TDM*Review*

Climate Change

Opportunities for a TDM Response

The Role of TDM and Other Transportation Strategies in State Climate Action Plans

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A growing number of states are drafting plans to reduce their greenhouse gas emissions, and incorporating transportation strategies as a key element of these plans. ICF has facilitated the transportation and land use components of climate action plans for several states, including; Arizona, New Mexico, Colorado, Montana, North Carolina, and Vermont, under contract to the Center for Climate Strategies (CCS). In this article we look at the basic process for drafting state climate action plans, and the role of transportation strategies—including transportation demand management (TDM)—in these plans.

Background

Human-induced climate change is the one of the most pressing environmental problems of the 21st century. An increase of average global temperatures of just a few degrees threatens to melt polar ice caps, raise sea levels, increase extreme weather events, and change patterns of rainfall and snowfall worldwide. These shifts in climate will have drastic implications for natural systems as they disrupt ecosystems, change habitat functions, and threaten some species with extinction. Climate change threatens humans, too, with flooding, droughts, and disruptions to food and water supplies. Scientist and policymakers alike find the threat significant and anthropogenic sources of greenhouse gas emissions (GHGs) to be the primary cause.

The attention of scientists and policymakers is now increasingly turning to what can be done to reduce GHG emissions. The transportation sector, as one of the most prolific emitters of GHGs, is a focus of attention. Transportation,

including on-road and non-road vehicles, accounted for about 28 percent of U.S. GHG emissions in 2005. [1] Figure 1 shows trends in the percentage share of GHG emissions by economic sector. Within the transportation sector, light-duty vehicles are the largest source of GHGs, followed by heavy-duty vehicles (LDVs). Figure 2 illustrates the breakdown of transportation emissions. Additionally important to note, 31% of all transportation related GHGs are from passenger cars. [1]
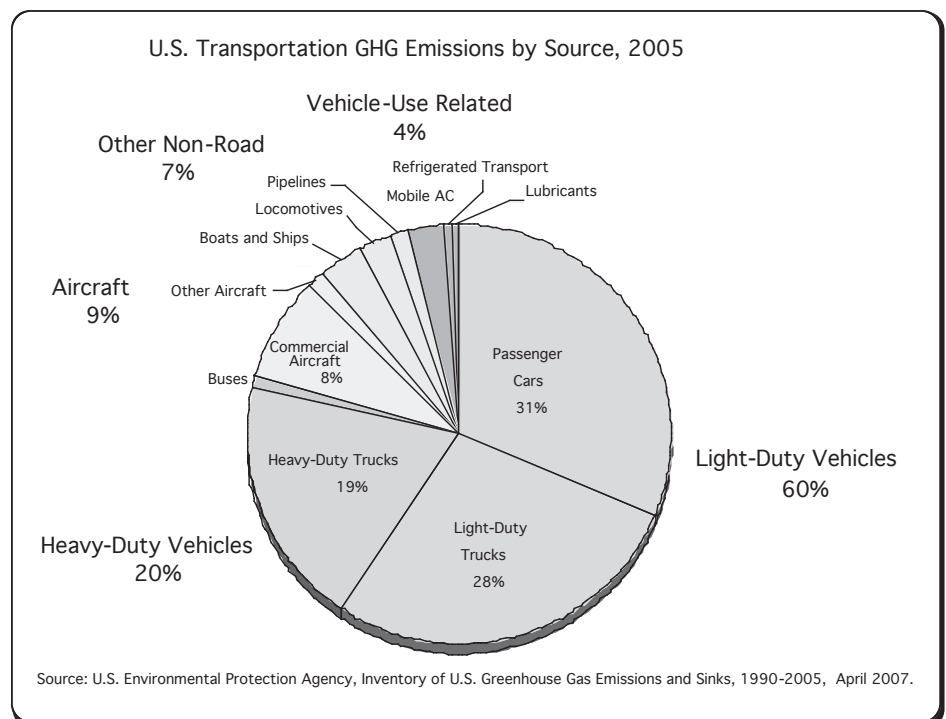
In addition to being one of the most significant sources of GHG emissions, the transportation sector is also the fastest growing source of emissions. The sector accounted for nearly half of the growth in U.S. GHG emissions between 1990 and 2005. In the absence of policies to reduce GHG emissions from transportation, the

