND LAND USE			
		Complete Street	Safe Routes to School	Bike/Pedestrian Master Plans	Subtotal	Pay-As-You-Drive Insurance	Variable Road Pricing	Commuter Incentives	Subtotal	Smart Growth/Growth Mgmt. Policies	Transit Oriented Development Incentives	Subtotal	
36	AL	0	0	0	0	15	4	0	19	0	0	0	19
37	MO	0	0	0	0	15	4	0	19	0	0	0	19
38	OH	0	0	0	0	15	4	0	19	0	0	0	19
39	WV	0	0	0	0	15	4	0	19	0	0	0	19
40	IA	0	0	3	3	15	0	0	15	0	0	0	18
41	NC	15	0	3	18	0	0	0	0	0	0	0	18
42	MT	0	0	0	0	15	0	0	15	0	0	0	15
43	SD	0	0	0	0	15	0	0	15	0	0	0	15
44	NY	0	0	3	3	0	6	0	6	0	0	0	9
45	ND	0	5	3	8	0	0	0	0	0	0	0	8
46	IN	0	0	3	3	0	4	0	4	0	0	0	7
47	MS	0	5	0	5	0	0	0	0	0	0	0	5
48	AR	0	0	0	0	0	0	0	0	0	0	0	0
49	NE	0	0	0	0	0	0	0	0	0	0	0	0
50	WY	0	0	0	0	0	0	0	0	0	0	0	0

Analysis—Increasing Transportation Options

Within the Increasing Transportation Options sub-category, the most states earned points for having a statewide bicycle and/or pedestrian plan, with 30 states receiving 3 points. The criterion where the fewest states fared well was for providing additional non-federal funding to a State Safe Routes to School Program, for which only 15 states received the 5 available points. Only 23 states had a Complete Streets design policy in place, and only 14 of those were codified in state law.

While having specific plans for developing infrastructure projects to accommodate those who choose to travel by methods other than their vehicle is good first step, which more states need to take, it is also clear that many states could be taking this principle further with policies that begin to incorporate standards and procedures to carry such plans out into everyday DOT operation. Examples such as Safe Routes to School, Complete Streets or other similar policies help to ensure states carry out these plans and that residents begin to see a more multi-modal transportation network where they live and work.

Despite progress in many states that pursue one or more of the evaluated policies, on balance, too few states take much responsibility for providing non-highway infrastructure for citizens. Though many of the states that scored poorly have large numbers of residents living in more rural areas, some rurally oriented states such as Kentucky, the Carolinas, and Tennessee scored well. In fact, nearly every state has significant population in areas such as small cities or towns where traditional main streets and downtown centers, as well as newer suburban centers, would benefit from a greater focus on accommodating and promoting non-highway travel.

BURNING CALORIES INSTEAD OF CARBON: COLORADO'S COMPLETE STREETS POLICY

In June 2010, the State of Colorado adopted Complete Streets legislation, making it the 13th state to do so. Sponsored by Representative John Kefalas, the legislation codified a policy unanimously adopted by the Colorado Transportation Commission in October 2009. Now strengthened as law, this policy commits the state to including the needs of bicyclists and pedestrians in “the planning, design, and operation of transportation facilities, as a matter of routine.”

Colorado's policy represents a major step forward in ensuring safety, connectivity, and access for all transportation users in the state, regardless of age, ability, or chosen mode of transportation. They also represent several years of stakeholder meetings between the state's DOT, other state departments, local governments, and user groups like Bicycle Colorado, whose input was carefully gathered and shaped into a broadly-supported policy that will provide Coloradans with more transportation choices.

As a result of the Complete Streets policy, Colorado's DOT is steadily working to make changes in everyday operations. In February 2010, the DOT released a thorough procedural directive, covering everything from planning and design to education and maintenance.

As these new standards and procedures take hold across the state in the form of new facilities and upgrades to existing facilities, Coloradans are sure to see real change on the ground that enhances their ability to travel conveniently, safely, and sustainably.

Analysis—Incentives for Cleaner Transportation

Within the Incentives for Cleaner Transportation sub-category, the most states received credit for allowing auto insurance companies to offer Pay-As-You-Drive (PAYD) policies, with 41 states receiving 15 points for this criterion. Supporting commuter incentives was in place in the fewest states—just 15 states received credit for this criterion.

The analysis in *Moving Cooler* shows that PAYD is one of the most effective policies for reducing GHG emissions from transportation. While there are numerous technological and structural obstacles that need to be overcome to see broad market penetration of PAYD insurance policies, it is important that states, which regulate the auto insurance industry, not stand in the way of this.

Though it is promising that few states restrict this type of insurance policy, more must be done before consumers and the environment can experience the benefits of PAYD. The next step would be for states to proactively work with insurers to overcome obstacles to offering PAYD policies and promoting them through education and incentives, as some states have begun to do (and which will be evaluated in future iterations of this report).

It is disappointing, as well as surprising, that relatively few states support programs or provide incentives to promote alternatives to commuting alone by car. This type of program is among the most effective and readily accessible that state transportation departments can take advantage of to ease rush hour congestion. Moreover, commuter programs are extremely cost-effective compared to increasing capacity, and save money and time for commuters. Commuter programs might be seen as necessary only in congested areas, but by proactively deploying these programs statewide, transportation departments can prevent congestion rather than just mitigating it after the fact, as well as ensuring that all state residents have equal access to the benefits of such programs.

LOW COST, LOW-CARBON MOBILITY: STATE COMMUTER PROGRAMS

Though only about 20 percent of trips are made commuting, they are concentrated in a very short period of time, often leading to high levels of congestion. Therefore, commuting trips represent especially carbon-intensive travel. Programs for commuters directly improve mobility for those who use them, as well as others using less congested roads, reducing pollution including GHG emissions.

Moreover, these programs produce such benefits at relatively low cost. The Washington, D.C.-area Commuter Connections program, funded by the DOTs of Maryland, Virginia, and the District of Columbia, replaces auto trips at 21 cents per trip. Around the country, most commuter assistance programs replace driving at between 1 cent and 6 cents per VMT. Per public dollar, a Transportation Management Organization (TMO) can accommodate the mobility needs of seven times as many commuters than would new highway investment, including in areas without substantial transit.

Recent advances in electronic infrastructure and workplace culture have given DOTs an even lower-cost way to meet mobility needs and reduce emissions. Minnesota DOT estimated that teleworkers remove an estimated 125,000 commute trips per day off of statewide roads, equivalent to the total number of vehicle trips carried by I-394 on a typical weekday.

As a result, the DOT initiated an *eWork* program, in which participating employers now range from small businesses with less than 10 employees to large branches of multinational companies, as well as public agencies and non-profits. The Minnesota DOT finds the program effective at reducing commute trips, vehicle miles traveled, pollution, and travel time and costs.

Analysis—Linking Transportation and Land Use

Overall, states did not score well within the Linking Transportation and Land Use sub-category. Only 15 states received credit available for implementing statewide Smart Growth or growth management policies, and seven states received the 10 points available for offering incentives for transit-oriented development (TOD).

It is unsurprising that states fared poorly in this sub-category. It must be acknowledged that the policies evaluated are in some ways more complicated and difficult for states to implement than those in other sub-categories. Land use is in many ways beyond the scope of control of state transportation departments, since zoning and development decisions are often made by municipal governments. However, state land use guidelines and state-sponsored transportation investments can have a significant impact on local land use patterns, especially programs designed to incentivize and reward projects that coordinate transportation and land uses.

Notwithstanding, analysis in both *Moving Cooler* and *Growing Cooler*, as well as additional analysis from the National Academy of Sciences has demonstrated how linking transportation and land use plans is among the most important steps that can be taken to reduce GHG emissions from transportation.⁶ Further, coordinating transportation and land use plans is useful for maximizing other benefits, such as those described in Appendix D. Some states have undertaken statewide efforts to link transportation and land use. California and Massachusetts have shown, these initiatives can be a collaborative effort with municipalities and local government that yield benefits for all.

Analysis—Overall Infrastructure Policy Score

There are some broad trends and themes that can be observed in the overall Transportation Policy category scores. First, transportation policy is often better aligned with goals to reduce energy use and GHG emissions in states that are also leaders in other areas of climate change policy. Of the 20 states that earned the highest policy scores, most have completed climate change action plans. The top five have committed to significant statewide GHG emission reductions, and have joined regional GHG pollution cap-and-trade initiatives. Fourth-ranked California has enacted the nation's first state economy-wide GHG reduction law. Virginia was an exception to this pattern. It had the 10th highest policy score, even though non-transportation proposals to reduce GHG emissions have been met with skepticism and controversy.

Finally, some states that are leading on climate change action are also taking only very modest steps on adapting transportation policy to support these goals. New York is a member of an active regional GHG pollution cap-and-trade framework, for example, yet the state falls near the bottom of the Transportation Policy category ranking. States such as Vermont, Florida, Rhode Island, and Pennsylvania have all taken significant steps to reduce GHG emissions, and though ranked well, still achieved only half of the available points. In fact, it is troubling that outside of the top six, no state received more than 75 of the available points. Nearly every state has significant opportunity to take further action to better align transportation policy with climate change goals.

CALIFORNIA'S CLEAN TRANSPORTATION GOAL: THE SUSTAINABLE COMMUNITIES AND CLIMATE PROTECTION ACT (S.B. 375)

While states are the primary transportation policy-makers, municipal governments have the greatest jurisdiction over land use. However, coordinating these two sets of decisions is critical to improving the efficiency of the transportation network.

California's landmark Sustainable Communities and Climate Protection Act seeks to link land use decisions to transportation funding. While the concept behind this law might be implemented differently in other states, the general approach is an excellent model for effectively connecting transportation and land use decisions with respect to achieving GHG emission reductions. The key components of this law are:

1. The state sets an overall GHG reduction target for the transportation sector.
2. The state works with regions to establish a regional share of responsibility for meeting those targets.
3. Regions develop growth plans (aided by the state through technical assistance if needed) that demonstrate the agreed level of reductions, balanced with other transportation goals.
4. State transportation funding is then prioritized according to these plans, and development incentives offered to support them.

The requirement that regions must have and follow a growth plan before they receive state transportation dollars is driven by GHG emission reduction targets. But the law is widely viewed as good policy for reasons beyond GHG reductions; the more rational and coordinated regulation and public funding should accelerate the pace at which development consistent with these plans can proceed. For example, the Urban Land Institute, S.B. 375 Impacts Analysis Report, June 2010 stated:

The overarching anticipated benefit of S.B. 375 is its ability to provide more consistency, coordination, and clarity to the development process, which the land use industry needs to start recovering from the recession.

At the press conference releasing the report, one developer said simply that the Sustainable Communities and Climate Protection Act "is a pro-growth strategy."

In sum, an S.B. 375-style approach would be an excellent way for other states to bring GHG targets into their transportation planning process.

3. INVESTMENT DECISION CRITERIA

While sound policies are critical to directing state transportation policy, state investment decisions offer critical insight about where the true priorities lie. Investment decisions must back well-intentioned policies if they are to be effective. In 1991, Congress provided programmatic funding flexibility to increase state options for building multimodal systems. For example states have a large degree of flexibility in how to spend federal transportation dollars, particularly dollars received through the Surface Transportation Program. These funds can be spent on a variety of projects including roads, bicycle and pedestrian infrastructure, and they can also be “flexed” to support transit projects. In addition to federal funds, states also spend sizable state generated funds on transportation. The criteria within the investment category look at how states are choosing to make these substantial investments, and whether they are reinforcing state and federal climate and mobility goals or undermining them.

Like the policies described above, some of the investment categories are weighted more heavily, based on the effectiveness of the investment category in reducing GHG emissions and the amount of funding being directed toward clean transportation and its actual impact.

Description and Justification of Investment Decision Criteria

The Investment Decision criteria included in the report are described below.

- ***State Air Pollution Reduction Funds (Congestion Mitigation and Air Quality Program)***
States currently receive funding through the Congestion Mitigation and Air Quality program (CMAQ) for projects that contribute to air quality improvements and reduce congestion. Projects can include diesel engine retrofits, bicycle and pedestrian infrastructure, public transit expansion and improvement, intelligent transportation systems, and freight, among other things. Though CMAQ does not explicitly make eligible projects that reduce GHGs, almost all eligible project categories reduce GHGs, along with improving regional air quality. A state that was using its transportation budget in a way that also reduced GHGs would certainly spend or obligate all of its available CMAQ money.
- ***Highway Maintenance Priority***
Maintaining transportation assets in a state of good repair is not only the sensible and responsible practice for states, it has far reaching implications for GHG emissions. State DOTs bear significant responsibility for keeping the millions of miles of roads they have constructed in safe and usable condition. Unfortunately, all levels of government have failed to maintain this highway infrastructure; the American Society of Civil Engineers has given the nation’s roads a grade of D- in their 2009 infrastructure report card.⁷

Prioritization of maintenance of the existing road system ahead of expanding capacity goes beyond improving safety and remediating poor road conditions; it can also deter the growth of GHG emissions. Studies show that new roadway capacity promotes higher driving rates by triggering new development further away from established communities.⁸ Congestion and gridlock are often cited as the impetus for investing billions in highway expansions, bypasses, and new beltways, but most of this new capacity delivers only a short-term solution, ultimately exacerbating both the congestion and transportation emissions problems. States have an enormous backlog of repairs and need to focus more resources on this lower-cost and lower emissions investment. The need for new capacity should be closely reviewed to determine its effect on both land development and transportation patterns and whether there are other low-emissions solutions available. This criterion specifically looks at whether states are striking a reasonable balance between maintenance and expansion.

- ***Federal Safe Routes to School Funding Distribution***

The 2005 federal transportation bill created a \$612 million Safe Routes to School program that provides states funding to give to local governments and schools to increase the numbers of students bicycling and walking to school. This funding is available for infrastructure projects as well as public awareness campaigns to promote the benefits of walking and bicycling to school and traffic enforcement around schools. The program is in high demand by local governments and schools, yet many State DOTs take a long time to get the money out the door. Significant delays in the state's administration process can compromise the federal goals behind the program. This criterion evaluates a state's commitment to implementing the federal Safe Routes to School program by looking at the obligation rate of federal funds, which shows how much money has been distributed to implement projects.

- ***State Support for Non-Motorized Transportation***

Walking and bicycling are the only modes of transportation that produce zero greenhouse gas emissions, and there is tremendous potential to shift short car trips to these modes if the infrastructure is there to support them. Installing walking and bicycling facilities and building out these networks is relatively inexpensive compared to other surface transportation improvements. A little bit of funding goes a long way. Virtually all of the aid from the Federal Highway Administration can be used for non-motorized projects. Nationally, pedestrians and bicyclists make up 13 percent of all road fatalities, yet less than 1 percent of the federal safety funds are used to make these travel options more secure. This study examines what proportion of the FHA's Surface Transportation Program (STP) funds states actually use for pedestrian and bicycling infrastructure.

- ***State Financial Contribution to Public Transportation***

Like all transportation investments, ensuring high quality public transportation service is a responsibility shared among state, federal, and local governments. This criteria looks at whether states contribute a reasonable share of funds to support public transit by providing needed capital and operations investments, or whether they leave the responsibility of providing transit choices to federal and local governments.

- ***Balanced State Transportation Investment***

States have a great deal of flexibility in spending federal transportation dollars, with the option to redirect highway dollars toward transit projects. This criterion evaluates the extent to which states support public transportation by taking advantage of this flexibility.

Figure 2 describes the points allocated to each of the Investment Decision criteria. A full discussion of each point allocation can be found in Appendix A.

