

FOCUS ON

CLIMATE CHANGE & TRANSPORTATION



A TRENDS IN AMERICA SPECIAL REPORT



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FOCUS ON: CLIMATE CHANGE & TRANSPORTATION

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FOCUS ON: CLIMATE CHANGE & TRANSPORTATION

Executive Summary

- ▶ The climate is unequivocally warming due to greenhouse gas emissions resulting from human activities, according to the Environmental Protection Agency's Dec. 7, 2009, Endangerment Finding. That warming will pose severe risks related to health, the environment and infrastructure as a result of rising sea levels, higher temperatures and an increase in severe weather events.
- ▶ Transportation is the second-leading source of greenhouse gas emissions, representing 28 percent of all greenhouse gas emissions, and thus constitutes a key target in the battle against climate change.
- ▶ Researchers say policymakers need to take a three-pronged approach to reduce carbon dioxide, CO₂, one of the most common greenhouse gases, by improving vehicle fuel economy, changing the types of fuel used and reducing the number of vehicle miles Americans travel.
- ▶ A suite of policy options is available to state policymakers in order to mitigate the effects of climate change. These include renewable fuel standards, congestion pricing and behavioral strategies. Many states and localities are already seeking to mitigate climate change:
 - 17 states are adopting California's greenhouse gas emission standards;
 - 12 states have enacted renewable fuel standards that require gasoline to have a minimum percentage of ethanol mixed in;
 - The city of San Jose, Calif., coordinated traffic signals at more than 200 intersections, reducing an estimated 4,200 tons of CO₂ a year by smoothing traffic flow;
 - Utah enacted an experimental four-day work week in the 2009 fiscal year, cutting vehicle miles traveled by government employees and cutting greenhouse gas emissions by more than 12,000 metric tons;
 - Arlington, Va., enacted transit-oriented development policies that led to population growth of more than 1 percent per year with no growth in vehicle miles traveled.
- ▶ In addition to such ad hoc policy options, states can also address climate change in state-wide long-range transportation plans and by broadly transforming current public policies and procedures that increase sprawl and automobile dependence.
- ▶ Mitigating climate change, however, will not be enough. States will need to draft plans that adapt to its effects and will need to consider such actions as moving roads and bridges inland, building protective levees, and revising engineering standards to withstand more extreme storms and other events.
- ▶ So far only 10 states have begun drafting adaptation plans. Adaptation planning involves:
 - Identifying regional and local hotspots;
 - Assessing the structural integrity of transportation infrastructure; and
 - Establishing guidelines for future infrastructure development.
- ▶ If states take a proactive approach to mitigating and adapting to climate change, they can moderate its effects and reduce its impacts while saving potentially billions of dollars in remediation costs in the long-run.

The Threat of Climate Change

The Environmental Protection Agency announced Dec. 7, 2009, that greenhouse gases threaten the public health and welfare of the American people and that on-road vehicles contribute to that threat. According to the EPA, “warming of the climate system is unequivocal,” and this warming is due to an increase in anthropogenic, or human-induced, greenhouse gas emissions. Warming is expected to accelerate over the course of the 21st century, raising global temperatures by three to seven degrees Fahrenheit. This will result in sea-level rise, with increased risk of flooding; reduced snow-pack, meaning diminished water supplies; and numerous health-related risks associated with higher temperatures; more severe weather events such as hurricanes; and poorer air quality.¹

Though the impacts of warming cannot be completely averted due to the carbon dioxide already in the atmosphere, the effects of climate change can be ameliorated by reducing future emissions of greenhouse gases.

While stationary sources of greenhouse gas emissions, such as power plants and cement factories, are often easier to target in an attempt to mitigate climate change, transportation produces enormous amounts of greenhouse gases. Thus, reducing emissions from transportation sources is essential in order to mitigate climate change.

This brief explores the relationship between transportation and climate change and the policies—such as congestion pricing and alternative fuels—states and localities are adopting in an effort to ameliorate the effects of climate change.



The Role of Transportation in Climate Change

Transportation accounts for 28 percent of greenhouse gas emissions,² second only to electricity generation. The majority of these emissions (approximately 62 percent) come from light-duty vehicles, that is, passenger cars and trucks.³ Personal transportation is therefore a key target in the battle against climate change.

Since 1990, greenhouse gas emissions from light-duty vehicles have grown by 19 percent.³ By 2035, transportation is expected to continue to be the second largest emitter of greenhouse gases, though emissions will rise only a modest 10 percent due to increased biofuels requirements at the federal level, the advancement of plug-in hybrids, and greater fuel efficiency for vehicles because of Corporate Average Fuel Economy standards.⁴



Though the growth rate in emissions is expected to slow, emissions need to be further reduced in order to mitigate the more severe impacts of climate change. In the EPA's Endangerment Finding, the "future warming is very likely to be larger than warming during the 20th century," even with low emissions growth.¹

The Three-Legged Stool

Researchers say the reduction of greenhouse gases, in particular carbon dioxide, can be viewed as a three-legged stool—policies in all three areas are needed to make the reduction a reality. Those areas are improving the fuel economy of vehicles on the road, changing the types of fuel used and reducing the number of vehicle miles Americans travel.⁵

In recent years, Congress has taken steps to address two legs of the stool. With the Energy Independence and Security Act of 2007, Congress mandated 35 mile per gallon Corporate Average Fuel Economy, known as CAFE, standards and a 10 percent reduction in the greenhouse gas intensity of motor fuels by 2020. The third leg of the stool—reducing how much people drive—was not addressed.⁶ But, there are numerous policy options at all levels of government to address all three legs of the stool.

Improving Fuel Economy

CAFE Standards

Corporate Average Fuel Economy is the federal fuel economy standard. With the 2007 legislation, the standards were set to 35 miles per gallon by 2020 for both cars and light trucks, up from a combined average of 25 miles per gallon today (27.5 miles per gallon for cars). The U.S. Department of Transportation's National Highway Safety Administration, which is responsible for setting CAFE standards, joined the EPA in proposing a joint rule that would require model year 2016 vehicles to meet a 35.5 miles per gallon requirement and produce, on average, no more than 250 grams of CO₂ per mile. Model year 2009 vehicles emit an average of 380 grams of CO₂ per mile.⁷ The rule would take effect in 2012 and requires an annual increase in fuel economy standards of 5 percent. The proposed rule was developed in consultation with a broad set of stakeholders that included automakers.