sector is expected to continue to show the most rapid growth between now and 2030. The U.S. Energy Information Administration projects a 40 percent increase in CO_2 emissions from transportation over that period. [2]
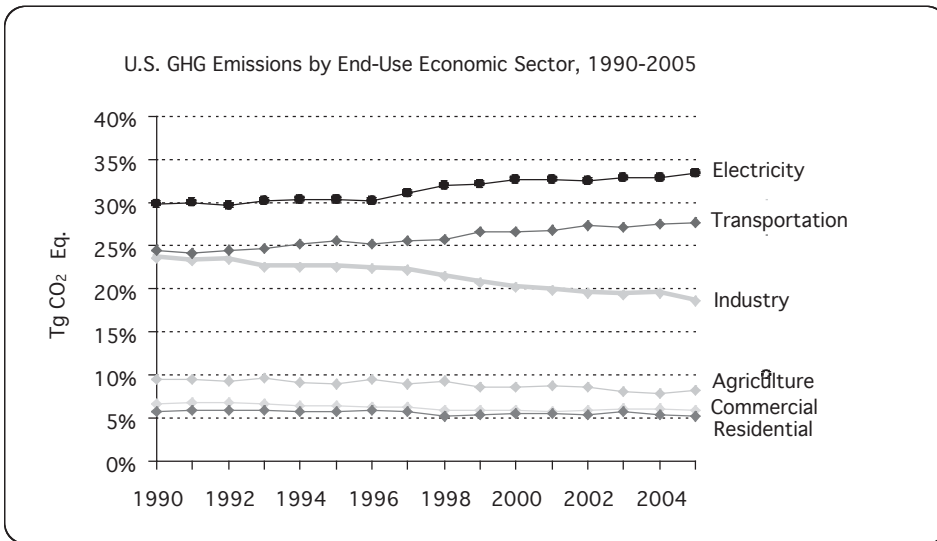
Climate Action at the State Level

To address these growing concerns, policymakers at the state (and local) level are increasingly turning their attentions to actions aimed at GHG emission reductions. As of June 2007, over 500 U.S. mayors had signed the U.S. Conference of Mayors Climate Protection Agreement, which commits to reducing emissions in their cities to seven percent below 1990 levels by 2012 by promoting alternative modes of transportation to SOVs, reducing sprawl, increasing energy

Figure 1: U.S. GHG Emissions by End-Use Economic Sector, 1990-2005

U.S. Transportation GHG Emissions by Source, 2005

Source: U.S. Environmental Protection Agency, Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-2005, April 2007.

Figure 2: U.S. Transportation GHG Emissions by Source, 2005

U.S. GHG Emissions by End-Use Economic Sector, 1990-2005

efficiency, increasing recycling rates, and planting trees. Similarly, 36 states have completed, or are developing, climate action plans to analyze steps they can take to reduce their contribution to climate change.

Action at the state and local level has the potential to effect substantial change, by reducing emissions, and by moving forward national and even global climate policy.

States as emitters. U.S. states are some of the world's largest sources of emissions: 34 out of the 75 largest greenhouse gas emitters in the world are U.S. states.[7] If we consider U.S. states in the same cohort as other countries, Texas is the sixth largest emitter of GHGs in the world. California is the twelfth largest emitter.

States as policy labs and exemplars. States have traditionally been important actors in the development and implementation of environmental policy. Federal environmental laws, particularly those relating to air pollution, have often built on state and regional initiatives.

States serve both as testing grounds for emerging climate policies and as the building blocks for political support at the federal level. At the state level, climate action can be more flexible than at the federal level. State-led initiatives also

have the potential for greater stakeholder involvement, and therefore potentially better consensus building, than federal initiatives. The policy areas of transportation and land use, traditionally held within the purview of state and local decision making, are particularly appropriate—and one might argue necessary—for state-led climate action.

California has been a first mover in passing binding legislation. In August 2006, the California legislature passed AB 32 (the Global Warming Act of 2006), which established a goal to reduce the state's greenhouse gas emissions to 1990 levels by 2020. AB 32 establishes California as the first state to impose mandatory emission limits. In the transportation sector specifically, California adopted AB 1493 in 2002, which requires tailpipe greenhouse gas emissions from new vehicles be reduced by 22 percent by the 2012 model year, and by 30 percent by the 2016 model year.

Other states have also moved rapidly into climate-related action and legislation. 42 states have compiled GHG inventories and forecasts as of May 2007. Seventeen states have set GHG reduction targets as of August 2007. In 2007, New Jersey enacted legislation requiring the most dramatic state-level reduction in GHG

emissions to date, the governor of Florida signed an executive order to reduce GHG emissions, and Maine mandated that state-owned buildings use 100 percent clean energy by 2010.

Several regional initiatives are also addressing climate change in the United States, including the Western Regional Climate Action Initiative, Western Governors' Association (WGA) Clean and Diversified Energy Initiative, Regional Greenhouse Gas Initiative (RGGI), New England Governors and Eastern Canadian Premiers (NEG-ECP) climate action plan, and Powering the Plains. These regional initiatives generally establish regional emissions targets. Some, such as the RGGI, have also established cap and trade systems for GHGs.

State climate action plans have been developed to identify specific strategies, policies, and approaches that will be used to reduce GHG emissions.