FIGURE 2: POINT ALLOCATIONS - TRANSPORTATION INVESTMENT DECISIONS		
Metric	Max. Points	Point Allocation
<i>State Air Pollution Reduction Funds (Congestion Mitigation and Air Quality Program - CMAQ)</i>	18	A state receives 18 points for obligating 90 percent or more of CMAQ program funds.
<i>Highway Maintenance Priority</i>	16	A state receives a maximum of 16 points for prioritizing maintenance of existing highway facilities over new capacity. A state receives 16 points for spending at least 10 times as much on maintenance as on new capacity. Point allocations decrease gradually to 0 points for a state that spends less on maintenance than it does on new capacity.
<i>Federal Safe Routes to School (SRTS) Funding Distribution</i>	9	A state can receive a maximum of 9 points for spending federal SRTS program funds. Points are allocated based on the percentage of federal SRTS funds the state has distributed since the program was created in 2005. A state receives 9 points for distributing 80 percent or more of federal SRTS program funds. A state receives 4 points for distributing between 50 percent and 80 percent of federal SRTS program funds.
<i>State Support For Non-Motorized Transportation</i>	17	A state can receive a maximum of 17 points for its financial support for non-motorized transportation through the flexible federal Surface Transportation Program (STP). A state receives 17 points for spending more than 2.5 percent of STP funds on non-motorized transportation. Point allocations decrease gradually to 0 for a state that spends less than 1 percent of STP funds on non-motorized transportation.
<i>State Financial Contribution to Public Transportation</i>	20	A state can receive a maximum of 20 points for supporting public transportation with state funds. States that supply 60 percent or more of their transit agencies' overall budgets receive the full 20 points. Point allocations decrease gradually to 0 for a state that contributes less than 10 of its transit agencies' overall budgets.
<i>Balanced State Transportation Investment</i>	20	A state can receive a maximum of 20 points for spending at least 60 percent as much on public transportation as on highways. Point allocations decrease gradually to 0 for a state that spends less than 5 cents on transit for every dollar spent on highways.

4. INFRASTRUCTURE POLICY EVALUATION AND ANALYSIS

TABLE 2: TRANSPORTATION INVESTMENT DECISIONS

	State	State Air Pollution Reduction Funds (CMAQ)	Highway Maintenance Priority	Federal SRTS Funding Distribution	State Support for Non-Motorized Transportation	State Financial Contribution to Public Transportation	Balanced State Transportation Investment	Total Investment Score
1	RI	18	9	0	17	16	8	68
2	DE	18	3	9	12	20	4	66
3	NY	18	16	0	0	8	20	62
4	CA	18	6	4	8	4	18	58
5	WA	18	0	4	12	4	18	56
6	MD	18	3	9	0	18	8	56
7	VT	18	12	4	17	4	0	55
8	PA	18	3	0	8	16	8	53
9	MI	18	12	4	5	8	4	51
10	NJ	18	3	0	0	8	20	49
11	UT	18	0	9	5	8	8	48
12	CT	18	3	0	0	18	8	47
13	MN	18	0	0	12	16	0	46
14	HI	18	3	0	17	0	8	46
15	AZ	18	0	0	17	0	8	43
16	AK	18	6	9	5	4	0	42
17	NV	18	0	4	0	16	4	42
18	NH	18	6	0	17	0	0	41
19	WY	18	9	9	5	0	0	41
20	WI	18	3	4	5	8	0	38
21	IA	18	3	4	12	0	0	37
22	OR	18	6	0	5	0	8	37
23	OH	18	6	0	5	4	4	37
24	ID	18	9	4	5	0	0	36
25	VA	18	0	9	0	4	4	35
26	FL	18	0	4	5	4	4	35
27	ME	18	12	0	5	0	0	35
28	NE	18	12	0	5	0	0	35
29	CO	18	3	0	5	0	8	34
30	TN	18	0	0	12	4	0	34
31	KS	18	3	4	5	4	0	34
32	MA	0	0	0	5	8	20	33
33	IL	0	3	0	5	4	20	32
34	NC	18	0	0	5	4	4	31
35	IN	18	0	0	5	8	0	31
36	MO	18	3	0	5	0	4	30
37	KY	18	3	4	5	0	0	30
38	SD	18	12	0	0	0	0	30

TABLE 2: TRANSPORTATION INVESTMENT DECISIONS (CONTINUED)

	State	State Air Pollution Reduction Funds (CMAQ)	Highway Maintenance Priority	Federal SRTS Funding Distribution	State Support for Non-Motorized Transportation	State Financial Contribution to Public Transportation	Balanced State Transportation Investment	Total Investment Score
39	NM	18	3	0	8	0	0	29
40	MT	18	6	0	5	0	0	29
41	ND	18	9	0	0	0	0	27
42	SC	18	0	4	0	4	0	26
43	TX	18	0	0	0	4	4	26
44	AL	18	3	0	5	0	0	26
45	MS	18	0	0	0	0	0	18
46	OK	18	0	0	0	0	0	18
47	GA	0	6	0	5	0	4	15
48	LA	0	3	4	0	0	0	7
49	WV	0	3	4	0	0	0	7
50	AR	0	0	4	0	0	0	4

Analysis—Transportation Investment Decisions

Overall, states did far worse in the Transportation Investment Decisions category than in the Transportation Policy category. Only nine states received more than 50 of the available points in this evaluation category.

The criterion where the fewest states fared well is Federal SRTS Funding Distribution. However, states did nearly as poorly on the measure of State Financial Contribution to Public Transportation, and not many more performed well in the Highway Maintenance Priority, Support for Non-Motorized Transportation, or Balanced State Transportation Investment criteria evaluations.

Broadly speaking, this indicates that only a handful of states are accounting for the impact on GHG emission of the transportation investment decisions they make. This is especially troubling because states control the majority of transportation funds. It is also troubling that states generally scored higher in the Transportation Policy category, as it suggests a trend of failure to carry out policy decisions with investments.

The criterion where most states scored well was for their use of State Air Pollution Reduction (CMAQ) Funds. These funds are awarded specifically to address regions within each state that fail to meet federal air quality standards under the Clean Air Act. These areas are awarded funds to invest in initiatives that reduce air pollution from mobile sources. States must show how their investment of these funds will lead to improved air quality, and are evaluated on their performance over time. The fact that so many states spent a high proportion of their overall allotment of these funds suggests that it this form of performance-oriented federal oversight may contribute to this outcome.

FIXING IT FIRST IN VIRGINIA: PRIORITIZING HIGHWAY MAINTENANCE

Over the past several years, Virginia has experienced significant political challenges to funding badly needed transportation improvements.

As a result, state transportation officials have learned to do more with less, refocusing attention and funding on maintaining an extensive system of high-quality state roads, as well as state-funded regional transit. Funding for new capacity on any mode was approved sparingly, while numerous cost-saving measures were also implemented. These changes have occurred in years outside of our data range, and therefore do not show up in this analysis.

This included a new street connectivity regulation requiring that all new neighborhoods connect, or provide provisions to connect, to surrounding streets. The change aims to reduce the impact of cul-de-sac street design, which creates pressure to construct additional inefficient roads, turning lanes, and streetlights, driving up construction and maintenance costs, as well as the cost of emergency and municipal services.

The policy will also result in better connected local street networks, which are one of the cornerstones of walkable neighborhood design.

In the case of Virginia, saving moneys through a priority on maintenance yielded benefits to taxpayers, motorists, and pedestrians.

5. TOUCHSTONE POLICY CRITERIA

These are policies that indicate which states recognize the importance of reducing emissions from the transportation sector. Unlike the other policies included in this report, which reduce GHG emissions but may be adopted for a number of reasons unrelated to climate concerns (including improved mobility or congestion relief), touchstone policies show an awareness of the direct connection between transportation and climate change.

Description and Justification of Touchstone Policy Criteria

The Investment Decision criteria included in the report are described below.

- ***State VMT reduction targets***

Vehicle Miles Traveled (VMT) reduction targets are currently the best proxy for reducing transportation sector greenhouse gas emissions. While establishing a VMT target is not itself enough to reduce greenhouse gas emissions from transportation, states that have adopted VMT reduction targets show they are serious about implementing policies and investing their transportation dollars in a way that supports climate goals.

- ***Transportation plans consider GHG emissions impacts***

Considering climate change impacts in long range transportation plans is an essential step toward achieving emissions reductions from the transportation sector.

- ***Flexibility of fuel tax revenue***

State and federal gas taxes are a primary funding source for transportation projects; often, it is the largest pot of money available. However, 22 states have language in their constitutions prohibiting the use of gas tax revenues for public transportation. Revenues are required to go only toward road projects and debt service. This restriction significantly limits a state's ability to adequately plan for a comprehensive transportation network comprised of a variety of options for users. In the worst cases, states completely abdicate their portion of the

responsibility to operate and expand transit choices, leaving it entirely up to the local and federal governments. Meeting climate goals requires moving to a more multi-modal transportation system, and such gas tax restrictions pose a fundamental obstacle to getting there.

FIGURE 3: POINT ALLOCATION - TOUCHSTONE POLICIES		
Policy	Max. Points	Point Allocation
<i>State Target for Reducing Vehicle Miles of Travel (VMT)</i>	5%	A state with a target for reducing VMT (or VMT per capita) receives a 5 percent point bonus, added to its final score.
<i>Consideration of GHG in Long Range Transportation Planning</i>	5%	A state that includes consideration of GHG pollution impacts when developing and evaluating long range state transportation plans receives a 5 percent point bonus, added to its final score
<i>State Use of Fuel Taxes</i>	5%	A state that allows fuel tax revenue to be used for public transportation receives a 5 percent point bonus, added to its final score

6. TOUCHSTONE POLICY EVALUATION AND ANALYSIS

TABLE 3: TOUCHSTONE POLICIES

	State	State VMT Reduction Target	GHG in Transp. Planning	Gas Tax Revenue Flexibility	Total Touchstone Bonus		State	State VMT Reduction Target	GHG in Transp. Planning	Gas Tax Revenue Flexibility	Total Touchstone Bonus
1	CA	5%	5%	5%	15%	26	SC	0%	0%	5%	5%
2	CT	5%	5%	5%	15%	27	TN	0%	0%	5%	5%
3	NY	5%	5%	5%	15%	28	TX	0%	0%	5%	5%
4	FL	0%	5%	5%	10%	29	VA	0%	0%	5%	5%
5	MA	0%	5%	5%	10%	30	VT	0%	0%	5%	5%
6	NM	0%	5%	5%	10%	31	WI	0%	0%	5%	5%
7	WA	5%	5%	0%	10%	32	AL	0%	0%	0%	0%
8	AK	0%	0%	5%	5%	33	AZ	0%	0%	0%	0%
9	AR	0%	0%	5%	5%	34	CO	0%	0%	0%	0%
10	DE	0%	0%	5%	5%	35	GA	0%	0%	0%	0%
11	HI	0%	0%	5%	5%	36	IA	0%	0%	0%	0%
12	IL	0%	0%	5%	5%	37	ID	0%	0%	0%	0%
13	IN	0%	0%	5%	5%	38	KS	0%	0%	0%	0%
14	LA	0%	0%	5%	5%	39	KY	0%	0%	0%	0%
15	MD	0%	0%	5%	5%	40	MN	0%	0%	0%	0%
16	ME	0%	5%	0%	5%	41	MO	0%	0%	0%	0%
17	MI	0%	0%	5%	5%	42	ND	0%	0%	0%	0%
18	MS	0%	0%	5%	5%	43	NH	0%	0%	0%	0%
19	MT	0%	0%	5%	5%	44	NV	0%	0%	0%	0%
20	NC	0%	0%	5%	5%	45	OH	0%	0%	0%	0%
21	NE	0%	0%	5%	5%	46	PA	0%	0%	0%	0%
22	NJ	0%	0%	5%	5%	47	SD	0%	0%	0%	0%
23	OK	0%	0%	5%	5%	48	UT	0%	0%	0%	0%
24	OR	0%	5%	0%	5%	49	WV	0%	0%	0%	0%
25	RI	0%	0%	5%	5%	50	WY	0%	0%	0%	0%

Analysis—Touchstone Policies

The touchstone criterion for which most states received credit was Gas Tax Revenue Flexibility, with 28 states earning points. This criterion offers insight into a state's transportation policy principles and priorities. States that restrict gas tax revenues from funding transit imply a philosophy that the state transportation program should be centered only around highway development. These states leave local communities who want and need transit choices to fend for themselves. Such a dramatic bias toward one mode of transportation fails to recognize the innovative ways that transit can be deployed in rural, urban, or suburban communities to enhance those transportation networks.

The criterion where the fewest states fared well was for having a State VMT Reduction Target, which was found in only four states. Though often politically controversial, VMT (or often more appropriately, per capita VMT, which accounts for population changes) targets are one of the best and most direct indicators of overall transportation GHG emissions. These targets provide a useful policy tool that accurately reflects the goal of building a transportation network that allows people to take fewer and shorter car trips, through sharing car trips, taking transit, walking, or cycling more often. More importantly, a VMT target is a signal to state transportation officials

and decision-makers that the practice and method of providing residents with mobility and access to goods, services, and other opportunities is changing.

Finally, it was surprising that only nine states currently consider the impact of transportation plans on state GHG emissions. While highly accurate modeling of transportation plans to assess GHG emission impacts is a sophisticated task that is still evolving, more rudimentary methods for estimating emissions are relatively available to state transportation officials and planners. Understanding the impact of transportation decisions on GHG emissions is a critical prerequisite to reducing emissions. Integrating a consideration of GHG emission impacts into transportation plans is a key part of this.

DRIVING DOWN CLIMATE CHANGE: WASHINGTON STATE'S VMT REDUCTION TARGETS

The transportation sector in Washington State makes up 47 percent of the state's greenhouse gas emissions and the legislature and governor realized that in order to meet the state's climate goals, transportation must do its part. A 2008 bill, H.B. 2815, set a vehicle-miles traveled (VMT) reduction target for the state of 18 percent reduction in per person VMT by 2020, 30 percent by 2035 and 50 percent by 2050.

Governor Christine Gregoire further strengthened the state's commitment to reducing greenhouse gases from transportation in Executive Order 09-05. This directed the Department of Transportation to develop additional strategies to reduce emissions from the transportation sector and work with the four largest Metropolitan Planning Organizations to develop and adopt regional transportation plans that would reduce greenhouse gases and achieve the VMT targets.

Washington State currently leads the country in its commitment to reduce transportation sector emissions through setting targets to reduce VMT. However, in order to be successful, the state and regional governments must align their transportation policy and funding decisions with the VMT reduction targets. The development of state and regional plans that is currently underway and the investment decisions that follow will determine whether Washington State could serve as a model for the rest of the country.

Overall State by State Scores

The total score and individual Policy, Investment, and Touchstone subtotals for each state can be found in Table 4. To give additional context to these numbers, each state is further categorized in Table 7 into three scoring tiers as defined below:

- **Tier 1 (75 - 100): Most alignment between transportation policy with climate change goals.** These states are leading the way in setting transportation policies that support GHG reduction. However, even these states must strive to do more to support a truly sustainable transportation system.
- **Tier 2 (25 - 74): Some alignment between transportation policy and climate change goals.** These states are taking some actions that will support GHG reduction goals, but there are many actions they are not taking. They must do more to get on the right track.
- **Tier 3 (0 - 24): Limited or no alignment between transportation policy and climate change goals.** Though these states' transportation policies may support climate change goals in some very limited ways, this is countered by many of their other policy choices. Most of the potential to reduce emissions through transportation strategies remains underutilized.