The EPA estimates that "the proposed standards would reduce CO₂ emissions from the U.S. light-

duty fleet by approximately 21 percent by 2030 over the level that would occur in the absence of the national program.”⁸

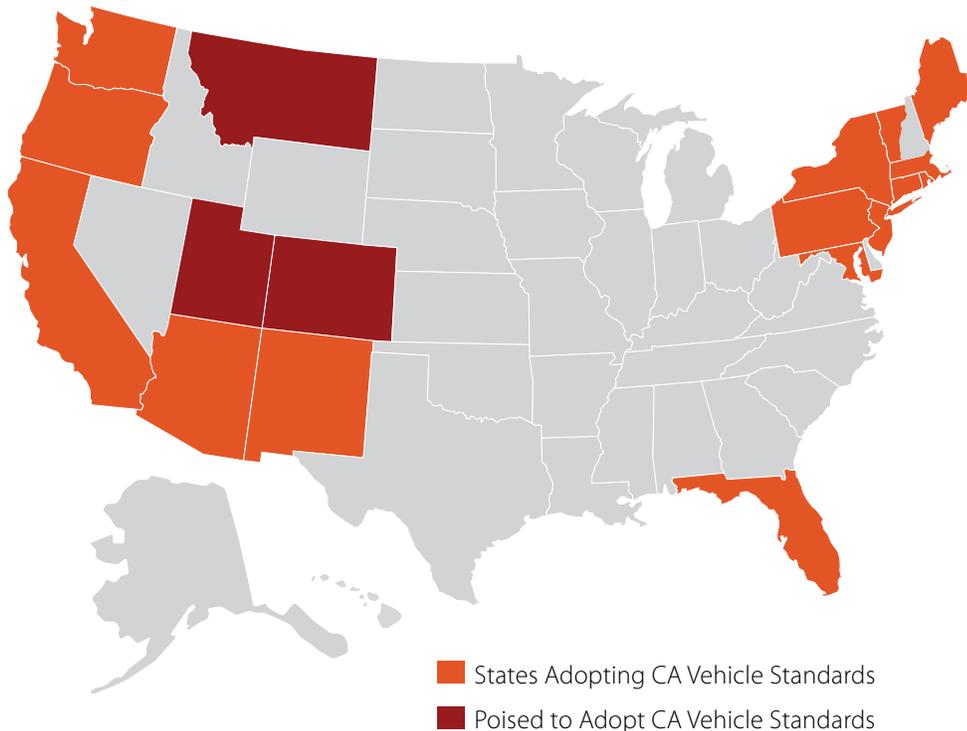
In June 2009, California received approval for a Clean Air Act waiver request from the EPA that will allow the state to enforce its own greenhouse gas emissions standards for new motor vehicles, beginning with 2009 model year vehicles. California is the only state in the nation permitted to set standards higher than the federal government under the Clean Air Act. Other states, however, can adopt California’s measures if they choose to do so. According to the Pew Center on Global Climate Change, 17 states—Arizona, Colorado, Connecticut, Florida, Maine, Maryland, Massachusetts, Montana, New Jersey, New Mexico, New York, Oregon, Pennsylvania, Rhode Island, Utah, Vermont and Washington—have either adopted

California’s standards or intend to adopt them.⁹ Beginning in 2012 and continuing through 2016, California and the other states will suspend their rules and follow the federal guidelines. Those states that want to take advantage of an early opportunity to reduce greenhouse gas emissions may consider adopting California’s rule.

System Efficiency

Many say one of the keys to improving fuel economy involves improving the efficiency and operation of the roads themselves. Research shows that a vehicle sitting in traffic consumes more energy and emits more greenhouse gas emissions per mile than a vehicle operating at a moderate but consistent speed. States can invest in and encourage strategies to improve traffic flow, reduce stop-and-go traffic, reduce conges-

Vehicle Greenhouse Gas Emissions Standards



Source: Pew Center on Global Climate Change http://www.pewclimate.org/what_s_being_done/in_the_states/vehicle_ghg_standard.cfm

tion and stabilize travel speeds. According to a 2009 report from the American Association of State Highway and Transportation Officials, nicknamed AASHTO, this can be done by making use of technology (both old and new) with intelligent transportation systems that cut down on congestion and idling including:

- ▶ Ramp metering, which uses traffic signals at freeway on-ramps to control the rate of vehicles entering the freeway;
- ▶ Message signs that warn of disruptions ahead;
- ▶ Real-time traveler information;
- ▶ Variable speed limits, which help cars flow smoothly onto a highway; and
- ▶ Advanced traffic signal controls that change timing based on traffic load.¹⁰

According to Congressional testimony from Randal O'Toole, a senior fellow at the Cato Institute, a nonprofit public policy research foundation headquartered in Washington, D.C., the potential impact of traffic signal coordination in particular shouldn't be underestimated.

"A small investment in signal coordination can do more to reduce greenhouse gas emissions than billions invested in transit," O'Toole told a U.S. Senate subcommittee in July 2009. "For example, San Jose recently coordinated signals at 223 intersections, which reduced emissions by 4,200 tons per year at a cost of about \$7 per ton. When the savings to motorists are counted, the project actually saved \$200 per ton of reduced emissions. Yet the Federal Highway Administration estimates that three-quarters of the nation's traffic signals are obsolete or have no coordination at all."¹¹

Road projects that help eliminate bottlenecks can also increase system efficiency. AASHTO's 2009 report points to examples like the Legacy Parkway Project in Utah, a \$685 million four-lane highway that provides an alternate route to the state's most congested freeway and has reduced afternoon commutes between Salt Lake City and Farmington from 42 minutes to just 16 minutes. Another would be Omaha's West Dodge Expressway, a \$100 million project which will build two elevated bridges to relieve congestion at the city's busiest intersection.¹⁰

But state governments can also seek to improve system efficiency by encouraging drivers to change the way they operate their vehicles.

The concept of "EcoDriving" aims to instill new habits that reduce emissions. These include: avoiding rapid stops and starts, using cruise control, planning trips using the shortest routes, avoiding idling, buying automated E-ZPasses for toll roads, using the highest gear possible, checking tire pressure monthly and removing excess weight from the vehicle.