The development of state climate action plans typically follows a standardized process. The process is directed by a broad-based plenary group of leaders selected by the commissioning state, who meet approximately every two months over a 9–12 month period. Sector-specific technical working groups are formed to develop policy recommendations for the plenary group. Typically, the processes have involved five such working groups:

1. Transportation and land use
2. Energy supply
3. Residential, commercial, and industrial
4. Agriculture, forestry, and waste
5. Cross-cutting issues

   The basic steps are as follows:

1. Develop initial statewide GHG inventories and projections
2. Identify full range of possible GHG policy options (a catalog of options)
3. Identify initial draft priority policy options for evaluation (voting by the technical working groups to pick the top 10 priorities)

4. Develop straw proposals for draft policy option design (often including numeric goals)
5. Quantify GHG reduction, cost/cost savings potential of draft policy options
6. Define implementation mechanisms, related policies and programs, and feasibility issues
7. Iterate to final consensus on draft policy options through voting by plenary group
8. Finalize recommendations and report language

From steps 2 to 8, the different working groups work in tandem, in conjunction with the policy committee, to develop policies in each of the subject areas. The process in individual states varies slightly based on the level of government support, the mix of stakeholders involved, and the state's prior experience with energy conservation and GHG mitigation measures.

Overview of Reduction Strategies

ICF International recently developed a paper that examined innovations in state-led action to reduce GHG emissions from transportation for six states, including Vermont, Arizona, North Carolina, Colorado, New Mexico and Montana. The menu of strategies to reduce GHG emissions from transportation included policy measures that seek to address light-duty vehicles, heavy duty vehicles, intercity travel and non-road travel. TDM activities fall under the light-duty vehicle category and focus on passenger cars as previously seen in Figure 2.

Transportation demand management (TDM) strategies are often a key component of these plans. Defined broadly, TDM encompasses activities to reduce VMT, typically by increasing travel options for mode other than driving alone, by reducing the need to travel, and/or by changing price signals. TDM strategies vary broadly in their approach, from infrastructure investment to public education to market-based incentives. TDM policies pursued by the six states examined by ICF included:

- Improving multi-modal options, including transit
- Pricing strategies for fuel and driving
- Pricing strategies for parking, and
- Public education and outreach.

Adopted Strategies

Of the six state climate action plans that were examined by ICF, a total of 76 policies to reduce GHG emissions from transportation were included.

Table 1 presents information on the estimated effectiveness of 18 specific policy types that comprise the measures in the six states' plans. Percentages represent the total transportation GHG emissions that the policy is estimated to reduce in 2020. For example, a 10 percent reduction means that the policy would eliminate 10 percent of the projected GHG emissions from transportation in 2020 in the respective state. Blank cells indicate that the state's plan did not include that policy. "NQ", not quantified, indicates that the plan included the policy but did not quantify the reduction in GHGs it might achieve. Policies are roughly ranked by estimated impact from highest to lowest. Not surprisingly, many of the most effective strategies are also the most common.

GHG emissions standards for LDVs is estimated to have the largest effect on transportation GHGs, reducing emissions by about 9 percent in most of the states. California has adopted fleet-based standards for per-mile GHG emissions for manufacturers of passenger vehicles, and under the Clean Air Act, other states have the option of adopting the California

Table 1: Effectiveness of Transportation Policy Types by State, 2020

Policy type	GHG Reduction as % of Transportation GHG Inventory						No. of State Plans
	AZ	CO	MT	NC	NM	VT	
GHG emissions standards for LDVs	9.6%	9.4%	8.6%	9.9%	8.5%		5
Smart growth measures	6.8%	1.3%	0.4%	9.8%	5.8%	17.8%	6
Clean car purchase incentives for consumers	NQ	NQ	NQ	2.7%	NQ	10.5%	6
Provision/promotion of transit and alternative modes	NQ	2.7%		7.1%		8.5%	4
Pay as You Drive Insurance	4.8%	2.6%		6.5%	4.5%	7.4%	5
Alt. Fuels/Low Carbon Fuel Standard	1.9%	6.1%	0.4%	5.5%	7.6%	7.7%	6
Commuter Benefits		1.2%				3.6%	2
Non-road measures			0.8%		2.2%	3.6%	3
Fuel efficient tire programs	1.4%		0.2%		2.7%		3
Fuel tax		1.4%				NQ	2
HDV anti-idling measures	2.2%	0.3%	0.1%	0.2%	3.1%		5
Lower speed limits	0.9%				1.3%		2
Emission reduction measures for diesel vehicles	0.1%		0.2%	NQ	NQ		4
Parking management		0.1%					1
Public fleet procurement policies	0.1%		NQ	NQ	NQ		4
Operational improvements to road networks			NQ				1
Public education		NQ	NQ				2
R&D					NQ		1

standards. This type of standard is also known as a "Clean Car Program" or the "Pavley" standards, in reference to former California State Assembly Member Fran Pavley who sponsored the California standards. Approximately 12 states have committed to these standards.