TABLE 4: OVERALL STATE BY STATE SCORES

	State	Policy Score	Investment Score	Touchstone Bonus	FINAL SCORE	Tier		State	Policy Score	Investment Score	Touchstone Bonus	FINAL SCORE	Tier
1	CA	85	58	15%	82	1	26	KY	39	30	0%	35	2
2	MD	90	56	5%	77		27	AK	22	42	5%	34	
3	NJ	93	49	5%	75		28	SC	37	26	5%	33	
4	CT	75	47	15%	70	29	ME	27	35	5%	33		
5	WA	68	56	10%	68	30	NH	22	41	0%	32		
6	OR	86	37	5%	65	31	GA	46	15	0%	31		
7	MA	84	33	10%	64	32	KS	27	34	0%	31		
8	RI	49	68	5%	61	33	ID	23	36	0%	30		
9	DE	47	66	5%	59	34	OH	19	37	0%	28		
10	MN	71	46	0%	59	35	IA	18	37	0%	28		
11	VT	54	55	5%	57	2	36	TX	26	26	5%	27	
12	VA	67	35	5%	54		37	NC	18	31	5%	26	
13	IL	68	32	5%	53		38	MO	19	30	0%	25	
14	WI	59	38	5%	51		39	OK	27	18	5%	24	
15	HI	50	46	5%	50		40	LA	37	7	5%	23	
16	PA	47	53	0%	50		41	MT	15	29	5%	23	
17	MI	36	51	5%	46		42	AL	19	26	0%	23	
18	AZ	47	43	0%	45		43	SD	15	30	0%	23	
19	FL	46	35	10%	45		44	WY	0	41	0%	21	
20	NV	42	42	0%	42		45	IN	7	31	5%	20	
21	NY	9	62	15%	41		46	NE	0	35	5%	18	
22	NM	38	29	10%	37		47	ND	8	27	0%	18	
23	CO	38	34	0%	36	48	WV	19	7	0%	13		
24	UT	24	48	0%	36	49	MS	5	18	5%	12		
25	TN	33	34	5%	35	50	AR	0	4	5%	2		

Analysis—Overall State Scores

Together, the states' Infrastructure Policy and Investment Decisions offer a good picture of whether and to what extent a state is aligning transportation policy and climate change goals. Unfortunately, the picture that emerges shows that states are taking very little action to reduce emissions in the transportation sector through infrastructure decisions. Only three states—California, Maryland, and New Jersey—fell in the top tier of our scoring methodology, and 12 states fell into tier three. While current policy does not promise to be effective at reducing emissions, and in some case could even support significant new emissions, states also have a wide variety of actions that can be taken to begin to address this policy gap.

The analysis also shows how both policy and investment decisions must be consistent to have a framework in place that supports GHG emissions reductions. While policies supportive of GHG reductions that are consistently and faithfully implemented can have a more sweeping impact than a collection of investment decisions, if the policies are poorly funded or undermined by conflicting investment practices, they will have little impact. On the other hand, a pattern of good investment decisions can support low-carbon transportation projects even in the absence

of a broader policy framework. The states that make both wise policy and investment decisions that support reductions in GHG emissions received the highest scores. In general, states that expressly commit to reducing transportation-related GHG emissions through intentional infrastructure policy and investment decisions also scored highly.

However, the evaluation reveals that there is some amount of conflict and inconsistency in state transportation decision-making. States that make transportation policy choices supportive of cleaner transportation do not always follow with similarly supportive investment decisions. For example, California scored very well in the Linking Transportation and Land Use sub-category, yet only contributes 16 percent of the state's overall public transportation funds. Similarly, while the state did very well in the overall Policy category (85 points), it did relatively worse in the Investment category (58 points). Though California has many of the right policies in place, the state could improve the effectiveness of its strong smart growth and transit oriented development policies, further supporting a reduction of transportation-related GHG emissions if the state focused a greater proportion of its transportation funds on cleaner transportation modes and projects such as transit and non-motorized facilities.

On the other hand, some states that do not have as many policies in place to support cleaner transportation demonstrated investment decisions that were relatively more supportive of GHG emissions reduction. New Hampshire, for instance, dedicates a respectable portion of transportation funds toward bicycle and pedestrian projects. However, the fact that New Hampshire lacks robust policies supportive of transit and non-motorized transportation means that the state transportation department may not be considering opportunities to address public transportation needs or serve non-motorized travel demand through development of bicycle and pedestrian projects. As a result, the state could miss opportunities to enhance mobility while reducing transportation GHG emissions, including some that would be very low cost.

In addition to the economic, public health, and other environmental benefits that lower-carbon transportation investments can bring, these strategies can help to manage congestion problems early, especially in faster growing communities.⁹ They also can have a self-reinforcing effect by influencing land use patterns that are best served by a more a multimodal transportation network. This means that the collective benefits of cleaner transportation investments could accrue faster and to a greater extent.

State governments that operate transit service, such as New Jersey, Maryland, and Rhode Island, also score highly. These states most likely rely less on local governments to fund transit service, and their transportation departments will be more apt to consider transit investments alongside highway investments. Finally, state oversight over transit service might mean that legislators, governors, and agency officials could be more likely to consider and support policies that promote transit use, such as robust commuter incentives or incentives to support transit oriented development.

VI. Conclusion and Policy Recommendations

A. Conclusion

There is a great deal of potential to reduce GHG emissions through transportation measures. Realizing this potential will require transportation policy and climate/energy policy to be harmonized and implemented in a coordinated way. Because states shape transportation decisions to such a large degree, this is particularly important at the state level. Conflicts between climate goals and transportation policies at the state level will prevent progress, just as aligning these policies will encourage it.

Based on the indicators selected for evaluation, this report finds that while state transportation policy and investment decisions support climate change goals to varying degrees, most states do not currently have a comprehensive transportation framework in place that will meaningfully reduce GHG emissions. The majority of states have basic transportation policies in place that support some amount of GHG reductions but only a few states make parallel investment decisions that support such policies.

Unfortunately, the analysis in this report shows that most states have failed to pursue a wide variety of transportation policies that reduce greenhouse gas emissions and provide numerous other mobility, economic and quality of life benefits. Surprisingly, this includes many states that take a variety of significant steps in other sectors to reduce GHG emissions. None of the states' transportation policies are likely to support robust GHG reductions to the extent demanded by current climate science. Nearly every state could be doing much more to increase mobility and access for residents in a way that supports fewer GHG emissions. Moreover, states that are forgoing these are missing obvious benefits that would improve the affordability and public health impact of transportation. The fact that many of these measures would yield substantial co-benefits makes this finding even more troubling.

Overall, the findings of this report suggest that there remains tremendous untapped potential to make greater progress on reducing transportation related GHG emissions by more closely aligning transportation policy with climate change goals. To correct for this, states need to become much more intentional about reducing transportation emissions. Consideration for GHG emissions should be a factor in all transportation policy and investment decisions.

Moreover, considering the extent to which federal transportation policy can influence state transportation policy and investment decisions, the federal government could play an important role in facilitating and encouraging this through broader transportation policy reforms. Federal transportation policy must remove disincentives to implement transportation strategies that reduce emissions, as well as provide tools and funding to be supportive of these efforts. Similarly, federal climate change and energy policy must complement federal and state transportation policy to help states get control of GHG emissions in the transportation sector.

B. State Policy Recommendations

States have much progress to make in aligning transportation and climate policies, as demonstrated by this evaluation and analysis. Though some states have already begun to take some initial actions, the package of recommendations outlined below will put states on the trajectory to harmonize transportation decisions with climate change goals, reaping additional benefits while doing so.

1. ***Balance state transportation investments by using state and federal resources to support robust public transportation service, prioritize highway repair and safety over new capacity, support non-motorized transportation, and ensure state fuel taxes can support all transportation modes.***

State transportation officials have spent decades building one of the greatest highway networks in history. Efforts must now shift to building other forms of transportation that are cleaner, more efficient, and in high demand. This requires policy changes that accommodates all transportation users, including transit riders, cyclists, and pedestrians in rural, suburban, and urban communities. States should seek to bring greater balance to their transportation investment plans. This includes balancing highway maintenance with new capacity investment and highway investments with transit, bicycle, and pedestrian infrastructure investments to ensure high-quality, convenient, well-maintained transportation networks for local, regional, and interstate travel. Balanced investment is a critical step toward improving the long-term prognosis for taming the transportation sector's role in climate change.

2. ***Manage traffic with congestion pricing tools and incentives for low-carbon transportation options through comprehensive commuter programs.***

Drivers have little idea about the true costs of their travel choices, especially when driving alone. Strategies such as tolling, parking cash-out, and demand-based parking fees are effective ways to signal to drivers through prices the impacts of driving and driving alone. Based on this information, travelers can then make more informed decisions about when and how often to drive. States that promote alternatives to driving alone when commuting provide a service in addition to information about smarter, cleaner travel choices.

3. ***Link transportation and land use in transportation plans, implement smart growth and growth management policies, and promote transit oriented development.***

Transportation land use decisions strongly influence one another. States can only maximize the benefits of transportation decisions with supportive land use policies. This relationship is essential not only for progress toward climate goals, but also for a generally successful and cost-effective transportation network.

4. ***Set a course to reduce emissions by setting per capita transportation GHG or VMT reduction targets.***

For efforts to reduce transportation GHG emissions to be successful, states need to become more intentional about achieving this goal. This involves reorienting transportation policy principles to allow greater support for cleaner transportation options, understanding how transportation decisions will affect emissions, and setting clear goals to reduce emissions through transportation infrastructure and management policy.

C. Federal Policy Recommendations

Transportation policy is a shared state and federal responsibility, and reducing emissions from transportation must be as well. To effectively support state efforts to reduce transportation-related GHG emissions, the federal government, guided by Congress, must reform national transportation policy so that it is more closely aligned with national climate change and energy goals.

To accomplish this goal, Congress should consider the following policies to both allow and encourage consistency between state transportation and climate goals:

- **Set a national transportation sector GHG reduction target to reduce emissions, and require states and regions to set similar targets.**

There is broad agreement that a reformed federal transportation policy must be oriented around national transportation policy objectives. As one of these objectives, Congress should set a national transportation sector greenhouse gas reduction target, and require states and large metropolitan areas to set corresponding

LEADING THE WAY: MASSACHUSETTS DEPARTMENT OF TRANSPORTATION GREENDOT INITIATIVE

In June 2009, Governor Deval Patrick signed landmark legislation reforming Massachusetts' transportation policy and restructuring the state's numerous transportation authorities into a unified Massachusetts Department of Transportation (MassDOT). In June of 2010, the newly created agency rolled out an initiative called "GreenDOT," which is "a comprehensive environmental responsibility and sustainability initiative designed to make [Massachusetts] a national leader in greening the state transportation system."

The initiative is focused on achieving 3 objectives:

- reducing GHG emissions
- promoting the healthy transportation options
- supporting smarter, more efficient growth and development

Transportation in Massachusetts currently generates more than one-third of the state's total GHG emissions. As part of the state's overall GHG reduction goals, established in 2008, GreenDOT sets the goal of reducing GHG emissions in the transportation sector by 7.3 percent below 1990 emission levels by 2020, and 12.3 percent below 1990 emission levels by 2050. This makes MassDOT the first DOT in the country to adopt specific targets to reduce GHG emissions.

To accomplish the goals of GreenDOT, MassDOT will incorporate sustainability principles into all of its practices, from project planning and design through system operation. MassDOT will begin by working with planning agencies within the state to set regional GHG reduction targets. MassDOT will work with these regional planning agencies to develop Regional Transportation Plans and Transportation Improvement Programs that will meet these targets. Through these plans, MassDOT and the state's regional planning agencies will seek to balance investments in roadway maintenance, roadway expansion, public transit, pedestrian and bicycle projects.

The 2009 legislation that created MassDOT also made other key reforms. It created an Office of Transportation Planning to coordinate regional and local transportation plans along with statewide planning efforts. It also established an Office of Performance Management and Innovation to monitor the overall performance of the transportation network, facilitate data-driven management and planning, and implement innovative new transportation strategies to improve performance.

The reforms also codified the state's Complete Streets policy in law and created the Healthy Transportation Compact. The Compact is an initiative that seeks to ensure coordination between state transportation, public health, and environmental officials. Breaking down these traditional administrative silos will help the state to ensure transportation investments serve environmental and health related goals in addition to enhancing mobility.

GreenDOT is by far the most comprehensive effort by any state DOT to align its transportation policy with climate change goals. Success will require diligent implementation over time, but if this pans out, Massachusetts will be a leader among states in cutting transportation GHG emissions.

sub-targets. The national target should account for GHG benefits accruing from cleaner cars, lower-carbon transportation fuels, and investments in low-carbon transportation infrastructure and systems management.

- **Require consideration of GHG emissions in the transportation planning process.**

Federal law currently requires states and metropolitan planning organizations to undertake a planning process to be eligible for federal funds. They must develop short- and long-term plans showing which projects will be built and how they will be financed. This planning process should be revised to include a consideration of the impact on regional GHG emissions of the implementation of projects and plans. Plans should be required to show how transportation strategies and projects will be deployed to achieve transportation-related GHG emissions reductions goals.

The transportation planning process should also be better coordinated with non-transportation agencies that are influenced by transportation decisions, such as housing, economic development, and environmental agencies. Moreover, the guidance and resources should be given to regions to plan for future growth and development in a way that stabilizes and reduces emissions.

- **Increase funding parity for clean transportation infrastructure.**

Currently, public transportation funding receives only 18 percent of federal transportation dollars, and programs to encourage walking and bicycling receive less than 1 percent. In addition, even with recent changes to the requirements for non-federal matching funds for public transportation projects, the federal government still provides a greater proportion of funding for a highway project, and such funding is granted with less review.

Congress should increase funding for types of transportation that have been shown to effectively reduce GHG emissions, in addition to offering numerous other co-benefits. To ensure parity between all forms of transportation infrastructure, all elements of funding formulas such as non-federal matching requirements should be imposed equally on all transportation infrastructure projects regardless of mode.

Along with increased funding for transportation infrastructure that can reduce GHG emissions, performance measures should be used to create incentives for recipients of federal transportation funds to reduce GHG emissions. Implementing a performance-based federal transportation policy receives widespread support among transportation experts. Tools such as bonus funding, reduced non-federal match requirements, or other financial incentives for grant recipients that show progress toward meeting GHG reduction goals would help to ensure that such progress is being made. Non-financial incentives, such as the expedited project review offered under California's landmark S.B. 375 offer an alternative option.

- **Reorient federal transportation programs to support greater implementation of clean transportation projects.**

Federal transportation funds are distributed through various programs authorized in federal transportation authorization. In fact, consolidation and streamlining of the 108 federal transportation programs currently authorized has become a main goal of transportation reform efforts.

It is widely acknowledged that our transportation policy is broken. Repairing and reforming out transportation policy offers an opportunity to raise the importance of energy and climate change in transportation decisions. Programs that support cleaner transportation should be emphasized and programs that do not should be reformed to support cleaner option.

These reform efforts can support reduction on GHG emissions in a number of ways. Programs should encourage multi-modal project development, accommodate multiple forms of travel, promote sound asset management, encourage infill development and mixing of uses, and other policies that can generate more efficient travel while maintaining consumer welfare.

Some policies could set standards for design, maintenance, or operation of transportation facilities. Examples of this include Complete Streets policies, which encourage transportation agencies to design roadways that accommodate all appropriate users, including pedestrians, bicyclists, and transit users, in addition to drivers. Prioritizing highway maintenance through asset management standards ensure that existing infrastructure is maintained to a certain standard of repair before new infrastructure is built. This encourages infill development and prevents sprawling development, in addition to making for safer and higher-performing infrastructure. Other policies could allow different transportation modes to compete equally for selection. For example, federal approval of new highway and transit facilities should carry the same requirements to justify their selection, and further project review and administration should exhibit similar parity.

These are just a few of many well-documented examples of how federal transportation programs could be reformed to better support GHG emission reductions. Others include road pricing, expanded use of transportation demand management, and deployment of intelligent transportation systems to better manage roadways and transit systems. Congress should conduct a thorough review of all such policies when developing future federal transportation policy.