Countries such as Sweden require EcoDriving skills as part of driver education.¹⁰ The Auto Alliance, an organization representing vehicle makers, estimates that:

- ▶ If just half of all drivers nationwide practiced moderate levels of EcoDriving, annual carbon dioxide emissions could be reduced by about 100 million tons, or the equivalent of heating and powering 8.5 million households.
- ▶ If all Americans practiced EcoDriving, it would be equal to 450 billion miles traveled on our roadways without generating any CO₂ emissions. That's 1,500 CO₂-free miles for every man, woman and child in the U.S. each year.

On their Web site, the Auto Alliance touts the support of 18 governors for EcoDriving educational programs.¹²

Changing the Types of Fuels Used

Ethanol

Another series of policy options relate to encouraging a shift to fuels that produce lower or no CO₂ emissions. Ethanol, a biofuel additive for gasoline that can be produced from agricultural raw materials, may be one such fuel. According to the EPA, a gallon of gasoline produces 19.4 pounds of CO₂ emissions.¹³ A gallon of ethanol produces 12.7 pounds of CO₂ emissions. While ethanol directly produces less greenhouse gases than gasoline, there has been some debate about its lifecycle emissions; that is, the overall lifecycle emissions from the planting of the corn—or other raw agricultural products used for fuels—to its harvesting and, ultimately through its consumption as a fuel.

Nevertheless, states recognize that a greater use of ethanol—whether through increased blends with gasoline such as E10 (gasoline with 10 percent ethanol mixed in) or E85, where ethanol is the primary component—will result in fewer emissions of carbon dioxide. According to the

Pew Center on Global Climate Change, as of June 2009, 38 states have incentives that promote the production and use of ethanol and 12 states have enacted renewable fuel standards requiring that gasoline have a specific ethanol content.¹⁴

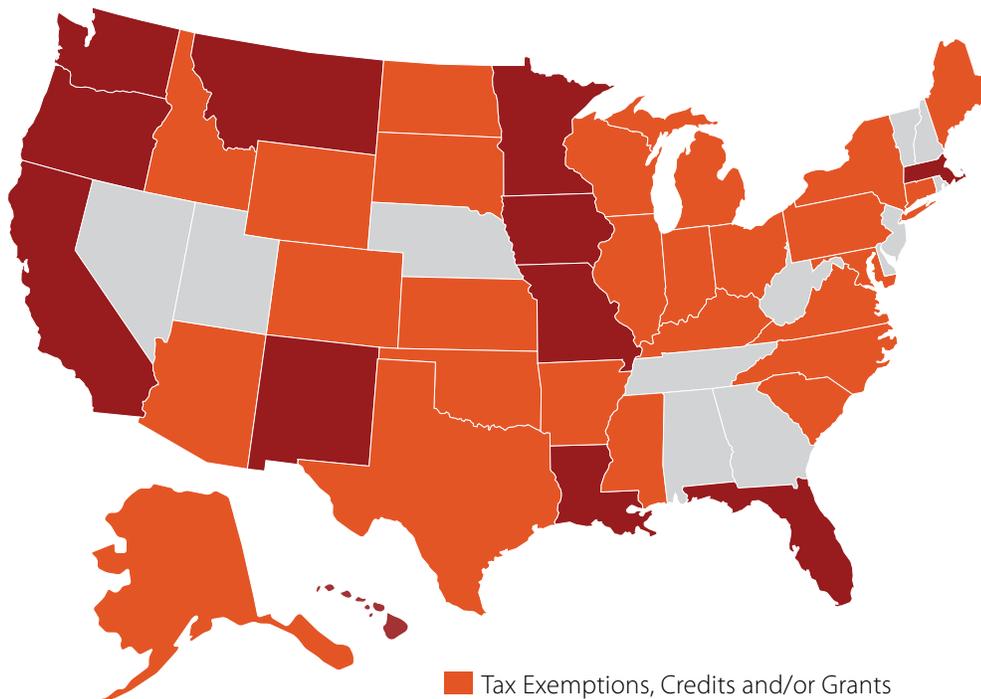
California, for example, requires all gasoline produced at its refineries to contain 10 percent ethanol. Florida, Missouri, Montana and Oregon have similar laws. Minnesota ups the ante and requires 20 percent ethanol by 2013. And Massachusetts provides a gasoline tax exemption for biofuels that reduce lifecycle greenhouse gas emissions by 60 percent when compared to gasoline.¹⁴

Diesel

Clean diesel, or ultra low sulfur diesel as it is technically known, has dramatically improved over the past several decades, reducing its sulfur content by 97 percent. Ultra low sulfur diesel was mandated by the EPA to become the standard beginning Dec. 1, 2010.

According to the Diesel Technology Forum, a nonprofit organization that serves to raise awareness about the economic and environmental potential of diesel technology, clean diesel is 20 to 40 percent more fuel efficient than gasoline and produces 10 to 20 percent less CO₂.

Mandates & Incentives Promoting Biofuels



Thirty-eight states provide incentives promoting ethanol production and use. Twelve states have also introduced their own Renewable Fuels Standard.

Source: Pew Center on Global Climate Change, http://www.pewclimate.org/what_s_being_done/in_the_states/map_ethanol.cfm

An added benefit of diesel vehicles is that the infrastructure largely exists, making it easy to find pumping stations, which can often be a problem with ethanol. (The EPA estimates that as of the fourth quarter of 2009, 99 percent of all highway pumps are now using ultra low sulfur diesel.¹⁵)

The Diesel Technology Forum suggests states offer incentives to conduct retrofits of diesel fleets in order to offset greenhouse gas in the near-term. For example, the Virginia Port Authority has established the Green Operators program, which provides low-cost financing to conduct retrofits of older vehicles.¹⁶ Likewise, the Texas Legislature established and funded, at \$7.5 million, the Clean School Bus Program, which aims to retrofit buses older than 10 years.¹⁷