The policy is straightforward to adopt and to analyze, since the required GHG emissions rates are explicit. As a result, the percent emission reductions are similar across all five states that have included this policy in their plans. The primary unknown is the market penetration rate of new vehicles produced to the standard. The California standards currently face legal challenges. If the standards survive these challenges, other states will have the option to adopt the standards as well. The policy is popular with legislators because it places the burden of compliance on vehicle manufacturers.

Incentives for consumers to purchase cleaner vehicles are present in all six state plans. These policies most often include market-based measures to change the types of vehicles that consumers purchase. For example, the state can charge consumers that purchase vehicles with higher emissions a surcharge and offer a rebate to consumers who purchase vehicles with lower emissions. This type of program is called a "feebate." Feebates affect GHG emission through two mechanisms:

1. Shifting consumer choice among available choices
2. Shifting vehicle fleet offerings from manufacturers.

Other types of incentives target purchasers of hybrid and alternative fuel vehicles specifically. They include financial incentives as well as preferential access to lanes and parking spaces.

Promotion of multiple modes, including transit, is found in four of the six state plans. The approach is usually multi-pronged. It can include enhanced provision of infrastructure for multiple modes, such as new or increased transit service and stations, walking and biking paths, bike racks, and other types of facilities. In addition, the policies often include packages for promotion of these modes such as public education, advertising and incentives.

The estimated effectiveness of these policies varies from 2.7 percent in Colorado to 8.5 percent in Vermont. The Colorado plan includes a simple plan to improve and expand transit service, primarily in urban areas. The North Carolina plan is much more aggressive. It includes improved and expanded transit service as well as Transit Oriented Development, marketing and promotion of transit, system management measures, and improvements to bike and pedestrian connections. The policy in the Vermont plan is also broader in scope. In addition, the stakeholder group in Vermont set ambitious goals to increase the proportion of non-SOV mode trips.

Pay as You Drive Insurance (PAYD) is included as a TDM measure in five out

of the six state plans. In PAYD, drivers pay for insurance based on the amount of miles that they drive. Thus drivers are financially rewarded for driving less. This measure may require a change to state insurance laws. PAYD policies in state climate action plans usually specify pilot programs, such as those already conducted in a few states, with eventual rollout to the entire market. Variation in effectiveness across states is generally due to assumptions about market penetration. Some plans propose making PAYD mandatory, in which cases penetration would reach 100%. The Colorado plan would not make PAYD mandatory. Both ultimate penetration and estimated effects are lowest in that state.

Alternative fuel measures are present in all six climate plans. The estimated effect of these measures varies greatly among the states because of the different ways the measures have been formulated. The Colorado plan includes a Low Carbon Fuel Standard, modeled after a similar standard in California that would mandate a 10% reduction in vehicle fuel carbon intensity without specifying a particular mix of fuels. Because the carbon reduction goal is written directly into the policy, the GHG benefits are straightforward to calculate and relatively large. Other states (such as New Mexico) have adopted broad alternative fuels policies that promote not only bio-fuels (ethanol and biodiesel) but also electric and hybrid-electric vehicles, and these far-reaching policies tend to be relatively effective as well. These types of strategies tend to achieve smaller GHG reductions when they focus only on promoting ethanol (which, if produced from corn feedstocks, has a minimal lifecycle GHG benefit) and biodiesel blends.

These policies that are particularly effective and/or popular are likely to continue to surface in other states' climate action plans. As the field of transportation and climate change progresses and states report their experience with certain policies, other types of measures may rise to the top of the list.

Summary

The transportation sector is one of the largest sources of GHG emissions in the United States. It is also the most rapidly growing source of GHG emissions. Policymakers at all levels are recognizing that action on climate change is necessary, and that transportation-related policies are particularly potent tools.

In the evolving field of policy on climate change, state governments are some of the most important players. The latest development in state policy on climate change is the development of state climate action plans. These plans convene multi-stakeholder groups to develop policies to combat climate change in several broad policy areas.

In the transportation policy area, stakeholder groups in different states tend to adopt similar policies. Some policies are more popular than others because of ease of implementation, high estimated reductions in GHGs, and availability of examples elsewhere. Some of the most popular policies among the six states examined are:

- GHG emissions standards for LDVs
- Smart growth measures
- Clean car purchase incentives for consumers
- Provision/promotion of transit and alternative modes
- Alt. Fuels/Low Carbon Fuel Standard

At the time of writing, several more states are initiating their own climate action plans. We expect this policy phenomenon to continue to grow and to perhaps influence policies at other levels of governments. As states gain experience with developing and implementing policies to reduce GHG emissions from transportation, policies and quantification methods will continue to be refined and TDM will likely continue to see a growing role in State Climate Action Plans. ◢ACT

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