- **Dedicate revenue from carbon pollution fees to clean transportation.**

Much of the increase in funding for clean transportation projects should come from traditional sources of transportation funding. However, revenues generated from the sale of GHG pollution permits under any national climate and energy policy are also an appropriate source of funding. A portion of such revenue should be directed towards planning and constructing transportation projects that reduce GHG emissions.

D. Recommendations for Further Research

Additional research and analysis would help decision-makers and transportation officials at all levels of government to gain a clearer picture of the most effective ways to address transportation emissions throughout the country, and the most accurate methods for evaluating results. Foremost, analysis of actual transportation-based GHG emissions trends in each of the states would be a critical indicator of performance. Unfortunately, such data is incomplete for many states.²⁹ Additionally, this data is collected in a variety of ways, and is oftentimes estimated through various proxies. These gaps and variations must be reconciled before a truly accurate picture of state performance on emissions can be gained. There are likely many other ways in which transportation performance with respect to GHG emissions could be improved, and we hope that others will build upon this work as a foundation for future

research that gives us an ever-improving picture of state performance in aligning transportation policies with critical climate change goals.

Though policies to address the efficiency of goods movement were not included, such strategies will clearly be important in addressing transportation GHG emissions. Goods movement, especially by truck, is expected to increase steadily over the coming decades. A discrete and targeted set of policy responses will be required to manage the increase emissions that will result. As states and the federal government weigh options for developing a more robust set of coordinated freight strategies, research into the potential GHG emissions impacts, both positive and negative, will help policymakers to manage freight traffic while also promoting energy efficiency.

Many government transportation agencies consider system management to be a separate policy area from transportation infrastructure design and investment. System management strategies offer real benefits that can add effective capacity to both road and transit systems without requiring physical expansion. This can address peak travel in a way that can limit the need to overbuild facilities accommodate the relatively short period of peak travel that occurs during morning and evening commute hours. The extent and sophistication of system management strategies requires a thoughtful evaluation to assess how to best deploy them to address both mobility needs and the need to minimize emissions.

Endnotes

Chapter III

- 1 Emissions of Greenhouse Gases Report. U.S. Energy Information Administration, December 2009 <http://www.eia.doe.gov/oiaf/1605/ggrpt/>
- 2 U.S. EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2008
- 3 U.S. DOE, Energy Information Administration (EIA). *International Energy Statistics*. Available at <http://tonto.eia.doe.gov/cfapps/ipdbproject/IEDIndex3.cfm>
- 4 *Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions*. Urban Land Institute, 2009.
- 5 Ewing, Reid, Pendall, Rolf, and Chen, Don. *Measuring Sprawl and Its Impact*. 2002.
- 6 U.S. EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2003.
- 7 Polzin, Steven E., Ph.D. *The Case for Moderate Growth in Vehicle Miles of Travel*. 2006.
- 8 Ibid.
- 9 U.S. Department of Energy/Energy Information Agency (USDOE/EIA): *Annual Energy Outlook*, 2007.
- 10 *Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions*. Urban Land Institute, 2009.
- 11 Ewing, Reid, et al. *Growing Cooler: The Evidence on Urban Development and Climate Change*. Urban Land Institute, 2007.
- 12 *Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions*. Urban Land Institute, 2009.

Chapter IV

- 1 *Maryland's Intercountry Connector: Exacerbating Petroleum Dependence and Global Warming*. Environmental Defense Fund. Accessed at http://www.edf.org/documents/4339_ICC_oilGlobalWarming.pdf May 2009.
- 2 *Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions*. Urban Land Institute, 2009.
- 3 *Cost-Effective GHG Reductions through Smart Growth & Improved Transportation Choices*. Center for Clean Air Policy, 2009.
- 4 Final Report of the National Surface Transportation Infrastructure Financing Commission
- 5 Ibid
- 6 Federal Transit Administration policy guidance: Docket Number: FTA-2007-27172
- 7 The formulas by which the total payout of dollars from the Federal Highway Trust Fund are sub-allocated or “apportioned” to each state rewards such factors as VMT, fuel use, and lane-miles of travel. An overview of the apportionment process is provided by the GAO 2006 report available at <http://www.gao.gov/new.items/d06572t.pdf>.

Chapter V

- 1 See Appendix B
- 2 National Complete Streets Coalition, “Complete Streets Fight Climate Change”, <http://www.completestreets.org/webdocs/factsheets/cs-climate.pdf> (citing 2001 National Household Transportation Survey)
- 3 “Travel and Environmental Implications of School Siting.” U.S. Environmental Protection Agency, 231-R-03-004: 2, 2003. Available at www.epa.gov/livability/school_travel.htm.
- 4 McDonald, N. “Active Transportation to School: Trends among U.S. Schoolchildren, 1969-2001,” *American Journal of Preventive Medicine*, Volume 32, Number 6, June 2007. And “Emission Facts: Average Annual Emissions and Fuel Consumption for Passenger Cars and Light Trucks,” U.S Environmental Protection Agency. Available at <http://www.epa.gov/otaq/consumer/f00013.htm>.

- 5 Jason E. Bordoff & Pascal J. Noel, *Pay-As-You-Drive Auto Insurance: A Simple Way to Reduce Driving-Related Harms and Increase Equity*, The Brookings Institution, July 2008, http://www.brookings.edu/~media/Files/rc/papers/2008/07_payd_bordoffnoel/07_payd_bordoffnoel.pdf
- 6 Gomez-Ibanez et al. *Driving and the Built Environment: The Effects of Compact Development on Motorized Travel, Energy Use, and CO2 Emissions*. National Research Council, 2009.
- 7 2009 Report Card for America's Infrastructure - American Society of Civil Engineers
- 8 Williams-Derry, Clark. "Increases in greenhouse-gas emissions from highway-widening projects." Sightline Institute, October 2007.
- 9 See Appendix D

Chapter VI

- 1 See Testimony of Steve Winkelman, Center for Clean Air Policy, before the House Committee on Science and Technology Subcommittee on Technology and Innovation: "The Role of Research in Addressing Climate Change in Transportation Infrastructure"

VII. Appendices

APPENDIX A: METHODOLOGY

The policies evaluated in the report were selected because they are projected by expert analysis to achieve transportation sector GHG reductions. Further, these policies were selected because states can implement them independent of local or federal action, and they have been adopted in one or more states. The policy evaluation criteria fall into three categories:

- Infrastructure Policies
- Investment Decisions
- Touchstone Policies

For both the **Infrastructure Policy** and **Investment Decisions** categories, states earned points on a 100-point scale, receiving points for individual evaluation criteria within each category. The criteria within each category each have a different impact on GHG emissions. To account for this, the maximum points allocated to each criterion was determined by the cumulative GHG reduction potential from 2010 through 2050 of a counterpart policy modeled as part of the *Moving Cooler* analysis (see Appendix B). Points for each criterion were adjusted to represent the specific policy included in *Moving Cooler* as accurately as possible. Further, the criteria evaluated in the report did not always have a direct policy equivalent in *Moving Cooler*. The point maximums for these policies were determined based on the most similar policy included in the analysis. In all cases, the best judgment of the authors determined the final point allocations.

The points allocated to each criterion are not intended to represent its actual GHG reduction potential. In other words, scoring the highest number of points for any individual criterion will not necessarily translate to cumulative 2010 to 2050 GHG emission reductions of the corresponding *Moving Cooler* strategy (or the proportion of the total reductions that would be represented by a state). Rather, the point values for each criterion are intended to represent its relative importance with respect to the others.

For criteria in the **Investment Decision** category, the size of the program through which the funding in question is directed is also considered. For example, programs that direct highway and transit investments are much larger than those that direct bicycle and pedestrian investments, and so are weighted more heavily.

Finally, the **Touchstone Policies** were considered differently. These are criteria that do not lead directly to GHG reductions, but rather indicate a certain goal or commitment to reducing emissions via other policy decisions. These criteria were not allocated points in the base ranking; states can achieve the highest grade without any **Touchstone Policies** in place. However, states with these policies in place received a bonus to recognize the clear intention of policymakers to reduce transportation emission through infrastructure decisions. This bonus is represented as a percentage increase, so the greater a state's score in the two other categories, the larger its bonus, since the state is clearly delivering on the intention expressed by the **Touchstone Policy**.

To evaluate the states according to the above criteria, the best available state-level data for each criterion was collected. Points were allocated to each state in both the **Infrastructure Policy** and **Investment Decision** categories according to the predetermined schedule, up to a maximum of 100 points in each of these categories. The **Infrastructure Policy** and **Investment Decision** grades are then averaged. The bonus points allocated by the **Touchstone Policies** were then added to each state's average grade to determine a final grade.

1. Infrastructure Policy Criteria

Increasing Transportation Options

The following three criteria in the Increasing Transportation Options subcategory were allocated a combined total of 133 points. This equals the total GHG reduction potential of the Combined Bicycle and Combined Pedestrian strategies evaluated in *Moving Cooler* at the Expanded Current Practice deployment level.

The Combined Bicycle strategies are defined as:

- “Complete streets’ policies adopted by state and local transportation agencies, requiring appropriate bicycle accommodations on all roadways;
- “Bicycle parking provided at all commercial destinations;
- “All new commercial buildings >100,000 sq. ft. required to provide showers, lockers, and covered/protected bicycle parking; all new multi-unit residential buildings have indoor bike parking;
- “Buses fitted with bike carriers, rapid transit stations have bike parking, all rapid transit lines are bike-accessible during off-peak hours;
- “School curriculums include safe cycling skills for children.”

The Combined Pedestrian strategies are defined as:

- “All new developments have buffered sidewalks on both sides of the street, marked/signalized pedestrian crossings at intersections on collector and arterial streets, lighting;
- “New or fully-reconstructed streets in denser neighborhoods (>4,000 persons/sq mi and business districts) incorporate traffic calming measures such as bulb-outs and median refuges to shorten street-crossing distances;
- “Complete streets’ policies adopted by state and local transportation agencies, requiring appropriate pedestrian accommodations on all roadways.”

This compares well to the set of policies in the three criteria evaluated, which, if implemented at a level that would receive full points, would likely result in many of the outcomes above.

Complete Streets Policies

This criterion evaluates whether a state has a Complete Streets policy in place as of 2009. Such a policy covers the entire are of a state, so this criterion was allocated 70 percent of the total 133 points, equal to 93.1 points. This converts to 17.6 points on our 100 point scale, which was rounded down to 17 to fit within the 100 point scale. A state receives 17 points for having a law in place requiring Complete Streets design. A state receives 15 points for having an administrative or agency-level Complete Streets design policy. A legislative policy is given more weight since it is more permanent and was approved by representatives of a majority of a state’s residents.

SOURCE: National Complete Streets Coalition, State Complete Streets Policies (2010). <http://www.completestreets.org/webdocs/policy/cs-state-policies.pdf>

State Safe Routes to School Programs

This criterion evaluates whether a state has a Complete Streets policy in place as of 2009. Such a policy only affects a limited number of areas within a state that are nearby to schools, so this criterion was allocated 20 percent of the total 133 points, equal to 26.6 points. This converts to 5 points on our 100 point scale, which was rounded down to 17 to fit within the 100 point scale.

A state receives 4 points for having a state level Safe Routes to School program.

SOURCE: Alliance for Biking and Walking, *Bicycling and Walking in the United States: 2010 Benchmarking Report* (2010), page 68.

NOTES: States listed in the table “Safe Routes to School Policies” as providing additional (non-federal) funding to their SRTS program received credit.

Bicycle and Pedestrian Master Plans

This criterion evaluates a state’s efforts to plan development of bicycling and/or walking infrastructure as of 2009. Such plans are important to identifying key areas in need of bicycle and pedestrian investments, but plans are not always implemented. As a result, this criterion was allocated 10 percent of the total 133 points, equal to 13.3 points. This converts to 3 points on our 100 point scale, which was rounded down to 17 to fit within the 100 point scale.

State scores are based on whether a state has approved a master plan for developing for bicycling and/or walking infrastructure as of 2009. A state receives 3 points for having a bicycle and pedestrian master plan.

SOURCE: Alliance for Biking and Walking, *Bicycling and Walking in the United States: 2010 Benchmarking Report* (2010), page 60.

Clean Transportation Options

The following three criteria in the Clean Transportation Options subcategory are not similar enough policies to group, so each were allocated a different number of points.

Pay-As-You-Drive (PAYD) Insurance

This criterion evaluates whether a state permits auto insurance companies to offer PAYD insurance policies. This was compared to the PAYD strategy evaluated in *Moving Cooler* at the Expanded Current Practice deployment level, which has a total GHG reduction potential of 789 MMT through 2050. This strategy is defined as:

- By 2010, “Require all states to permit the offering of per-mile insurance rates.”

This does not compare well to the policy criteria evaluated. PAYD policies only generate significant GHG reductions when high levels of market penetration are achieved. The *Moving Cooler* analysis assumes continued market penetration of PAYD insurance policies through 2050. Our analysis does not assume this as a likely outcome of simply permitting PAYD policies. As a result, our analysis only allocates a portion of the total corresponding GHG reduction potential. This criterion was allocated 10 percent of the 789 point total, equal to 78.9 points. This converts to 15 points on our 100 point scale.

State scores are based on whether a state currently permits auto insurance companies to offer PAYD insurance policies. A state that permits auto insurance companies to offer PAYD insurance policies receives 15 points.

SOURCE: Georgia Institute of Technology, *Current State Regulatory Support for Pay-As-You-Drive Insurance Options* (2003): <http://commuteatlanta.ce.gatech.edu/Resources/PAYD%20State%20Survey%20Paper%20Final%20Version%20Sent%20to%20Journal%20Edit..pdf>

Supplemented by an update from Justin Horner, Natural Resources Defense Council on May 25, 2010, based on the following materials:

- California Department of Insurance press release: <http://insurance.ca.gov/0400-news/0100-press-releases/0080-2009/release157-09.cfm>
- Seventh Generation Advisors matrix of state climate action plans: http://seventhgenerationadvisors.org/index.php?option=com_content&view=article&id=79%3Astate-climate-policy-tracker&catid=4&Itemid=19.
- Availability of Progressive Insurance company's MyRate product: <http://www.progressive.com/snapshot/common-questions.aspx>

Variable Road Use Pricing

This criterion evaluates the extent to which a state is implementing variable road use pricing on its highway network. This criterion was allocated 31 points, equal to the total GHG reduction potential of the Intercity Tolls strategy evaluated in *Moving Cooler* at the Expanded Current Practice deployment level. This converts to 6 points on our 100 point scale. The Intercity Tolls strategy defined as

- By 2010, "Toll all Interstates at a minimum of \$0.02 per mile. Assume 1 year required for deployment."

This compares moderately well to the policy criteria evaluated, which could reasonably result in this outcome.

State scores are based on whether a state currently uses or plans to use variable road use pricing on a highway facility. A state receives 6 points for having at least one existing or planned road facility with variable pricing.

SOURCE: Office of Highway Policy Information, FHWA Toll Facilities in the United States: Bridges-Roads-Tunnels-Ferries (2009), Tables 1.1-1.4.

- 1.1 Interstate System Toll Bridges and Tunnels in the United States
- 1.2 Non-Interstate System Toll Bridges and Tunnels in the United States
- 1.3 Interstate System Toll Roads in the United States
- 1.4 Non-Interstate System Toll Roads in the United States

Commuter incentives

This criterion evaluates incentives that states offer to commuters to reduce single occupant automobile trips. This was compared to the Employer-Based Commute Strategies evaluated in *Moving Cooler*, which has a total GHG reduction potential of 252 MMT through 2050. These strategies are divided in to two groups, defined as:

Telework and Compressed Work Week

- Employer-based TDM requirements, outreach, and support - By 2015, "Private Sector: Provide employer goals and tax incentives for the offering and adoption of telecommuting and compressed workweek targets. Provide public funding or subsidies for the private provision of regional telework centers and shared satellite offices. Require elimination of telecommuting barriers in state and local tax codes (e.g., double taxation);
- By 2015, "Public Sector: All government agencies allow option of telecommuting and compressed work week for eligible employees;

TDM Requirements, Outreach, and Support

- By 2015, "States and/or MPOs provide on-line ride matching and vanpool services and guaranteed ride home program for all areas where services are not already provided by TDM service providers by 2015;
- By 2015, "MPO or other designated agencies (such as TMAs) implement aggressive outreach program to inform major employers (100+ employees) of alternative travel options, assist with providing information

and incentives to employees by 2015. Transit agencies make monthly passes available through employers at discounted rates.”