Hybrids & Other Vehicles

Hybrid vehicles like the Toyota Prius and the Honda Insight, which use a combination of gasoline and electricity, can get more than 50 miles per gallon and achieve greater fuel economy and lower emissions than conventional gasoline engines. States like Virginia promote the use of hybrid cars by allowing single drivers of those vehicles to ride in high occupancy vehicle lanes along with the carpoolers for whom they were originally intended.¹⁰ Cities like Los Angeles and New Haven, Conn., have in recent years permitted owners of hybrid vehicles to park free at metered spots. Several states also exempt hybrids from motor vehicle emissions and inspection testing requirements.¹⁸ Many states have also either tried or considered various rebates, tax incentives, credits or exemptions for hybrid vehicles. But tight state budgets, declining tax revenues and the growing popularity of hybrids may prompt states to rethink these efforts in the years ahead. Last year, the D.C. Fiscal Policy Institute, a Washington-based think tank that is part of the Center on Budget and Policy Priorities, recommended eliminating the hybrid car sales tax exemption in the nation's capital as a potential revenue-raising proposal. "While at one point it may have made sense to create incentives to buy a hybrid car, hybrids are now an accepted part of the car market, and high gas prices offer substantial incentives for new car buyers to consider a hybrid," according to the organization's Web site.¹⁹

A number of states have also sought to encourage the conversion of state vehicle fleets to low or zero emission vehicles by a certain date. Washington, for example, passed a law that requires state agencies to achieve 40 percent fuel usage from electricity or biofuel by June 1, 2013, for operating publicly owned vehicles.²⁰ In 2008, Massachusetts passed legislation requiring various state and regional agencies to develop a 10-year statewide plan for the development of hybrids and alternative fuel vehicles and related technologies.²¹ Lawmakers in Massachusetts also proposed legislation in 2005 to provide tax credits to corporations with vehicle fleets of more than 50 that are comprised of at least 10 percent alternative fuel vehicles.

The ultimate goal, however, is of course to have more zero-emission vehicles on the road, perhaps ones that run on natural gas or exclu-

sively on electricity. Hybrids still use gasoline for power, but the engine also charges batteries for use when the engine is off. States can work with local governments to ensure that the facilities and infrastructure are in place to accommodate such vehicles with residential and public charging and fueling options. According to AASHTO, San Francisco and Portland are already competing to become the first cities to offer electric charging stations for the vehicles. And though the U.S. does not yet have an infrastructure to fuel natural gas vehicles on a large scale, many homes already use natural gas for heating and cooking and it's believed these home sources could be tapped to fuel personal vehicles.¹⁰

Reducing Vehicle Miles Traveled

Land Use Patterns

But even if vehicle and system efficiency improvements occur and fuel carbon content decreases, some predict that CO₂ emissions will continue to rise because those changes will simply be overwhelmed by the growth in driving over the next decades. According to "Growing Cooler," a 2009 report by the Urban Land Institute, "the U.S. cannot achieve ... large reductions in transportation-related CO₂ emissions without sharply reducing the growth in the number of miles driven." Since 1980, the number of miles Americans drive has grown three times faster than the U.S. population and almost twice as fast as vehicle registrations, according to the Federal Highway Administration.⁵

Many believe that one very big way to reduce the number of miles traveled would be to move away from development patterns in our cities and communities that have created the sprawling, disconnected places that exist now and to move toward denser, more all-purpose developments where residents can live, work and shop without driving.

A 2009 review of nearly 100 studies conducted over the last two decades indicates more compact development would cut driving by 5 to 12 percent. The review, by the National Research Council, also said denser development will cut fuel use and CO₂ emissions, but by how much is unclear. If 75 percent of new and replacement housing units were built in more compact developments, which the review considers unlikely, residents of these communities would drive 25

percent less. Such a decline could cut CO₂ emissions 7 to 8 percent by 2030. In a more realistic scenario, according to researchers, 25 percent of future housing in denser communities could result in a 12 percent reduction in driving but as little as a 1 percent drop in emissions by 2030.²²

Nevertheless, if one accepts that reducing vehicle miles traveled is critical to reducing emissions that impact climate change, one policy option is investing in public transportation and centering all-purpose communities around it. Transit-oriented development is a key part of Smart Growth initiatives around the country. Investing in bike and pedestrian infrastructure can pay dividends as well, many believe. AASHTO proposed \$500 million or more be spent annually nationwide on trails and other facilities.¹⁰

In July 2009 testimony before the U.S. Senate Environment and Public Works Committee, Steve Winkelman of the Center for Clean Air Policy related the following evidence:

- ▶ In Arlington, Va., extensive transit-oriented development policies led to population growth of more than 1 percent per year with no growth in vehicle miles traveled. This would be equivalent to a 20 to 30 percent reduction in vehicle miles traveled per capita from 1980 to 2005.
- ▶ Through comprehensive investments in transit, bicycle and pedestrian infrastructure, the Portland-Vancouver region saw a per capita vehicle miles traveled reduction of 8 to 10 percent, while national vehicle miles traveled per capita grew by 8 percent. During this same time, population grew by 14 percent and the region grew as an economic center. Portland's bicycle infrastructure investment is also credited for a reduction of greenhouse gas emissions by 26,500 tons CO₂ in five years, and another 36,700 tons CO₂ over the following five years.⁶

Winkelman went on to cite a few other studies that project reductions in the number of vehicle miles traveled as a result of land use planning:

- ▶ In Sacramento, Calif., a series of public workshops with local government staff and elected officials produced a Preferred Blueprint scenario that depicts a way for the region to grow through the year 2050.²³ It takes into account transportation choices, mixed-use and compact development and other growth principles.²⁴ Research

found the Preferred Blueprint land use scenario would reduce vehicle miles traveled per capita between 6 and 10 percent in 2035.⁶ The group also found that the vehicle miles traveled per day per household would decline from 47.2 miles to 34.9 miles.²⁵

- ▶ A study by the management consulting firm McKinsey and Company for Georgia, which proposed a number of transit, system efficiency and transportation demand management measures, projects a 7 percent reduction in vehicle miles traveled per capita for the Atlanta metropolitan area, from 2010 to 2030, if the measures are implemented.⁶

James Oberstar, chairman of the U.S. House Transportation and Infrastructure Committee, gave another example of the impact transit can have during a July 2009 interview on the Public Radio International program "Living On Earth."

