REDUCING GREENHOUSE GAS EMISSIONS FROM TRANSPORTATION:
LESSONS FROM WEST COAST STATES

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ABSTRACT

Planners and policymakers in the United States increasingly recognize climate change as a critical challenge. Because the transportation sector accounts for one-third of all greenhouse gas emissions (GHGs) linked to climate change, some states have passed legislation to reduce such GHGs.

California, Oregon, and Washington are innovators in adopting climate goals into statute and passing legislation to reduce GHGs from transportation, particularly related to vehicle miles traveled (VMT.) In 2008, California adopted Senate Bill 375, requiring metropolitan areas to undertake transportation and land use scenario planning to reduce GHGs from light-duty vehicles. In Oregon, 2009 and 2010 legislation called for a Statewide Transportation Strategy for reducing GHGs and for metropolitan areas to undertake scenario planning. In 2008, Washington adopted legislation setting vehicle miles traveled reduction targets.

This paper summarizes efforts in these three west coast states to reduce GHGs from transportation. Relying on document analysis and stakeholder interviews, this paper describes the GHG reduction goals, and transportation sector targets, plans and policies for reducing GHGs from VMT. This study examines how GHG reduction goals are integrated into state and regional transportation plans. This study examines the similarities and differences between the states and synthesizes perspectives gained from stakeholders to assess strengths and weaknesses. This study offers lessons learned from California, Oregon and Washington.

Keywords: climate change, greenhouse gases, state departments of transportation, metropolitan planning organizations, transportation planning
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INTRODUCTION

Planners and policymakers in the United States increasingly recognize climate change as a critical challenge. Although there is not yet a comprehensive national response, several states have adopted ambitious goals to reduce greenhouse gas emissions (GHGs) linked to climate change. To achieve their goals, these states have adopted policies and strategies or delegated authority to the regional or local level. GHGs from the transportation sector constitute approximately one-third of all emissions in the U.S. (1). Reducing GHGs from transportation rests on the “three-legged stool” of vehicle efficiency, fuel content, and vehicle miles traveled (VMT) (2). Even with great improvements in vehicle efficiency and fuel content, increasing VMT is expected to outweigh such gains. Total VMT generally rises with increasing population. Moreover, at least until recently, VMT per capita has been rising as communities grow in size and people tend to take more and longer trips, leading to total VMT growing faster than population. Recent data shows that VMT per capita is beginning to increase again following its the Great Recession, and especially in western states, though VMT has not risen to pre-Great Recession levels in all states. (3). Acknowledging this connection, several state-level strategies involve reducing GHGs by shifting transportation modes and promoting compact development patterns. Unlike many of the strategies related to vehicle efficiency and fuel content, which may be achieved through top-down federal action, reducing VMT requires changes in individual choices. Although concerns around climate change provide an additional reason, some states have been using transportation planning to provide alternative modes and land use planning to encourage compact development for several decades. In this paper, we examine how the three West Coast states—California, Oregon, and Washington—are seeking to reduce GHGs from the transportation sector by reducing VMT. This study focuses on West Coast states rather than the largest states because all three states have passed legislation related to reducing GHG.

This study proceeds as follows. Relevant literature on GHGs from the transportation sector, state climate action plans, and implementation research are summarized. Then, this study offers a conceptual framework explaining the process for setting targets, adopting plans, taking actions, and reducing GHGs. Next, this study summarizes the approach in each state, looking first at goals and then at implementation, including monitoring and results. Then, information from our four case study states is synthesized, summarizing key similarities and differences among state approaches and describing key strengths and weaknesses. Finally, key lessons learned from efforts in California, Oregon, and Washington are described.

BACKGROUND

Currently, transportation end-use sector emissions constitute approximately 27% of GHGs from fossil fuel combustion in the United States. Approximately 62% of transportation sector emissions come from passenger cars or light-duty vehicles while the remainder come from freight, aircraft, rail, ships and boats. From 1990–2012, transportation emissions rose by 18% while vehicle miles traveled increased by 35% (1).

Emissions from transportation can be represented by a three-legged stool consisting of vehicle types, fuel content, and VMT. Even if the federal government adopts stringent standards for fuel economy (CAFE standards) and fuel content changes, rising VMT will outweigh gains in these two sectors (2). Thus, to reduce transportation emissions, it is important to focus on reducing VMT. This study focuses on state-level attempts to reduce transportation emissions by reducing VMT.