This compares moderately well to the policy criteria evaluated. Though the strategies described are similar to the policies evaluated, the evaluated policies are far less extensive, and would likely result in most much less substantial outcomes than those described in *Moving Cooler*.

As a result, the criterion was allocated ½ of the 252 point total, equal to 126 points. This converts to 24 points on our 100 point scale. State scores are based on both the existence and the quality of such policies in each state.

State scores are based on the presence and characteristics of state-sponsored commuter programs. A state can receive a maximum of 24 points for its commuter programs. A state can receive: 8 points for programs that applied to several transportation modes and 4 points or those limited to one mode; 8 points for statewide policies or 4 points for policies that were limited to certain regions or otherwise restricted by area; 8 points for direct subsidies or services or 4 points for tax incentives.

MAIN SOURCE: University of South Florida, TDM and Telework Financial Incentives Offered at the State Level (2010). <http://www.nctr.usf.edu/clearinghouse/stateincentives.htm>

- AZ SOURCE: Mike Walbert, The Arizona Republic, “Bicycle Commuters Showered with Perks,” (2005) <http://www.azcentral.com/arizonarepublic/local/articles/1019bikepool19.html>
- MA SOURCE: Mass.gov Department of Revenue, “TIR 06-14: Personal Income Tax Commuter Deduction” (2006) <http://www.mass.gov/>
- WI SOURCE: Wisconsin Department of Employee Trust Funds “FAQs: Commuter Benefits Programs” <http://etf.wi.gov/faq/commuter.htm#gione>.

Linking Transportation and Land Use

The following two criteria in the Linking Transportation and Land Use subcategory were allocated a combined total of 160 points. This equals the total GHG reduction potential of the Combined Land Use strategies evaluated in *Moving Cooler* at the Expanded Current Practice deployment level. This strategy is defined as:

“All MPOs (or another regional agency designated by the MPO) develop a regional transportation and land use plan meeting defined criteria for process and content;

- “Plans collectively provide for at least 60 percent of new development in attached or small-lot detached units, in pedestrian- and bicycle-friendly neighborhoods (e.g., sidewalks, bike facilities, good connectivity) with mixed-use commercial districts and high-quality transit;
- “The majority (nearly three-quarters) of communities adopt zoning and planning standards allowing for sufficient densities and requiring pedestrian friendly design in these area;
- “State, regional, and local agencies work collaboratively on other implementation policies identified through these efforts.
- “Provide Federal and state transportation funding incentives/set-asides for (a) regional comprehensive planning activities and (b) local planning and implementation (infrastructure) activities that support land use objectives as described above.”

This compares well to the two policy criteria evaluated, which, if implemented at a level that would receive full points, would likely result in many of the outcomes above.

Smart Growth and Growth Management Policies

This criterion evaluates state's Smart Growth or growth management policies a comprehensive, well-implemented. Such a policy covers the entire are of a state, so this criterion was allocated twice as many points, or of the 160 point total, equal to 106.67 points. This converts to 20 points on our 100 point scale. State scores are based on both the existence and the quality of such a policy in each state.

State scores are based on the presence of a state Smart Growth or growth management policy, as well as the quality and implementation of the policy. The quality of each state policy was evaluated according to an interpretation of the results of a proprietary report, commissioned by the Wallace Global Fund, which reviewed the quality and performance of statewide policy efforts to curb sprawl development in each of the fifty states. A state with a comprehensive, well-implemented policy in place receives 20 points. A state receives 15 points for having a moderately effective or partially implemented policy in place. A state receives 10 points for having a policy with limited effectiveness or implementation.

SOURCE: Robert Liberty for SGA, Stopping Sprawl in the Fifty States (2009).

NOTES: View appendix C for more information on how individual states were evaluated.

Incentives for Transit Oriented Development

This criterion evaluates whether a state has in place any program that provides financing, grants, or planning funds to support development nearby to public transportation access. Because these incentives only would affect a relatively small number of locations in any state, this criterion was allocated 1/3 of the 160 point total, or 53.33 points. This converts to 10 points on our 100 point scale.

State scores are based on whether a state sponsors incentives for development nearby to transit. States received 10 points they offered such incentives and 0 if not.

SOURCE Reconnecting America, Realizing the Potential for Sustainable and Equitable TOD: Recommendations to the Interagency Partnership on Sustainable Communities, Appendix A: "Local Programs to Support Transit Oriented Development," (2009). http://reconnectingamerica.org/public/display_asset/091118ra_sustainabilityrecommendations_final

Category	Sub-Category	Criteria	Moving Cooler Equivalent	Deployment Level	Moving Cooler Points	Raw Point Allocation	100 Point Scale	Final Points	Scale details
INFRASTRUCTURE POLICY	Increasing Transportation Options	Complete Streets law or policy (as of 2009)	Nonmotorized	Expanded Current Practice	133	93.10	17.60	17	Law = 17 Policy = 15
	Increasing Transportation Options	SRTS program (as of 2008/2009)	Nonmotorized	Expanded Current Practice	133	26.60	5.03	5	Yes = 5
	Increasing Transportation Options	Bike/ped Master plan	Nonmotorized	Expanded Current Practice	133	13.30	2.51	3	Yes = 3
	Clean Transportation Incentives	PAYD	PAYD	Expanded Current Practice	789	79.00	14.93	15	Permits PAYD policies = 15
	Clean Transportation Incentives	Variable Road Pricing	Cordon Pricing / Intercity Tolls	Expanded Current Practice	31	31.00	5.86	6	Yes = 6
	Clean Transportation Incentives	Commuter incentives	Employer-Based Commute Strategies	Expanded Current Practice	252	126.00	23.82	24	Multimodal = 8 Limited modes = 4 Statewide = 8 Regional/limited = 4 Direct subsidy = 8 Tax incentive = 4
	Linking Transportation and Land Use	Smart growth and growth management policies	Combined Land Use	Expanded Current Practice	160	106.67	20.16	20	Strong = 20 Moderate = 15 Weak = 10
	Linking Transportation and Land Use	TOD incentives	Combined Land Use	Expanded Current Practice	160	53.33	10.08	10	Provides financing/grants/planning funds = 10
		TOTAL				529	100	100	

2. Investment Decision Criteria

Congestion Mitigation and Air Quality (CMAQ) Funds

The following criterion evaluates the extent to which a state has utilized federal funds that are intended to assist with reducing air pollution. The Congestion Mitigation and Air Quality program makes funds available to states for projects that will reduce traffic congestion and improve air quality. Whether a state has consistently utilized these funds is a proxy for the strength of its intention to align environmental and transportation goals. This criterion was allocated 95 points. This is equal to the total GHG reduction potential of several System Operation and Management strategies evaluated in *Moving Cooler* at the Expanded Current Practice deployment level, including: Ramp Metering (27), Variable Signage (2), Incident Management (58), Road Weather Management (1), Signalization (3), Travel Information (4). These strategies are defined as:

- Ramp Metering—“Implement with electronic roadway monitoring in large urban areas where $V/C > 1.05$ by 2030 with new and expanded Traffic Management Centers (TMCs);
- Variable signage—“Implement with electronic roadway monitoring where $V/C > 1.05$ by 2030;
- Incident management—Between 2010 and 2030, “ $V/C > 1.05$ (detection algor/free cell call, CCTV cameras, on-call service patrols, TMC integration/coordination);
- Road weather management—“Fully deployed on freeways by 2030;
- Arterial Management (signalization)—Between 2010 and 2030, “Upgrade to closed loop or traffic adaptive when $V/C > 1.0$;
- Travel Information—Between 2010 and 2030, “ $V/C > 1.05$ (511 + DOT website).”

Congestion Mitigation and Air Quality program funds can be used in a wide variety of strategies to relieve congestion and improve air quality. They are generally grouped as transit, traffic flow improvements, shared ride programs, travel demand management, bicycle/pedestrian projects, freight/intermodal, dust mitigation, and diesel emissions reduction. This report used traffic flow improvements and travel demand management projects to choose *Moving Cooler* strategies for comparison. These strategies were selected to determine the point value for these two criteria because they make up a large number of CMAQ projects, and because many other strategies eligible under CMAQ are evaluated elsewhere, such as bicycle/pedestrian projects, shared ride programs, and public transportation projects.

Though these strategies do not exactly correspond to overall CMAQ projects, they end result reasonably approximates the policy criterion evaluated.

State scores are based on a state’s rate of obligation of CMAQ funds between 1991 and 2010. A state can receive 18 points for obligating 90 percent or more of its allotted CMAQ program funds.

SOURCE: FHWA, CMAQ Obligations/Appportionments for 2010 (March 15, 2010)

Prioritizing highway maintenance (Fix-It First)

The following criterion evaluates how balanced state highway investments are between new construction and maintenance. This criterion was allocated 80 points, equaling 50 percent of the total GHG reduction potential of the Combined Land Use strategies evaluated in *Moving Cooler* at the Expanded Current Practice deployment Level. These strategies are defined as, by 2015:

- “All MPOs (or another regional agency designated by the MPO) develop a regional transportation and land use plan meeting defined criteria for process and content;
- “Plans collectively provide for at least 60 percent of new development in attached or small-lot detached units, in pedestrian- and bicycle-friendly neighborhoods (e.g., sidewalks, bike facilities, good connectivity) with mixed-use commercial districts and high-quality transit;

- “The majority (nearly three-quarters) of communities adopt zoning and planning standards allowing for sufficient densities and requiring pedestrian friendly design in these area;
- “State, regional, and local agencies work collaboratively on other implementation policies identified through these efforts.
- “Provide Federal and state transportation funding incentives/set-asides for (a) regional comprehensive planning activities and (b) local planning and implementation (infrastructure) activities that support land use objectives as described above.”

This comparison was chosen because of the link between transportation investments and land use patterns. Focusing transportation funds on existing infrastructure not only better maintains public assets; it promotes development in or near currently developed areas, and relieves pressure to develop in new areas. This outcome was determined to be qualitatively similar to a weak version of an urban growth boundary. Therefore, this criterion was allocated points equal to 50 percent of the total GHG reduction potential of *Moving Cooler's* Combined Land Use strategies. The 80 points allocated to this criterion converts to 16 points on our 100 point scale.

State scores are based on the average ratio of investment in highway maintenance to investment in new highway capacity between 2004 and 2008. A state can receive 16 points for spending at least 75 percent of highway funds on maintenance; 12 points for spending between 50 percent and 70 percent of highway funds on maintenance; 9 points for spending at between 40 percent and 50 percent of highway funds on maintenance; 6 points for spending between 30 percent and 40 percent of highway funds on maintenance; 3 points for spending between 10 percent and 30 percent of highway funds on maintenance; and 0 points for spending less than 10 percent of highway funds on maintenance.

SOURCE: FHWA “Highway Statistics Series,” Table SF-12A for each year, “State capital outlay and maintenance, classified by improvement type” (2004-2008). <http://www.fhwa.dot.gov/policy/ohpi/hss/hsspubs.cfm>

The analysis includes “ROW” (Right-of-Way), “New Construction,” “Reconstruction – Added Capacity,” “Major Widening,” and “New Bridge” as new capacity spending. It includes “Reconstruction – No Added Capacity,” all “3R,” and all bridge expenditures except “New Bridge” as state-of-good-repair spending. These spending amounts were totaled for the six road types listed for 2004-2008 to determine the total new capacity spending and SOGR spending over the five-year time period. Calculate total SOGR spending was divided by calculated total new capacity spending to produce the state ratios.

Non-motorized Transportation Investments

The following two criteria evaluate investments in non-motorized transportation. Together, these criteria were allocated 133 points, equaling the total GHG reduction potential of the Combined Bicycle and Combined Pedestrian strategies evaluated in *Moving Cooler* at the Expanded Current Practice deployment Level.

The Combined Bicycle strategies are defined as:

- “Complete streets’ policies adopted by state and local transportation agencies, requiring appropriate bicycle accommodations on all roadways;
- “Bicycle parking provided at all commercial destinations;
- “All new commercial buildings >100,000 sq. ft. required to provide showers, lockers, and covered/protected bicycle parking; all new multi-unit residential buildings have indoor bike parking;
- “Buses fitted with bike carriers, rapid transit stations have bike parking, all rapid transit lines are bike-accessible during off-peak hours;
- “School curriculums include safe cycling skills for children.”

The Combined Pedestrian strategies are defined as:

- “All new developments have buffered sidewalks on both sides of the street, marked/signalized pedestrian crossings at intersections on collector and arterial streets, lighting;
- “New or fully-reconstructed streets in denser neighborhoods (>4,000 persons/sq mi and business districts) incorporate traffic calming measures such as bulb-outs and median refuges to shorten street-crossing distances;
- “Complete streets’ policies adopted by state and local transportation agencies, requiring appropriate pedestrian accommodations on all roadways.”

This compares well to the two policy criteria evaluated, which, if implemented at a level that would receive full points, would likely result in many of the outcomes above.

Administering Federal Safe Routes to School Funding

This criterion was allocated 1/3 of the 133 point total, or 44.33 points. This converts to 9 points on our 100 point scale.

State scores are based on the percentage of Federal Safe Routes to School funding disbursed by the state between 2005 and 2010. States received 9 points for disbursing more than 80 percent, 4 points for distributing between 50 percent and 80 percent, and 0 points for disbursing less than 50 percent of funds.

SOURCE: Safe Routes to School National Partnership, Safe Routes to School Federal Program-State of the States (Life of program through March 2010). <http://www.saferoutespartnership.org/media/file/State-of-the-States-May-2010-FINAL.pdf>

Non-motorized Transportation Infrastructure

This criterion was allocated 2/3 of the 133 point total, or 88.67 points. This converts to 17 points on our 100 point scale.

State scores are based on the average percentage of federal transportation funding spent by a state on bicycle and/or pedestrian infrastructure between 2004 and 2009. States received 17 points for spending more than 2.5 percent of STP funds on non-motorized transportation; 12 points for 2 percent to 2.49 percent; 8 points for 1.5 percent to 1.99 percent; 5 points for 1 percent to 1.49 percent; and 0 points for spending less than 1 percent.

SOURCE: Alliance for Biking and Walking, Bicycling and Walking in the United States: 2010 Benchmarking Report (2010), pg 78.

Public Transportation Investments

The following two criteria evaluate investments in public transportation. Together, these criteria were allocated 208 points, equaling the total GHG reduction potential of several Public Transportation strategies evaluated in *Moving Cooler*, including: fare measures (19), level of service (45), and capital expansion (144). These strategies are defined as:

- By 2020, “Lower fares by 25% except where already at capacity. Decrease the cost of passes so as to provide at least a further 25% discount from the cost of equivalent single-fare purchases.”
- By 2025, “Implement signal prioritization, limited stop service, etc. over 5 years to improve travel speed an additional 10%.”
- By 2025, “Increase transit level of service by 1.5 times trend revenue mile expansion rates. Investments targeted in areas with at least 4000 persons/sq. mile or that otherwise facilitate increases in pax/VRM.”
- By 2010, “Expand service proportional to 3% per year ridership growth. Includes all transit modes.”
- By 2010, “Increase capital and operating assistance over baseline trend by 5% per year for 20 years to improve service in existing markets and expand operation of Amtrak-associated motor coach service.”