"Boise, Idaho, in the 1880s through 1950 or so, had a wonderful streetcar system that started in the downtown, traveled out to the outskirts of the city to a beautiful picnic area," Oberstar

said. "Little further on there was a chapel where weddings took place. And it all was done on the streetcar. And then the streetcar was abandoned in favor of the automobile. And now a few years ago the mayor of Boise invited me out to look at the smog suffocating the city because it's in sort of a bowl and you have mountains on both sides and the emissions are trapped in this. Now they want to rebuild their streetcar. And they're working on it. Choices like that are being made all across America."²⁶

Indeed, according to AASHTO, a kind of renaissance in intercity passenger rail transportation is taking place in the U.S. right now. A commitment of \$8 billion in the American Recovery and Reinvestment Act of 2009 is expected to spur even more activity on intercity and high speed rail projects around the country. Altogether, 13 rail corridors received part of the \$8 billion in January 2010 to jumpstart high-speed rail networks and plans. California, Florida and Illinois were the only three states to win grants of more than \$1 billion each, according to the White House.

"Intercity passenger rail service in North America can provide the traveling public with



a genuine transportation alternative,” according to a 2009 AASHTO report. “Passenger rail service which is well-connected to other transportation modes and systems, including commuter rail and other public transit alternatives, will further enhance its utility.”¹⁰

Road Pricing & Vehicle Miles Traveled

But thinking about how we plan our communities and providing transportation options aren’t the only policy ideas that might reduce the number of vehicle miles traveled. Several mechanisms that could be the future for raising revenues to fund transportation may also have an impact on how much we drive and the resulting emissions. These mechanisms, which are examples of a concept called road pricing, attempt to assess vehicles for the costs they impose on society. Examples include conventional tolling as well as variable rate pricing for the use of high occupancy toll lanes. Fees can be charged based on factors like the level of congestion on a given roadway or the time of day, with higher charges for peak hours and lower charges for off-peak hours. Research shows these charges can impact the number of trips motorists take, the total miles they travel, the times at which trips are taken and other indicators.²⁷

Some believe the ultimate extension of the road pricing concept is to charge motorists a fee for the actual number of miles they travel. Such a vehicle miles traveled charge was tested with success in a pilot project in Oregon. Officials there said the project demonstrated the viability of the concept as well as its popularity among pilot participants. Such a vehicle miles traveled charge could involve installing global positioning systems or other devices in cars that monitor the amount of miles driven. The pilot project in Oregon and a similar one in Washington suggest when people pay a fee based on their driving, they tend to drive fewer miles mainly by combining trips.¹⁰ Vehicle miles traveled systems are already online in Europe and three federal commissions have recommended that the U.S. transition to a vehicle miles traveled charge system as soon as realistically possible. But a number of technology, logistics and policy hurdles remain and most don’t expect to see a vehicle miles traveled system on a wide scale in this country for about a decade.

Other Travel Demand Management Policy Options

In his July testimony, Winkelman, from the Center for Clean Air Policy, also lists a number of other emissions reduction strategies that seek to manage travel demand that he said can yield quick results. They include:

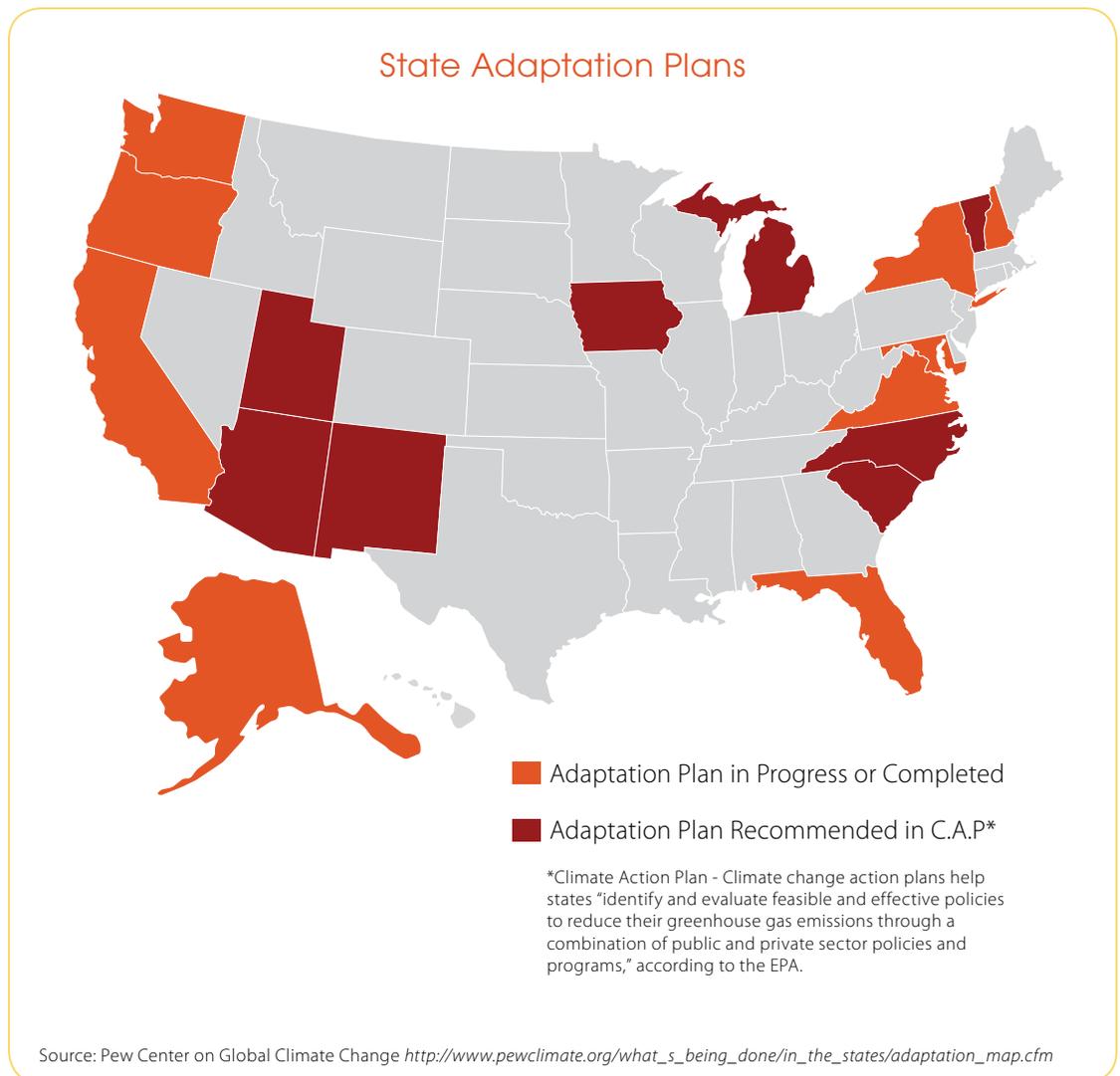
- ▶ Comprehensive, statewide travel demand management programs—Winkelman cites as an example the Washington State Commute Trip Reduction Performance Program.⁶ The program, approved by the Washington legislature in 1991, helps to reduce traffic congestion, air pollution and fuel consumption by working with local jurisdictions and major employers to reduce drive-alone commuting. Nearly 1,100 worksites in Washington participate in the program, which encourages employees to carpool, work from home, ride the bus, walk or bike to work, and to compress their 40 hour workweek to four days. Employees made more than 26,000 fewer vehicle trips each weekday morning in 2007 as a result of the program and in the process reduced emissions of nearly 4,000 tons of air pollution.²⁸
- ▶ Telecommuting/Telework Programs—Companies like AT&T found that telecommuting reduces vehicle emissions by approximately 44,000 metric tons.²⁹
- ▶ Compressed Work Weeks—Winkelman said working fewer days can cut vehicle miles traveled by 10 to 20 percent.⁶ Utah ran a yearlong experiment in the 2009 fiscal year with a four-day workweek for thousands of government employees, a policy Gov. Gary Herbert has now decided to extend. The state estimates that by eliminating a Friday commute for those employees, the initiative will cut greenhouse gas emissions by more than 12,000 metric tons.³⁰
- ▶ Carpooling—The Washington legislature in 2003 created a vanpool grant program that assists public transit agencies with capital costs of putting new vans on the road and provides incentives for employers to increase employee vanpool use.³¹
- ▶ Parking Cash Out/Parking Pricing—California enacted legislation in 1992 that requires many employers to offer employees the option to choose cash in lieu of any parking subsidy offered. At eight employers that complied with