Several scholars have explored the connection between VMT and development patterns. Several studies describe the relationship between VMT and urban form discussing density,
Recent studies summarize the relationship between VMT and development patterns, finding that compact development reduces VMT by 20–40%. Doubling residential density reduces VMT by 5–12% but combining with mixed use and transportation reduces VMT by up to 25% (2, 6, 7). This study does not provide a full description or critique of the variation in the range of findings on the connection between VMT and development, but refers to the literature to provide support for the assumption that development patterns impact VMT.

To plan for reducing GHGs, several states have adopted state climate action plans. As of 2014, approximately 32 states have created state climate action plans, and 29 states have adopted some kind of GHG reduction goal (1, 8). To meet GHG reduction goals, states include a broad spectrum of policies covering energy efficiency and renewable energy, and many of these climate action plans include GHG reduction strategies related to transportation. Among GHG reduction strategies, “efficient vehicles” and “reduced fuel use” are the 4th and 5th most popular strategies in state climate action plans, respectively (9).

A few scholars have offered assessments of state climate action plans and offered guidance for improving state climate action plans. In assessing the first generation of municipal and state climate action plans, Wheeler identified key weaknesses in early plans: inadequate goals; lacking strong actions and institutional and political commitment. Wheeler recommends stronger near-term goals, robust monitoring and progress reporting, a broader range of actions, and changing policies, regulations and incentives to reduce emissions, moving beyond existing actions (10). Gallivan, ang-Olson, and Torchetta examined the integration of climate change into state and regional transportation plans, examining 12 Departments of Transportation (DOTs) and 18 Metropolitan Planning Organizations (MPOs), finding that the level of integration varied across state and regions (11). Other scholars have synthesized the research on climate change and transportation research at state agencies and universities (12). Many of these articles provide guidance for selecting greenhouse gas reduction strategies but overlook the challenge of implementation and agency coordination. A few short new articles discuss various approaches to implementation in U.S. States. Specifically, a 2012 issue of TR News examined state and local action on climate change, focusing on agency implementation (13, 14, 15). Turner et al. (16) outline the course of action for implementation in Maryland and predict potential challenges. Barbour & Deakin (17) evaluate the progress implementing Senate Bill 375 in California, focusing on the local and metropolitan level.

While several states have created climate action plans, many of which contain transportation and land use strategies, and a few states have gone further in placing GHG reduction goals and strategies in law, research on states with statutory mandates for reducing GHGs and legislation aimed at the transportation sector is sparse.

**METHODOLOGY**

This project relies on document analysis and qualitative research methods to evaluate state efforts to integrate transportation and land use planning to reduce GHGs from transportation. First, researchers examined statutes and analyzed state-level transportation, land use and climate plans; regulations; other plans and programs; and interim progress reports to obtain an understanding of relevant climate, transportation and land use legislation and plans. Next, between December 2014 and June 2015, the research team conducted confidential semi-structured interviews with state agency staff and other stakeholders, including MPOs, local and regional associations, and nongovernmental advocacy organizations. The research team conducted 34 interviews in person or via phone. Interviews focused on understanding the policy
framework within each state and investigating the strengths, weaknesses and best practices from each state.

**STATE APPROACHES**

States aiming to reduce GHGs generally follow a consistent process.

First, the governor or legislature establishes measurable goals for reducing GHGs. In our case study states, each governor pressed their legislature to adopt such goals into law. Furthermore, our case study states have adopted specific targets for reducing GHGs from transportation.

Next to make progress, states often adopt climate action plans with recommended policies and strategies for reducing GHGs, or embed such policies into existing transportation plans. There is considerable variation in these “plans” across states. California adopted a comprehensive state-level plan (18); Oregon and Washington have drafted but not formally adopted interim comprehensive documents (19, 20).

Whether formally planned or not, reducing GHGs involves a variety of strategies, for example: investing in multi-modal transportation, transportation demand management, technological improvements, planning for compact development, etc. Some states have adopted implementation mechanisms, like funding or regulatory relief, to aid in reducing GHGs. For example, California uses cap-and-trade to fund implementation. Additionally, some states had pre-existing programs in place that aid in reducing GHGs, though not the core focus.

Finally, to monitor progress towards GHG and VMT reduction goals, many states publish progress reports, with key evaluation dates written into statute. Moreover, some states require periodic updates to targets and plans.

**Goals**

In 2004, the West Coast Governors’ Global Warming Initiative released a report urging California, Oregon, and Washington to adopt comprehensive goals for reducing GHGs (21). By 2007, each state had adopted such goals for reducing total statewide GHGs by various times to various levels compared to the 1990 base year.