Two additional Public Transportation strategies evaluated in Moving Cooler – Intercity Passenger Rail and High Speed Passenger Rail – were omitted from the comparison because this report relies on policies and spending criteria focused local and regional public transportation service.

This compares well to the three policy criteria evaluated, which, if implemented at a level that would receive full points, would likely result in many of the outcomes above.

State financial contribution to public transportation

This criterion evaluates what portion of the cost of transit service in the state is paid for with state funds. This criterion was allocated ½ of the 208 point total, or 104 points. This converts to 20 points on our 100 point scale.

State scores are based on the percentage of in-state transit costs paid with state funds, averaged from 2004 to 2008. States received 20 points for paying more than 60 percent of transit costs, 18 points for paying between 50 percent and 59 percent, 16 points for paying between 40 percent and 49 percent, 8 points for paying between 20 percent and 39 percent, 4 points for paying between 10 percent and 19 percent, and 0 points for paying less than 10 percent of transit costs.

SOURCE: FTA, National Transit Database, “TS1.1: Total Funding Timeseries,” (2004-2008). <http://www.ntdprogram.gov/ntdprogram/data.htm>

NOTES: States received points based on the calculated percentage of total funding for transit for 2004-2008 covered by state-level sources (rather than federal sources, local sources, and ‘other’ sources). To calculate this percentage, the state-level contribution and total contribution to transit for each state were determined by summing the state-level and total funding contributions to each transit agency listed under that state in the table

Balanced State Transportation Investment

This criterion evaluates the balance of state transportation investments between highway and public transportation projects. This criterion was allocated ½ of the 208 point total, or 104 points. This converts to 20 points on our 100 point scale.

State scores are based on the average ratio of overall state spending on transit projects to highway projects between 2005 and 2006. States received 20 points for investing 60 percent as much funding in transit as in highways; 18 points for investing between 50 percent and 59 percent, 16 points for investing between 40 percent and 49 percent; 8 points for investing between 20 percent and 39 percent, 4 points for investing between 10 percent and 19 percent, and 0 points for investing less than 10 as much funding in transit as in highways.

SOURCE: Bureau of Transportation Statistics, RITA State Transportation Statistics, published 2007-2009 (actual data covers 2005-2007), Table 6-8, “Transportation Expenditures by State Governments.” http://www.bts.gov/publications/state_transportation_statistics/

NOTES: States received points based on a calculated ratio of spending on transit to spending on highways for years 2005-2007.

Category	Sub-Category	Criteria	Moving Cooler Equivalent	Deployment Level	Moving Cooler Points	Raw Point Allocation	100 Point Scale	Final Points	Scale details
INVESTMENT DECISIONS	Investment	CMAQ obligation rates (through March 2010)	System Ops and Mgmt Strategies	Expanded Current Practice	95	95.00	18.41	18	≥ 90% - 18
	Investment	Highway Maintenance Priority (ratio maintenance: new capacity, 2004-2008 avg)	Combined Land Use	Expanded Current Practice	160	80.00	15.50	16	≥ 0.75 - 16 0.5 to 0.75 - 12 0.4 to 0.49 - 9 0.3 to 0.39 - 6 0.1 to 0.29 - 3 < 0.09 - 0
	Investment	Safe Routes to School Funding Distribution	Nonmotorized	Expanded Current Practice	133	44.33	8.59	9	≥ 80% - 9 50% to 80% - 4
	Investment	Nonmotorized Transportation State Support (% Fed \$ allocated to bike/ped - 2004-2009 avg)	Nonmotorized	Expanded Current Practice	133	88.67	17.18	17	≥ 2.5% - 17 2% to 2.49% - 12 1.5 to 1.9% - 8 1 to 1.49% - 5 < 1% - 0
	Investment	State Financial Contribution to Public Transportation (Transit/hwy spending ratio 2005-2006 avg)	Public Transportation Strategies	Expanded Current Practice	208	104.00	20.16	20	≥ 60% - 20 50 to 59% - 18 40 to 49% - 16 20 to 39% - 8 10 to 19% - 4 < 10% - 0
	Investment	Overall State Financial Support for Public Transportation (2008)	Public Transportation Strategies	Expanded Current Practice	208	104.00	20.16	20	≥ 60% - 20 50 to 59% - 18 40 to 49% - 16 20 to 39% - 8 10 to 19% - 4 < 10% - 0
		TOTAL				529	100	100	

3. Touchstone Policy Criteria

Each of the Touchstone Policies was allocated bonus points equal to 5 percent of the state's base score. The bonus points are awarded to recognize the state's clear intention to reduce GHG emissions through transportation policy decisions. States that have followed through on this intention by taking greater action to reduce GHG emissions through transportation policy and investment decisions will have a higher base score and therefore receive a larger bonus.

Sources

State Target for Reducing VMT

MAIN SOURCE: Pew Climate Center on Global Climate Change, "VMT-Related Policies and Incentives," (Nov. 2009). http://www.pewclimate.org/what_s_being_done/in_the_states/vehicle_miles_traveled

CT SOURCE: Governor's Steering Committee on Climate Change, Connecticut Climate Action Plan (2005), pg 23. <http://ctclimatechange.com/index.php/2005-connecticut-climate-action-plan/>

NOTES: States identified on the Pew Climate Center map as having a VMT reduction target in place were awarded a 5% bonus. Connecticut was also awarded the bonus based on an identified VMT reduction target of 3% in its climate action plan.

Category	Sub-Category	Criteria	Moving Cooler Equivalent	Deployment Level	Moving Cooler Points	Raw Point Allocation	100 Point Scale	Final Points	Scale details
TOUCHSTONE POLICIES	Touchstone	State VMT reduction targets	n/a	n/a	n/a	n/a	5%	5%	Yes - 5%
	Touchstone	Transportation plans consider GHG emission impacts	n/a	n/a	n/a	n/a	5%	5%	Yes - 5%
	Touchstone	State gas tax revenues able to fund public transportation	n/a	n/a	n/a	n/a	5%	5%	Yes - 5%
		TOTAL				n/a	n/a	15%	

Consideration of GHG in Long Range Transportation Planning

SOURCE: ICF International, Integrating Climate Change into the Transportation Planning Process (2008), Section 4-Table 2, “State DOT Integration of Climate Change in Long-Range Planning Documents,” pg 14. <http://www.fhwa.dot.gov/hep/climatechange/>

States with adopted Long Range Transportation Plans listed in Table 2 received points. AZ did not receive credit because the integration of climate change in its plan was evaluated as too limited.

State Use of Fuel Taxes:

SOURCE: Brookings Institute, Center on Urban and Metropolitan Policy, Fueling Transportation Finance: A Primer on the Gas Tax (2003) Appendix 2, page 17. <http://www.brookings.edu/es/urban/publications/gastax.pdf>

States identified as having either no exclusivity provision for gas tax revenues or a statutory (rather than constitutional) provision received credit. States with constitutional restrictions did not receive points. A distinction was drawn between statutory and constitutional restrictions because several states have been able to circumvent their statutory restrictions and dedicate some money to transit in the past.

APPENDIX B: MOVING COOLER STRATEGY CHART

CUMULATIVE GHG REDUCTION, IMPLEMENTATION COSTS, AND CHANGE IN VEHICLE COSTS BY STRATEGY BY 2050									
Strategy Description	Expanded Current Practice Deployment (2010 to 2050)			Aggressive Deployment (2010 to 2050)			Maximum Deployment (2010 to 2050)		
	GHG Reduction (mmt) ^a	Implementation Cost Estimate ^b (\$B 2008)	Change in Vehicle Cost Estimate ^c (\$B 2008)	GHG Reduction (mmt) ^a	Implementation Cost Estimate ^b (\$B 2008)	Change in Vehicle Cost Estimate ^c (\$B 2008)	GHG Reduction (mmt) ^a	Implementation Cost Estimate ^b (\$B 2008)	Change in Vehicle Cost Estimate ^c (\$B 2008)
Pricing Strategies									
CBD/Activity Center on-street parking	33	< \$0.05	\$(26.8)	41	< \$0.05	\$(36.2)	42	< \$0.05	\$(37.8)
Tax/higher tax on free private parking	N/A	N/A	N/A	18	< \$0.05	\$(14.7)	31	< \$0.05	\$(26.8)
Residential parking permits	N/A	N/A	N/A	20	< \$0.05	\$(15.9)	48	< \$0.05	\$(40.4)
Cordon Pricing	66	\$24.2	\$(66.0)	76	\$36.1	\$(76.3)	92	\$39.3	\$(97.9)
Congestion Pricing	510	\$233.9	\$(522.8)	1,021	\$349.0	\$(792.9)	1,241	\$380.3	\$(1,033.8)
Intercity Tolls	31	\$33.6	\$(27.4)	54	\$44.7	\$(52.1)	105	\$58.5	\$(107.8)
PAYD	789	\$166.0	\$(831.2)	1,677	\$166.0	\$(1,678.0)	2,233	\$166.0	\$(2,225.8)
VMT fee ^d	280	\$166.0	\$(252.5)	840	\$166.0	\$(757.6)	3,361	\$166.0	\$(3,030.4)
Carbon Pricing (VMT impact)	350	< \$0.05	\$(316.1)	1,067	< \$0.05	\$(962.8)	4,744	< \$0.05	\$(4,246.2)
Carbon Pricing (Fuel economy impact)	1,181	< \$0.05	\$(236.7)	3,343	< \$0.05	\$(671.7)	10,442	< \$0.05	\$(2,121.1)
Land Use and Smart Growth Strategies									
Combined Land Use	160	\$1.5	\$(118.0)	865	\$1.5	\$(655.5)	1,445	\$1.5	\$(1,098.5)
Nonmotorized Transportation Strategies									
Combined Pedestrian	74	\$15.2	\$(64.4)	171	\$30.4	\$(148.4)	227	\$42.2	\$(197.2)
Combined Bicycle	59	\$4.6	\$(47.6)	117	\$20.6	\$(95.2)	176	\$37.7	\$(142.9)
Public Transportation Strategies									
Transit Fare Measures	19	< \$0.05	\$(17.8)	34	< \$0.05	\$(31.3)	78	< \$0.05	\$(72.2)
Transit Frequency/LOS/Extent	45	\$52.5	\$(47.0)	72	\$102.6	\$(99.3)	168	\$243.8	\$(265.5)
Urban Transit Expansion	144	\$255.0	\$(135.5)	281	\$503.0	\$(281.7)	575	\$1,197.3	\$(611.6)
Intercity Passenger Rail	46	\$19.3	\$(46.5)	47	\$35.6	\$(49.6)	50	\$76.1	\$(58.0)
High-Speed Passenger Rail ^e	73	\$99.6	\$(24.7)	97	\$108.2	\$(29.5)	143	\$144.2	\$(40.2)
HOV/Carpool/Vanpool/Commute Strategies									
HOV Lanes	48	\$171.8	\$(10.2)	64	\$231.9	\$(13.4)	141	\$569.1	\$(31.0)
HOV Lanes (24-hour applicability)	1	< \$0.05	\$(0.2)	1	< \$0.05	\$(0.3)	2	< \$0.05	\$(0.4)
Car-Sharing	37	\$0.2	\$(31.9)	77	\$0.3	\$(67.5)	163	\$0.3	\$(147.6)
Employer-Based Commute Strategies	252	\$106.0	\$(217.4)	486	\$120.8	\$(419.9)	1,165	\$135.6	\$(1,013.4)
Regulatory Measures									
Nonmotorized Zones	2	\$1.4	\$(1.3)	4	\$4.2	\$(3.2)	6	\$8.5	\$(4.9)
Urban Parking Restrictions	80	< \$0.05	\$(55.5)	189	< \$0.05	\$(135.6)	359	< \$0.05	\$(276.1)
Speed Limit Reductions	1,236	\$4.1	\$(389.8)	2,320	\$6.5	\$(753.6)	2,428	\$7.5	\$(805.1)
System Operations and Management Strategies									
Eco-Driving	727	< \$0.05	\$(134.9)	1,170	< \$0.05	\$(221.8)	1,815	< \$0.05	\$(366.9)
Ramp Metering	27	\$1.3	\$(4.5)	78	\$3.1	\$(12.3)	83	\$7.5	\$(13.2)
Variable Message Signs	2	\$0.8	\$(0.3)	2	\$2.0	\$(0.4)	3	\$4.8	\$(0.4)
Active Traffic Management	N/A	N/A	N/A	46	\$10.8	\$(7.7)	80	\$25.9	\$(13.0)
Integrated Corridor Management	N/A	N/A	N/A	46	\$10.8	\$(7.7)	80	\$26.0	\$(13.0)
Incident Management	58	\$2.2	\$(9.4)	72	\$5.4	\$(11.8)	80	\$12.9	\$(13.2)
Road Weather Management	1	\$2.0	\$(0.1)	1	\$4.9	\$(0.2)	2	\$11.8	\$(0.4)
Signal Control Management	3	\$2.5	\$(0.5)	18	\$6.1	\$(3.0)	37	\$16.9	\$(6.1)
Traveler Information	4	\$2.0	\$(0.7)	30	\$4.9	\$(4.8)	31	\$11.8	\$(5.0)
Vehicle Infrastructure Integration	65	\$42.6	\$(9.9)	16	\$42.6	\$(2.2)	8	\$42.6	\$(1.0)
Bottleneck Relief and Capacity Expansion Strategies									
Bottleneck Relief ^f	(3)	\$29.0	\$(124.7)	(5)	\$71.4	\$(218.7)	(11)	\$142.7	\$(481.1)
Capacity Expansion ^g	(4)	\$333.2	\$(175.3)	(7)	\$617.0	\$(324.6)	(15)	\$1,234.0	\$(650.5)
Multimodal Freight Strategies									
Rail Capacity Improvements	44	\$19.9	\$(18.5)	66	\$32.6	\$(27.7)	131	\$48.5	\$(55.5)
Marine System Improvements	5	\$4.0	\$(1.0)	8	\$8.0	\$(1.4)	12	\$17.7	\$(2.1)
Shipping Container Permits	8	< \$0.05	\$(1.6)	8	< \$0.05	\$(1.7)	9	< \$0.05	\$(1.9)
LCV Permits	8	< \$0.05	\$(9.6)	12	< \$0.05	\$(15.8)	15	< \$0.05	\$(17.2)
WIM Screening	1	< \$0.05	\$(0.1)	1	< \$0.05	\$(0.1)	1	\$0.1	\$(0.1)
Weigh Station Bypass	1	< \$0.05	\$(0.2)	1	< \$0.05	\$(0.2)	2	\$0.1	\$(0.2)
Truck Stop Electrification	11	\$0.6	\$(2.9)	25	\$1.3	\$(6.2)	46	\$2.2	\$(10.5)
Truck APUs	133	\$0.3	\$(28.8)	148	\$0.3	\$(32.6)	162	\$0.4	\$(36.5)
Truck-Only Toll Lanes	24	\$17.1	\$(4.6)	59	\$42.7	\$(11.5)	107	\$71.6	\$(20.7)
Urban Consolidation Centers	6	\$0.4	\$(1.6)	8	\$0.4	\$(2.3)	9	\$0.4	\$(3.1)

Note: This table summarizes how well each strategy is expected to help reduce GHGs by 2050, as well as the direct implementation costs and vehicle costs and savings of implementing these strategies. It is important to note that the results shown in this table for the individual strategies cannot simply be added together to estimate the impacts of combining strategies; the synergistic impacts of bundling the strategies are discussed in Section 4.2. LOS = level of service.

^a mmt = million metric tonnes greenhouse gases.

^b Implementation cost is the estimated cumulative cost to implement each strategy, including capital, maintenance, operations, and administrative costs.