the program, solo driving to work fell by 17 percent, carpooling increased by 64 percent, transit ridership increased by 50 percent, walking and bicycling increased by 33 percent and commuter parking demand fell by 11 percent. Total vehicle miles traveled for commuting were reduced by an average of 12 percent or a total of 1.1 million vehicle miles traveled annually.³²

- ▶ **Public Information Campaigns**—Portland, Ore., was the first city in the U.S. to use individualized marketing to try to reduce vehicle miles traveled and has seen success. The SmartTrips program, based on similar ones in Europe and Australia, was started by the Portland Office of Transportation in 2002. The program delivers packets of information to residents who wish to learn more about all their transportation options. Packets include biking and walking maps and information about organized activities that get people out in

their neighborhoods or places of employment to shop, work and discover how many trips they can make without using a car. The program has reportedly yielded a reduction of 9 to 13 percent in drive-alone car trips by all area residents with a corresponding increase in walking, bicycling and transit mode shares in SmartTrips areas.³³

- ▶ **Pay-As-You-Drive Insurance**—These programs require all insurers to utilize mileage driven in determining insurance rates for all their customers. Customers with lower mileage would pay reduced rates. Such insurance plans, which first became available in 2004 and are now available in 30 states, have been somewhat slow to catch on. But a 2008 Brookings Institution study estimates that if all motorists paid for accident insurance per mile rather than in a lump sum, driving would decline by 8 percent nationwide, CO₂ emissions would decline by 2 percent and oil consump-



tion would go down 4 percent.³⁴ The California Department of Insurance announced in 2009 it plans to mandate 100 percent adoption of Pay-As-You-Drive insurance beginning in 2010.

State Long-Range Transportation Plans

Statewide long-range transportation plans provide another vehicle to address the issue of climate change in state policy.

Connecting Maine, adopted in 2007, is the state's long-range transportation plan for 2008-2030. The plan includes a section, "Greenhouse Gases and Global Warming," that cites the need for long-term strategies like using low-greenhouse gas fuel, implementing tailpipe emissions standards, reducing the number of vehicle miles traveled and increasing the availability of low-greenhouse gas travel choices including transit passenger rail, vanpools, walking and biking. The plan also cites the importance of using transportation investments to enable businesses and individuals to shorten their trip times and use more fuel-efficient modes of transportation.³⁵

Connecticut's long-range transportation plan includes the following mandate: "Protect and enhance the environment, promote energy conservation, improve quality of life, and promote consistency between transportation improvements and state and local planned growth and economic development patterns." To that end, it sets out the following principles:

- ▶ Encouraging and supporting responsible growth efforts that focus on integrating land use planning with transportation, affordable housing, retail and employment in a manner that discourages sprawl, provides and expands non-motorized mobility options, and facilitates the use of public transportation options.
- ▶ Developing and using transportation demand management tools to encourage commuters to use alternative rideshare options such as carpooling, vanpooling, telecommuting, compressed workweeks, and flextime.
- ▶ Continuing to integrate Connecticut's air quality goals into the state's transportation planning to mitigate the effects of transportation projects on air quality.
- ▶ Continuing to investigate the potential for improvements to the state's transportation system that will reduce greenhouse gas emissions.

- ▶ Encouraging transportation research and projects that explore innovative solutions to reduce greenhouse gas emissions.
- ▶ Continuing to participate on the governor's Steering Committee on Climate Change and supporting the committee's efforts to implement recommendations for reducing greenhouse gas emissions generated by the state's transportation system.³⁶

The long-range transportation plan in Massachusetts, adopted in 2006, includes the following action items:

- ▶ Aggressively pursuing the acquisition of alternative fuel vehicles and related infrastructure for all transportation agencies; and
- ▶ Continuing to explore the feasibility of using recycled materials for pavements. Experts say recycled materials in roadway construction can reduce energy use and thereby reduce greenhouse gas emissions.³¹

Other Policy Objectives

In addition, the Urban Land Institute report offers a list of broader key policy objectives for each level of government that could help transform current public policies that increase sprawl, dependence on the automobile and greenhouse gas emissions. The report said implementing an effective Smart Growth strategy for climate stabilization will require reorienting local zoning codes, public spending priorities and transportation policies. Among the state actions suggested in the report:

- ▶ Translating state greenhouse gas reduction goals into vehicle mile traveled reduction targets—The targets could be proportionally allocated to metropolitan regions within the state. Each metropolitan planning organization could be charged with developing a plan for meeting its respective target.
- ▶ Aligning state spending with climate and Smart Growth goals—States can begin by analyzing the criteria used to distribute all state and federal funds in housing, economic development, water and sewer infrastructure, schools, transportation and recreation. States could earmark and distribute a portion of these funds according to local performance in meeting greenhouse gas emissions and vehicle miles traveled reduction targets.

- ▶ Adopting a statewide “complete streets” policy and funding program—This program could require that pedestrian and bicycle facilities be provided on all new and reconstructed streets and highways and that pedestrian and bicyclist needs be considered in routing roadway operation and maintenance. It could also mandate that new streets be interconnected and cul-de-sacs be discouraged so that travel distances for pedestrians and bicyclists are minimized.⁵

State Climate Adaptation Plans

While it is possible to reduce the impacts of climate change through the policy options discussed above, it will be impossible to avert them to a certain degree. States are therefore developing plans that anticipate and prepare for impacts in a variety of contexts, including transportation. The Pew Center on Global Climate Change reports that 10 states are developing climate change adaptation plans: Alaska, California, Florida, Maryland, Massachusetts, New Hampshire, New York, Oregon, Virginia and Washington.³⁷

What effects will climate change have on transportation? According to Pew, transportation infrastructure is expected to face challenges from the erosion and flooding of roads to extreme temperatures which can impact the strength and durability of the infrastructure.

California’s Climate Change Adaptation Strategy draft, for example, projects that extreme heat could potentially warp railroad tracks and derail trains, as well as buckle highways.³⁸ In addition, the higher average temperatures that result from climate change, together with more extreme rainfall, could lead to an increase in mudslides. Finally, sea-level rise will put an estimated 2,500 miles of roads and railroads at risk from flooding.³⁴

California is considering several actions to address these potential problems. For example, the California Department of Transportation is considering moving three miles of coastal highway approximately 500 feet inland to protect against cliff erosion.³⁴ The Department of Transportation also predicts it will need to raise bridges and streets and move some roads inland.

The California Department of Transportation will undertake several initiatives to guard against climate change, beginning with identifying local and regional hot spots for early action, assessing the structural integrity of transportation infrastructure, and establishing guidelines for buffer-zones.³⁴

And though California estimates these adaptation measures will cost billions of dollars, it expects that amount will be considerably less than the cost of cleaning up and repairing climate-induced catastrophe.



References

- ¹ Environmental Protection Agency. "EPA's Endangerment Finding: Climate Change Facts, Environmental and Welfare Effects, & Health Effects." December 7, 2009. Accessed from: <http://www.epa.gov/climatechange/endangerment.html> December 21, 2009.
- ² Transportation Research Board. "A Transportation Research Program for Mitigating and Adapting to Climate Change and Conserving Energy, 2009, p. 1." October 2009. Accessed from: <http://onlinepubs.trb.org/onlinepubs/sr/sr299.pdf> December 21, 2009.
- ³ EPA. "Greenhouse Gas Emissions from the U.S. Transportation Sector, 1990-2003," March 2006. Accessed from: <http://www.epa.gov/oms/climate/420r06003.pdf> December 21, 2009.
- ⁴ Energy Information Administration, Annual Energy Outlook 2010, Reference Case, accessed from: <http://www.eia.doe.gov/neic/speeches/newell121409.pdf> on December 15, 2009.
- ⁵ Ewing, Reid; Bartholomew, Keith; Winkelman, Steve; Walters, Jerry; and Chen, Don. "Growing Cooler: The Evidence on Urban Development and Climate Change." Urban Land Institute. 2008. Accessed from: <http://www.smartgrowthamerica.org/documents/growingcoolerCH1.pdf> December 3, 2009.
- ⁶ Senate Environment and Public Works Committee. Testimony of Steve Winkelman, Center for Clean Air Policy. July 14, 2009. Accessed from: http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=8a92a671-848a-4eef-b75d-79b150d3e944 December 3, 2009.
- ⁷ Steven Mufson. "Vehicle Emission Rules to Tighten: U.S. Would Also Raise Fuel Mileage Standards by 2016." Washington Post, May 19, 2009. Accessed from: <http://www.washingtonpost.com/wp-dyn/content/article/2009/05/18/AR2009051801848.html> December 21, 2009.
- ⁸ EPA. "EPA's Endangerment Finding, Paving the Way Toward the Next Generation of Cars and Trucks." Accessed from: http://www.epa.gov/climatechange/endangerment/downloads/EndangermentFinding_LightDutyVehicleProgram.pdf December 21, 2009.
- ⁹ Pew Center on Global Climate Change. "Vehicle Greenhouse Gas Emissions Standards." Accessed from: http://www.pewclimate.org/what_s_being_done/in_the_states/vehicle_ghg_standard.cfm on December 15, 2009.
- ¹⁰ American Association of State Highway and Transportation Officials. "Real Transportation Solutions for Greenhouse Gas Emissions Reductions." 2009. Accessed from: <http://realsolutions.transportation.org/Documents/RealSolutionsReport.pdf> December 3, 2009.
- ¹¹ Senate Banking Subcommittee on Housing, Transportation and Community Development. Testimony of Randal O'Toole, Senior Fellow, Cato Institute. July 7, 2009. Accessed from: <http://www.cato.org/testimony/ct-ro-20090707.html> December 3, 2009.
- ¹² Auto Alliance. "Southern Governors Endorse EcoDriving USA." Press Release. Accessed from: <http://www.ecodrivingusa.com/#/news-and-events/?type=single&post=206>
- ¹³ EPA. "Emission Facts: Average Carbon Dioxide Emissions Resulting from Gasoline and Diesel Fuel," 2005. Accessed from: <http://www.epa.gov/OMS/climate/420f05001.htm> December 21, 2009.
- ¹⁴ Pew Center on Global Climate Change. "Mandates and Incentives Promoting Biofuels," updated June 17, 2009. Accessed from: http://www.pewclimate.org/what_s_being_done/in_the_states/map_ethanol.cfm December 21, 2009.
- ¹⁵ EPA Ultra Low Sulfur Diesel Pump Survey. Accessed from: http://www.clean-diesel.org/pump_survey.html February 5, 2010.
- ¹⁶ Diesel Technology Forum, "Clean Diesel Technology Powers Virginia", April 2009. Accessed from: <http://www.dieselforum.org/policy/state-corner/news-center/pdfs/VA%20Fact%20Sheet%20FINAL.pdf> on February 5, 2010.
- ¹⁷ Diesel Technology Forum, "Clean Diesel Technology Powers Texas", September 2008. Accessed from: <http://www.dieselforum.org/policy/state-corner/state-fact-sheets/DTF%20Fact%20Sheets-13%20TX.pdf> on February 5, 2010.
- ¹⁸ "Hybrid Vehicle Purchase Incentives: Federal Tax Credits & State Incentives." Whybuyhybrid.com. Accessed from: <http://www.whybuyhybrid.com/hybrid-buying-incentives.htm#state> December 4, 2009.
- ¹⁹ D.C. Fiscal Policy Institute. "Revenue-Raising Proposals, July 2009." Accessed from: <http://dcfpi.org/wp-content/uploads/2009/07/7-27-09-dcfpi-revenue-ideas.pdf> January 15, 2010.