^c Vehicle cost is the estimated cumulative reduction in the cost of owning and operating vehicles from a societal perspective, which would result with reductions in VMT and fuel consumption experienced with implementation of each bundle. Vehicle costs DO NOT include other costs and benefits that could be experienced as a consequence of implementing each bundle, such as changes in travel time, safety, user fees, environmental quality, and public health.

^d An equivalent national VMT fee could accomplish the same VMT reductions, but not the fuel efficiency reductions of carbon pricing. The deployment costs of VMT based fees could be shared with required vehicle technology or odometer audits for PAYD if both of these strategies were implemented using consistent approaches.

^e The evaluation of high-speed rail only takes into account the GHG emissions reduction associated with effects on surface transportation (and does not include air travel effects).

^f GHG emission reductions use the FHWA methodology, as used for the Conditions and Performance (C&P) reports, to project the effect of capacity expansion on future VMT. This methodology addresses induced demand and diverted travel and also assumes that increased user fees will pay for capacity expansions. If the C&P methodology were to be applied absent the user fee assumption, the estimated GHG produced by these strategies would increase to between 440-560 mmt (which is less than 1 percent of the Moving Cooler baseline). This result underscores the importance of pricing strategies.

APPENDIX C. ANALYSIS OF STATE SMART GROWTH LAWS AND POLICIES

The points allocated to each state for the “State has enacted smart growth laws” criteria were determined by Smart Growth America’s interpretation of the results of a proprietary report, commissioned by the Wallace Global Fund, which reviewed the quality and performance of statewide policy efforts to curb sprawl in each of the fifty states.

Points:

- 0: State either has taken no meaningful action to enact smart growth laws, or those laws are not being implemented in a way that has meaningful impact.
- 10: Weak; state smart growth laws exist but have only modest potential or actual effect on patterns of development.
- 15: Moderate; state has smart growth laws with potential or actual effect to reshape development.
- 20: Strong; state has strong smart growth laws with the potential or actual effect of significantly reshaping the patterns of development.

Narratives for states with scores of greater than 0 follow.

California: 20

California mandates comprehensive planning at the local level but those plans are not required to achieve Smart Growth outcomes. Not surprisingly, these planning requirements are not having measurable impacts at the state level.

However, several local government have taken action to curb sprawl at the local level, within the state authorization, and are having impacts on development patterns at a combined level equal to that of a small state.

California’s implementation of the Coastal Zone Management Act through the California Coastal Commission has delivered real results in protecting natural areas along the coast. The Commission has strong legal authority over permitting and the political support to exercise that authority.

In 2008 the California legislature passed SB 375. Obviously no analysis of the impact of SB 375 on sprawl is possible yet. Its impact on sprawl will be primarily determined by Metropolitan Planning Organizations and local governments’ discretion in developing Sustainable Community Plans or Alternative Plans, rather than the state law itself. Nonetheless:

1. the state law puts in place a strong framework that can be used to drive better coordination between transportation and land use, and, of particular relevance to this analysis, to do so in a way that reduces GHGs.
2. Various elements in SB 375 are intended to make it easier to build more dense housing, including requiring minimum density standards and revisions to the permitting standards under the California Environmental Quality Act. This may result in increased residential densities.

For its state and regional planning efforts California gets a 20, even though there is currently uncertainty about whether SB 375 will deliver results on the ground as opposed to just changes in planning documents.

Connecticut: 10

The most recently enacted Connecticut legislation concerning planning and growth patterns in the state were passed in 2007. House Bills 6428, 6441, and 6445—“Smart Growth” established a statewide policy of smart growth. It amended the general statutes to: (1) encourage and promote development where there is existing infrastructure, (2) discourage sprawl by increasing the land use planning and technical assistance capacity of the

Office of Policy and Management, (3) require a build-out analysis for 2032, 2042 and 2057, (4) implement a geographic information system, and (5) encourage each planning region to establish a regional council of government. While helpful, what was missing from the legislation is any regulatory component that would directly curb sprawl.

House Bill 7090, “An Act Concerning Responsible Growth” was also passed in 2007. The Act set standards for future growth in Connecticut and study land use laws, policies and programs.

While promising, these laws focus more on process than smart growth outcomes.

Florida: 10

Starting in 1987 Florida passed legislation it hoped would stop sprawl, conserve farmland and natural areas (especially wetlands) and promote more compact urban growth.

It used a combination of measures found in other states; mandatory local planning, review of those local plans and subsequent amendments to them by a state agency, targeting state infrastructure funds, substantial investments of public dollars in conservation, regional planning and review of developments of regional impact.

The best known element of the Florida program was the emphasis it gave to the concept of “concurrency”; not allowing development without adequate roads, waters, sewers and other forms of urban infrastructure.

Like Vermont and Oregon, Florida benefited from strong gubernatorial leadership at key moments. And, as in those two states, the politics of trying to reform the pattern of development has been turbulent.

Florida is also home to some more aggressive local efforts to curtail sprawl. Miami-Dade County and Sarasota-Sarasota County have the equivalent of urban growth boundaries and have made efforts to both increase density inside of them and to conserve rural lands outside of them. Orlando has also made an effort to establish limits to urban development.

The results of all the state efforts bear the closest parallel to Maryland; a lot of planning and analysis but very little change to development patterns. Its greatest achievement is probably in permanent protection of farmland and natural areas through purchase of these lands or conservation easements.

The local level efforts to curb sprawl may have had some beneficial effects in increasing urban densities but have not produced results in curbing rural sprawl.

The best prospects for new efforts to curb sprawl in the near term will be tied to efforts to reshape transportation investments and planning to reduce greenhouse gas emissions. Florida, like Louisiana, is very conscious of the consequences of sea level rise and therefore may be more willing to take action to address the problem.

Hawaii: 15

Hawaii adopted its statewide Land Use Law in 1961. The four-part zoning of the islands (urban, rural residential, agriculture and natural resources) remained remarkably stable over the first quarter-century of the program (1964-1987). The amount of land in the conservation zones dropped only about 1 percent, from 97 percent to 96 percent during a period of rapid growth.

The results of the state’s planning efforts are disputed. Some observers of development in the state regard the Land Use Law as ineffective in the face of powerful development pressures. There has been massive resort development along coastal areas on Maui (Kiehi, Lahina) and the island of Hawaii (Kona Coast.)

However, there is evidence that the Land Use Law has been effective in increasing urban densities and decreasing the amount of sprawl, compared to other states with comparable growth. Although the coastal resort development

is striking in its intensity on Maui and parts of the Kona Coast it is confined to a very narrow strip, less than a mile wide. Hawaii's land consumption per capita fell between 1982 and 1997.

Hawaii's simple law adopted decades before other states has made a measurable difference in its overall development patterns, even if it was unable to hold back development pressure from along many parts of its intensely valuable coastline. Hawaii has earned a solid 15 points for its laws and performance and perhaps time will show that a higher grade is merited.

Illinois: 10

Smart growth education efforts over the past 10 years have had an impact on statewide legislation in Illinois. Public and private programs, including the Campaign for Sensible Growth (in existence from 1999 to 2007), and various statewide task force's increased the public and decision maker's awareness of the costs of sprawl and the benefits of smart growth.

Unfortunately, almost all of the legislation makes voluntary guidelines for local governments. Rarely does the legislation include regulations. Some of the more effective bills have included funding mechanisms that promote smart growth.

There is no evidence that the voluntary planning provisions in the legislation are having any effects on land development patterns.

Maryland: 15

In 1974, the Maryland legislature passed the Land Use Act, which among other things, mandated the creation of a State Plan. In 1984, the Maryland Assembly passed legislation given the state oversight authority over development around the shores of the Chesapeake Bay.

In 1992, the Planning Act mandated the adoption of local comprehensive plans and implementing regulations that reflected seven state "visions." In 1997, Maryland Governor Parris Glendening took the approach of trying to direct development by organizing and targeting state infrastructure investment, a strategy also employed in New Jersey and later in Massachusetts.

This approach had numerous successes on multi-family and institutional development, and much less on single-family development, a high share of which has taken place outside areas designated for urban development.

Maryland also gets a higher score due to somewhat successful, local efforts to curb sprawl in Baltimore and Montgomery Counties where a significant share of the state's population lives. Although these are local efforts, they have benefitted and thus in some measure been supported by state policies and investments.

Massachusetts: 10

Governor Romney's effort to curb sprawl and promote compact growth through strategic use of state investments and incentives was possibly the most thoughtful and aggressively pursued program of its type.

His successor, Governor Deval Patrick, has expressed his support for compact growth and redevelopment. But his approach within the Executive Branch is more diffuse, and there is a question about whether it will be as effective.

In spite of a significant amount of executive action and legislation passed in the past 10 years on the subject of growth management, experts say that sprawl continues to be the predominant form of development.

Minnesota: 10

The Twin Cities region, which contains the majority of the state's population, has been nationally well known for its Metropolitan Council and its growth-management policies.

Because members of the Met Council are appointed by the Governor, the Council is, despite its regional charge, a creature of the state, and thus covered in this analysis.

The Metropolitan Urban Service Area (MUSA) is a type of urban growth boundary, defining areas sewer lines in particular will serve. The MUSA's impact on development patterns is driven both by decisions about where to locate it, and how to develop within it. Recent decisions in both cases by the most recent Council have supported rapid decentralization of the Cities.

The 1997 Community-Based Planning Act was viewed at the time as important Smart Growth legislation. Though a number of communities took advantage of the funding it provided for planning efforts and municipal cooperation, the local government plans that were adopted did not curb sprawl.

Minnesota's capacity to adequately manage growth pressures was seriously compromised when Governor Tim Pawlenty closed the State Office of Planning in 2003.

The state receives 10 points in recognition of the power of the Metropolitan Council's MUSA line to shape growth, when so used.

New Jersey: 15

New Jersey's effort to curb sprawl has taken two approaches.

One approach was through the adoption of the New Jersey State Development and Redevelopment Plan, which was intended to replace sprawl with focused, compact growth and the conservation of farmland and natural resources. The New Jersey State Plan was supposed to guide state infrastructure investment and through a process of consultation, local governments were encouraged, but not required, to adhere to the state plan framework.

The second approach is through three regional and one statewide land conservation measures; including the purchase and transfer of development rights in the Pinelands, Highlands and Meadowlands (which contain almost a third of New Jersey's lands). Some of these programs have been underway for three decades. Despite these efforts, New Jersey has seen much of its rural lands developed over the past 30 years, and ranks above the national median for land development in relation to population growth.

Without its regional land conservation efforts, New Jersey would merit a 10 because of weak performance in changing outcomes on the ground, but this combination of efforts earns New Jersey receives 15 points.

Nevada: 15

Nevada has a unique arrangement of state smart growth legislation limited to just the Las Vegas and Reno metropolitan areas. However, in recent years these two areas accounted for almost 90 percent of the state's population and its population growth and therefore these laws should be considered as having statewide impact.

Assembly Bill 493 passed in 1999 requires the adoption of regional metropolitan plans and those plans are supposed to achieve specified smart growth outcomes. Senate Bill 394 passed the same year requires metropolitan plans to address "the limitation of the premature expansion of development into undeveloped areas, preservation of neighborhoods and revitalization of urban areas, including, without limitation, policies that relate to the interspersions of new housing and businesses in established neighborhoods and set forth principles by which growth will be directed to older urban areas."

Although it is synonymous with sprawl in the desert, in fact Las Vegas' growth has become more compact; it is one of the few metropolitan areas that has been growing denser. Although terrain, Federal land ownership and water constrains also help shape development patterns, Las Vegas is doing better in modifying its growth patterns than similarly situated metro areas in the southwest.

The Reno-Sparks metro area has not done as well; important recent decisions have it implementing smart growth principles. For example, in 2009 local governments have authorized significant development on the 6,200 acre (10 square mile) Spring Mountain Planned Unit Development, 30 miles from downtown Reno.

This combination of a moderately strong metropolitan planning framework and improved performance entitles Nevada to 15 points.

Oregon: 20

Oregon has very strong anti-sprawl program in the form of a rigorous state policy framework and active state role. The structure of the program consists of (mostly) clear and mandatory binding state land use policies, carried out through the adoption and amendment of binding comprehensive land use plans and consistent implementing regulations. The law also requires state agency plans and programs to be consistent with state land use policy, although these provisions have been implemented only partially and half-heartedly at best.

The entire process is overseen by a statewide commission, which has been given wide powers to administer and enforce the program. The programs performance has also been enhanced by many organizations and active citizens who make use of liberal opportunities to challenge local government decisions that may violate state laws.

All cities in Oregon have urban growth boundaries; urban development is authorized only inside those boundaries. Ninety-five percent of the private land outside urban growth boundaries (40,000 square miles, an area about the size of Maine) is in Exclusive Farm Use or Forest Use zoning, as established by state law. This zoning sharply and separately limits land divisions and new homes and prohibits urban uses like residential subdivisions, shopping malls or office parks. Statewide, about 750,000 acres (1,200 square miles) outside urban growth boundaries are zoned for limited rural development, primarily for 2 to 20-acre homesite development (exurban sprawl.)

During an 11-year period in which 100,000 permits for new housing were issued inside the three counties encompassing the Portland, Oregon urban growth boundary, 90 percent of the residential permits were issued for sites inside the Portland UGB, 6 percent were inside other UGBs, 2 percent were located in rural residential zones and 2 percent were authorized in farm and forest zones. Population densities inside the Portland UGB have been rising steadily since about 1990.

Performance in other parts of the state, especially the Pacific coast and central Oregon falls far short of this standard. This demonstrates that administration and enforcement are just as important as laws and plans to achieving smart growth results.

The 2009 legislature passed a law requiring planning for greenhouse gas reduction planning in Oregon's MPOs, (similar to California's SB 375) with the additional requirements that an integrated land use and transportation plan to meet the greenhouse gas reduction goals must be adopted and implemented in the Portland metropolitan region.

These state policies and the measurable improvement in controlling sprawl across the state, despite falling short in some regions, earn Oregon the full 20 points.

Rhode Island: 10

The state's current "guide plan" is entitled "Rhode Island 2025" and was adopted in 2006. It contains four simple, but powerful goals, each one with a list of specific sub-goals:

- Goal 1. Build the greenspace and greenways system
- Goal 2. Achieve excellence in community design, [including] Focus growth in a variety of centers
- Goal 3. Develop first-class supporting infrastructure
- Goal 4. Implement the vision

The map contained in the plan shows development concentrated on the western shores of Narragansett Bay, focused in existing cities and towns and with the western part of the state maintained in a rural condition.

Tax Credit Incentive for Urban Revitalization

In addition to the state planning legislation, a notable part of the effort to curb sprawl was the 2002 Historic Tax Credit legislation, which was adopted in order to promote urban redevelopment. Owners of historic commercial properties can earn state income tax credits equal to 30 percent of qualified rehabilitation expenditures. Although other states have tax credit programs, the scale of the program in Rhode Island is what makes it significant.

As in many states, these efforts are having mixed success at best. The combination state's plan and far-better-than-average Tax Credit earn it 10 points.

Vermont: 20

Vermont has several decades of experience, and struggle, in adopting, implementing, defending and refining its efforts to curb sprawl and to promote a continuation of compact small-town development surrounded by farm and forestland, which is one of its distinguishing characteristics and greatest assets.

Vermont has adopted a spectrum of state laws and programs to promote and mandate smart growth outcomes. These include the adoption of regional plans, a permit review system for projects of regional significance, administered by regional commissions applying state criteria, tax and permitting incentives for redevelopment and infill and the coordination and direction of state agency actions to achieve smart growth outcomes.

Vermont (like other states) has struggled to translate these good planning requirements into good outcomes, but as has happened elsewhere, the results fall short of aspirations.

Vermont is one of two states in this report that have had success in curtailing sprawl by large-scale land conservation. This has been achieved through a generous (relative to the size of the state and land costs) and relatively steady stream of funding to the Vermont Housing and Conservation Board. Today about one-fifth of the state's total land area has been permanently protected.

For its strong laws and effective land conservation strategy, Vermont receives the full 20 points, despite deficiencies in implementation.

Virginia: 15

Virginia's has required local government comprehensive land use plans and implementing ordinances since 1975 but those state laws did not require smart growth outcomes.

The Comprehensive Transportation Funding and Reform Act of 2007 provides cities and counties funding and tools to reduce sprawl and traffic congestion, some of the most profound changes in land use planning seen in the Commonwealth of Virginia in a half century. Under the Act local governments with a 1990-2000 population growth rate of 15 percent or more or a 2000 population of at least 20,000 persons and a 1990-2000 population growth rate of 5 percent or more are required to designate Urban Development Areas (UDAs).

The Transportation Act of 2007 also encourages state and local expenditures for transportation, housing and economic development be focused in the UDA. While the term "encourages" is not defined, one could deduce that these efforts are voluntary, not mandatory.

Counties have until 2011 to incorporate these changes into their comp plans, so no evaluation is available yet.

Virginia has passed numerous laws that give local jurisdictions a variety of tools to address sprawl. In 2000, the state created the Virginia Agricultural Vitality Program to help underwrite the purchase of development rights and

protect farmland. To promote urban revitalization, the Urban Public-Private Partnership Redevelopment Fund also was started in 2000. The fund was designed to help local governments finance redevelopment of building sites, including costs for planning, clearing and remediation. Anti-sprawl policies were also adopted in the Chesapeake 2000 Agreement, which created a goal to reduce the rate of “harmful sprawl” by 30 percent by 2012.

Statewide Land Conservation

The General Assembly adopted two important programs to preserve open space in Virginia: the Open Space Land Act of 1966 and the Conservation Easement Act of 1988.

The Open Space Land Act was the first act to allow and state agency, county, or municipal governments to acquire land for open space.

Finally, efforts to manage development in the Northern Virginia / Washington DC regional are primarily regional, but have been supported by state transportation investments (in Virginia Rail Express and Metro).

Taken together, these laws, policies, and investments earn Virginia 15 points, with the caveat that we await the results of the implementation of the 2007 legislation.

Washington: 20

Washington’s Growth Management Act, adopted in 1991, is an (almost) statewide framework intended to replace sprawl with compact Smart Growth.

Of all the other state programs it most closely resembles the Oregon growth management program, (a comparison its drafters would take pains to reject.) Its provisions apply to the more populous and faster growing counties. They require the establishment of urban growth areas, the promotion of higher density development inside the UGAs, and the protection of farm and forestlands and natural areas outside UGAs. The implementation of the local planning provisions of the Growth Management Act are overseen by regional boards.

Detailed research shows that the Growth Management Act has had an impact on the patterns of the state’s urban growth, by increasing single family and multifamily development densities. This is especially apparent in King County, the location of Seattle and home to about 2 million people.

But just as in Oregon, implementation performance is very un-even. Some weaknesses built into the program (weak state oversight and enforcement powers) may have compromised its effectiveness in rural areas in the many counties that do not support its effort to stop exurban sprawl.

Nonetheless it is one of the nation’s strongest efforts to curb sprawl and earns Washington the full 20 points available for this category.

APPENDIX D: CO-BENEFITS OF REDUCING TRANSPORTATION GHG EMISSIONS

The policies that reduce transportation-sector GHG emissions, particularly investments in smart growth and multi-modal transportation, also generate numerous health and environmental co-benefits, some with quantifiable cost savings. Many in the business community recognize this and real-estate developers have hailed California's S.B. 375, a law that directs state and regional agencies to link land use, transportation, and affordable housing plans with GHG reduction targets, a "pro-growth strategy" that will be good for business.¹

1. Public Health Benefits

Automobile-dependence is closely linked to some of the leading causes of mortality and morbidity in the United States and smart growth policies can play a significant role in addressing the country's sky-rocketing health-care costs, estimated to be \$2.4 trillion in 2008, \$3.1 trillion in 2012, and \$4.3 trillion by 2016.²

Collisions decrease when people have transportation choices and drive less. Traffic crashes cause over 40,000 deaths a year and cost \$180 billion each year.³ The post-WWII growth pattern of low street connectivity and cul-de-sac development has been shown to have higher automobile collision fatality rates and pedestrian fatality rates.^{4, 5} Research shows that the risks of accidents, injuries, and fatalities to pedestrians and bicyclists decrease when rates of walking and bicycling increase.⁶

Sprawling land use patterns and an automobile-dependent transportation system contribute to the sedentary lifestyles and lack of opportunity for everyday physical activity. Physical activity is directly linked to the alarming obesity problem that costs an additional \$395 per person in yearly medical expenses or \$76 billion, approximately 10 percent of U.S. health care spending.^{7, 8, 9} However, the well documented link between the built environment and levels of physical activity also provides an opportunity to improve overall health and reduce the \$142 billion annual cost of obesity-related health care expenditures, lost wages, and premature deaths¹⁰ by improving land use and transportation planning. One study, for instance, found that Oregon could save \$206 million annually if every person in the state lost the 6 extra pounds per person experts attributed to urban sprawl.¹¹ The health cost reduction from increasing physical activity among those who do not currently meet recommended levels is estimated to be between \$420 million to \$28.1 billion.¹² The literature provides extensive evidence that higher levels of physical activity are associated with urban design and infrastructure supporting walking and cycling, mixed-use land use zoning, and increasing access to public transit.¹³ Walking associated with transit use is often enough to meet public health recommendations for physical activity of 30 minutes or more of moderate activity five days per week.¹⁴

An analysis of cost savings from reductions in mortality from increases in walking inspired by more walkable urban design for the Portland, OR region found that street connectivity saved up to \$23,205,007, retail employment density saved up to \$466,574, total employment density saved up to \$155,525 and population density saved up to \$8,353,802.¹⁵ Another analysis found that the 3.4 mile average bicycle commute in Madison, Wisconsin, expending 144kcal for a round trip, could amount to 9-10 lbs weight loss over a year, reducing risk of heart disease, stroke, breast cancer, colon cancer and type II diabetes.¹⁶

In addition to physical activity benefits, smart growth and clean transportation ensure that Americans have cleaner air to breathe. Traffic-related air pollution costs between \$50 billion and \$80 billion in health care costs and premature death, which can be reduced through planning as well as pricing mechanisms.¹⁷ Research shows that walkable, dense, mixed land use is associated with fewer vehicle-related emissions.¹⁸ The transportation strategy adopted to reduce downtown traffic congestion for the 1996 Summer Olympic games in Atlanta, for example, was found to have decreased peak morning traffic by 23 percent, peak ozone levels by 28 percent and asthma-related emergency room visits by children by 42 percent.¹⁹

2. Additional Environmental Benefits

Smarter land use planning preserves agricultural lands and open space. Sacramento planners discovered that their blueprint, or compact growth scenario, would reduce future land conversion from open space to developed land by 40 percent from the “business as usual” scenario.²⁰ The economic benefits include higher surrounding property values and the higher tax revenue per acre of agricultural land than other land use types. Trees themselves create extensive environmental benefits including \$3.8 billion in annual savings from reduced pollution.²¹ Tree cover in Garland, Texas avoids an additional 19 million cubic feet of stormwater each year saving \$2.8 million annually in construction costs and also avoided the need for additional stormwater retention structures in Washington, DC, saving the region \$4.74 billion in gray infrastructure costs per 30-year construction cycle.^{22, 23}

Smart growth also reduces water use, saving money for both users and service providers. Compact development can reduce outdoor water uses, such as lawn care, car washing, and pools, which accounts for 50 to 70 percent of household water use.²⁴ Higher residential density in Utah reduces water demand from approximately 220 gallons per capita per day to about 110 gallons per capita per day.²⁵ Smart growth can also delay or prevent the need to invest in expensive technologies like desalination by reducing depletion rates in water-poor regions and can reduce water-related energy use. In California water transmission accounts for 20 percent of overall electricity use and 1 to 3 percent of energy use across the country is for water and wastewater management costing about \$4 billion per year.²⁶ Water utility energy consumption ranges from 30 percent to 60 percent of urban energy bills. Reducing these figures by just 10 percent would save \$400 million and 5 billion kilowatt hours. The land use and infrastructure changes recently proposed by the governor of California are expected, by 2050, to save enough energy to power every home in the state for 50 years and enough water to fill the Hetch Hetchy Reservoir in Yosemite National Park more than 50 times.²⁷

Endnotes Appendix D

- 1 Schroerer, Will, June 10, 2010. "California Developers call SB 375 "a pro-growth strategy" that's good for business." *Smart Growth Around America Blog*.
- 2 Urban Design 4 Health, Inc. February 2010. *The Hidden Health Costs of Transportation*. American Public Health Association: Washington, DC. / Keehan, S. et al. 2008. Health spending projection through 2017. *Health Affairs*. Web Exclusive W146:21. February 28.
- 3 Urban Design 4 Health, Inc. February 2010. *The Hidden Health Costs of Transportation*. American Public Health Association: Washington, DC. / AAA. Crashes vs. Congestion Report. What's the Cost to Society? Cambridge, MD: Cambridge Systematics, Inc.; 2008. Available at: www.aaanewsroom.net/assets/files/20083591910.crashesVscongestionfullreport2.28.08.pdf. Adjusted to 2008 dollars.
- 4 Upstream Public Health. May 2009. *Health Impact Assessment on Policies Reducing Vehicle Miles Traveled in Oregon Metropolitan Areas*. Upstream Public Health: Portland, OR. Available at: <http://www.upstreampublichealth.org/newsroom?type=reports> / (Lucy, 2003; Ewing, Schieber, & Zegeer, 2003)
- 5 Upstream Public Health. May 2009. *Health Impact Assessment on Policies Reducing Vehicle Miles Traveled in Oregon Metropolitan Areas*. Upstream Public Health: Portland, OR. Available at: <http://www.upstreampublichealth.org/newsroom?type=reports> / (Beck, Paulozzi, & Davidson, 2007; Paulozzi, 2006)
- 6 Upstream Public Health. May 2009. *Health Impact Assessment on Policies Reducing Vehicle Miles Traveled in Oregon Metropolitan Areas*. Upstream Public Health: Portland, OR. Available at: <http://www.upstreampublichealth.org/newsroom?type=reports> / (Shefer & Rietveld, 1997; Lovegrove & Sayed, 2006)
- 7 Urban Design 4 Health, Inc. February 2010. *The Hidden Health Costs of Transportation*. American Public Health Association: Washington, DC. / Sturm R. 2002. The Effects Of Obesity, Smoking, And Drinking On Medical Problems And Costs. *Health Affairs*, March/April: 245-253.
- 8 Rails to Trails Conservancy. *Active Transportation for America*. 2008. Rails to Trails Conservancy: Washington, DC. / Centers for disease control and prevention, Overweight and Obesity: Economic Consequences. 2007 / Pratt, M., et al., Higher direct medical costs associated with physical inactivity. *Physician Sports Medicine*, 2000
- 9 Rails to Trails Conservancy. *Active Transportation for America*. 2008. Rails to Trails Conservancy: Washington, DC. / Centers for disease control and prevention, Overweight and Obesity: Economic Consequences. 2007 / Anderson, I.H., et al., Health care charges associated with physical inactivity, overweight, and obesity. *Prev Chronic Dis*, 2005.
- 10 Urban Design 4 Health, Inc. February 2010. *The Hidden Health Costs of Transportation*. American Public Health Association: Washington, DC. / National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. Statistics Related to Overweight and Obesity: The Economic Costs. Available at: <http://win.niddk.nih.gov/statistics/index.htm>
- 11 Upstream Public Health. *Health Impact Assessment: Creating a Transportation Policy for a Healthier Oregon* Fact Sheet: http://www.upstreampublichealth.org/newsroom?type=fact_sheet / Smart Growth America, "Measuring the Health Effects of Sprawl." 2003. <http://www.smartgrowthamerica.org/healthreport.html>
- 12 Rails to Trails Conservancy. *Active Transportation for America*. 2008. Rails to Trails Conservancy: Washington, DC.
- 13 Upstream Public Health. May 2009. *Health Impact Assessment on Policies Reducing Vehicle Miles Traveled in Oregon Metropolitan Areas*. Upstream Public Health: Portland, OR. Available at: <http://www.upstreampublichealth.org/newsroom?type=reports> / (Li, Peter, Harmer et al., 2008; Kitamura, Mokhtarian, & Laidet, 1997; Hoehner, Ramirez, Elliot, Handy, & Brownson, 2005; McCormack, Giles Corti, & Bulsara, 2008).
- 14 Upstream Public Health. May 2009. *Health Impact Assessment on Policies Reducing Vehicle Miles Traveled in Oregon Metropolitan Areas*. Upstream Public Health: Portland, OR. Available at: <http://www.upstreampublichealth.org/newsroom?type=reports> / (Edwards, 2008; Besser & Dannenberg, 2005; Villanueva, Giles-Corti, & McCormack, 2008; Wener & Evans, 2007; Vernez Moudon, Lee, Cheadle et al., 2007)
- 15 Urban Design 4 Health, Inc. February 2010. *The Hidden Health Costs of Transportation*. American Public Health Association: Washington, DC. /

- 16 Jonathan Patz presentation for EESI Congressional Briefing, May 24, 2010 / WHO, CRA 2002
- 17 Urban Design 4 Health, Inc. February 2010. *The Hidden Health Costs of Transportation*. American Public Health Association: Washington, DC. / Federal Highway Administration. 2000. Addendum to the 1997 Federal Highway Cost Allocation Study Final Report, May 2000. Available at: www.fhwa.dot.gov/policy/hcas/addendum.htm; Adjusted to 2008 dollars.
- 18 Upstream Public Health. May 2009. *Health Impact Assessment on Policies Reducing Vehicle Miles Traveled in Oregon Metropolitan Areas*. Upstream Public Health: Portland, OR. Available at: <http://www.upstreampublichealth.org/newsroom?type=reports/> (Frank, Sallis, Conway, Chapman, Saelens, & Bachman, 2006; Frank, Stone, & Bachman, 2000).
- 19 Patz, Jonathan presentation for EESI Congressional Briefing, May 24, 2010 / Friedman, Michael S., Kenneth E. Powell, Lori Hutwagner, LeRoy M. Graham, and W. Gerald Teague. 2001. *Journal of the American Medical Association*. 285 (7):897-905.
- 20 Sacramento Region Blueprint Transportation/Land Use Study “Special Report: Preferred Blueprint Alternative,” 2007. <http://www.sacregionblueprint.org/sacregionblueprint/home.cfm>
- 21 Nowak 2006
- 22 Beattie, Knollin, and Moll, “Trees Help Cities Meet Clean Water Regulations” cited in, Paul M. Sherer, “Benefits of Parks: Why America Needs More City Parks and Open Space,” Trust for Public Land, 2006 http://www.tpl.org/content_documents/parks_for_people_Jul2005.pdf; Protecting Water Resources with Smart Growth, http://www.epa.gov/smartgrowth/pdf/waterresources_with_sg.pdf
- 23 Smart Growth for Clean Water: Helping Communities Address the Water Quality Impacts of Sprawl (National Association of Local Government Environmental Professionals; Trust for Public Land; ERG: 2003)
- 24 EPA. “Growing towards More Efficient Water Use: Linking Development, Infrastructure, and Drinking Water Policies.” 2006.
- 25 EPA. “Growing towards More Efficient Water Use” citing Eckhoff, Dave. “Per Capita Residential Water Use as a Function of Density” June 24, 2003.
- 26 House Committee on Transportation and Infrastructure, Hearing on Sustainable Wastewater Infrastructure, 2/4/09.
- 27 Calthorpe Associates. May 2010. *Vision California – Charting Our Future, Statewide Scenarios Report*. Available at <http://www.visioncalifornia.org/reports.php>