- ²⁰ Washington House of Representatives. "House Bill 1481 Second Substitute" Effective Date 7/26/09.
- ²¹ "An Act Relative to Green Communities." 2008 Massachusetts Laws, Chapter 169. Accessed from: <http://www.mass.gov/legis/laws/seslaw08/sl080169.htm>
- ²² National Research Council. "Driving and the Built Environment: The Effects of Compact Development on Motorized Travel, Energy Use, and CO2 Emissions." August 2009. Accessed from: http://books.nap.edu/openbook.php?record_id=12747&page=1 December 4, 2009.
- ²³ Sacramento Region Blueprint. "The Project." Accessed from: http://www.sacregionblueprint.org/sacregionblueprint/the_project/discussion_draft_preferred_scenario.cfm December 7, 2009.
- ²⁴ Sacramento Region Blueprint. "Discussion Draft Blueprint Preferred Scenario for 2050 Map and Growth Principles." Accessed from: http://www.sacregionblueprint.org/sacregionblueprint/the_project/principles.pdf December 7, 2009.
- ²⁵ Sacramento Region Blueprint. "Preferred Blueprint Alternative Special Report." June 2007. Accessed from: http://www.sacregionblueprint.org/sacregionblueprint/the_project/BP_Insert_JUN_2007.pdf December 7, 2009.
- ²⁶ Living on Earth. "Transforming Transportation: Interview with Rep. James Oberstar." Transcript. July 17, 2009. Accessed from: <http://www.loe.org/shows/segments.htm?programID=09-P13-00029&segmentID=4> December 7, 2009.
- ²⁷ Schuitema, Michael. "Road Pricing as a Solution to the Harms of Traffic Congestion." *Transportation Law Journal*. 34 (2007):81-112. Accessed from: <http://law.du.edu/pdfdocuments/transpoarchive/v34.pdf> December 7, 2009.
- ²⁸ Washington State Department of Transportation. "Commute Trip Reduction Results - It Works." Accessed from: <http://www.wsdot.wa.gov/TDM/CTR/CTRworks.htm> December 7, 2009.
- ²⁹ Center for Clean Air Policy. "Examples of Short Term Strategies to Increase Travel Efficiency and Reduce Greenhouse Gas Emissions." Accessed from: <http://www.ccap.org/docs/resources/715/Short-Term%20Travel%20Efficiency%20Measures%20cut%20GHGs%209%2009%20final.pdf> December 21, 2009
- ³⁰ Brock Vergakis. "Utah gov keeps 4-day workweek." Associated Press. December 3, 2009. Accessed from: http://www.trib.com/news/state-and-regional/article_78cef17e-2897-5595-9e32-4c5e174e79da.html December 22, 2009.
- ³¹ Washington State Department of Transportation. "Status Report on Vanpool Grant Program." Accessed from: <http://www.wsdot.wa.gov/TDM/Vanpool/grantStatus.htm> December 7, 2009.
- ³² Shoup, Donald C. "Evaluating the Effects of Parking Cash Out: Eight Case Studies." California Environmental Protection Agency Air Resources Board. September 1, 1997. Accessed from: <http://www.arb.ca.gov/research/abstracts/93-308.htm> December 7, 2009.
- ³³ WalkingInfo.org. "Portland SmartTrips." Accessed from: <http://www.walkinginfo.org/library/details.cfm?id=3961> December 7, 2009.
- ³⁴ Bordoff, Jason E. and Noel, Pascal J. "Pay-As-You-Drive Auto Insurance: A Simple Way to Reduce Driving-Related Harms and Increase Equity." Brookings Institution. July 2008. Accessed from: http://www.brookings.edu/~media/Files/rc/papers/2008/07_payd_bordoffnoel/07_payd_bordoffnoel.pdf December 8, 2009.
- ³⁵ Federal Highway Administration. "Highways & Climate Change: Chapter Four: Inclusion of Climate Change in Existing Transportation Plans." Accessed from: http://www.fhwa.dot.gov/hep/climatechange/chapter_four.htm December 8, 2009.
- ³⁶ Connecticut Department of Transportation. "Connecticut on the Move: Strategic Long-Range Transportation Plan 2009-2035." June 2009. Accessed from: http://www.ct.gov/dot/lib/dot/documents/dpolicy/lrp/2009lrp/lrp2009_final_document_june_2009.pdf December 8, 2009.
- ³⁷ Pew Center on Global Climate Change. "Adaptation Planning- What U.S. States and Localities are Doing." August 2009. Accessed from: <http://www.pewclimate.org/docUploads/state-adapation-planning-august-2009.pdf> December 21, 2009.
- ³⁸ California Natural Resources Agency. "2009 Climate Adaptation Strategy Discussion Draft." 2009. Accessed from: <http://www.energy.ca.gov/2009publications/CNRA-1000-2009-027/CNRA-1000-2009-027-F.PDF> December 21, 2009.



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