But the three states have taken different approaches to setting targets for reducing GHGs from light-duty vehicles weighing less than 10,000 pounds (22). TABLE 1 summarizes each state’s policy choices in setting GHG reduction targets for light-duty vehicles. Each of our case study states used a different process for setting targets: California took a bottom-up approach; Oregon a top-down approach; and Washington simply legislated targets. California and Oregon have separate targets for each MPO, whereas Washington has just statewide targets. California’s and Oregon’s targets are tied to GHG, allowing MPOs to achieve targets through a combination of VMT reduction and other strategies; Washington’s targets are tied to VMT. California and Oregon set targets relative to a baseline year (2005); Washington’s targets are relative to a business-as-usual projection for 2020. Finally, in California all MPOs are required to plan to meet the targets; in Oregon only the largest MPO (Portland) is required to do so; and in Washington targets don’t apply at the MPO level. For all our case study states, targets are expressed as percentage changes in per capita values. By 2011, each state had adopted such targets.

TABLE 2 summarizes the statewide GHG reduction goals and light-duty vehicles reduction targets. More details on each state’s goals and targets are provided below.
1 **TABLE 1 Policy Choices in Setting GHG Reduction Targets for Light-Duty Vehicles**

<table>
<thead>
<tr>
<th>Question</th>
<th>Choice</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process?</td>
<td>Legislated Top-Down</td>
<td>Legislate targets without modeling how these relate to statewide GHG goals</td>
</tr>
<tr>
<td></td>
<td>Legislated Bottom-Up</td>
<td>Use modeling to set targets to be consistent with statewide GHG goals</td>
</tr>
<tr>
<td></td>
<td>Top-Down</td>
<td>Set targets based on what is technically / economically / politically feasible</td>
</tr>
<tr>
<td>Geography?</td>
<td>Statewide By MPO</td>
<td>Set a single target for entire state</td>
</tr>
<tr>
<td></td>
<td>By MPO</td>
<td>Set different targets for each MPO</td>
</tr>
<tr>
<td>Quantity?</td>
<td>GHG</td>
<td>Measure reductions in GHG as a result of local actions</td>
</tr>
<tr>
<td></td>
<td>VMT</td>
<td>Measure reductions in VMT</td>
</tr>
<tr>
<td>Representation?</td>
<td>Absolute</td>
<td>Target an absolute level to achieve</td>
</tr>
<tr>
<td></td>
<td>Relative</td>
<td>Target a percentage reduction from some reference</td>
</tr>
<tr>
<td>Metric?</td>
<td>Total</td>
<td>Measure total levels (sensitive to population changes)</td>
</tr>
<tr>
<td></td>
<td>Per Household</td>
<td>Measure levels per household (insensitive to population changes)</td>
</tr>
<tr>
<td></td>
<td>Per Capita</td>
<td>Measure levels per capita (insensitive to population changes)</td>
</tr>
<tr>
<td>Reference?</td>
<td>Baseline</td>
<td>Measure changes compared to a past baseline year</td>
</tr>
<tr>
<td></td>
<td>Trend</td>
<td>Measure changes compared to the business-as-usual trend in some future year</td>
</tr>
<tr>
<td>Obligation?</td>
<td>Mandatory</td>
<td>Each MPO is required to adopt a plan to meet its target</td>
</tr>
<tr>
<td></td>
<td>Voluntary</td>
<td>Each MPO may choose to pursue its target</td>
</tr>
</tbody>
</table>

2 **TABLE 2 Statewide GHG Reduction Goals and Light-Duty Vehicle Reduction Targets**

<table>
<thead>
<tr>
<th>State</th>
<th>Year</th>
<th>Statewide GHGs Goals (relative to 1990)</th>
<th>Light-Duty Vehicle Targets</th>
<th>Target Policy Choices</th>
<th>Key Legislation</th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>2020</td>
<td>0% below</td>
<td>1% above to 8% below</td>
<td>bottom-up by MPO GHG relative per capita baseline (2005) mandatory</td>
<td>2005: EO S-3-05 2006: AB32 2008: SB375 2011: EO G-11-024</td>
</tr>
<tr>
<td></td>
<td>2035</td>
<td>10% below</td>
<td>1% above to 16% below</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2050</td>
<td>80% below</td>
<td>30% below</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2035</td>
<td>10% below</td>
<td>30% below</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2050</td>
<td>75% below</td>
<td>50% below</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2035</td>
<td>25% below</td>
<td>30% below</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2050</td>
<td>50% below</td>
<td>50% below</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
In 2005, Governor Schwarzenegger issued Executive Order S-3-05, setting the goal to reduce statewide GHGs by 2050 to 80% below 1990 levels. In 2006, the legislature passed Assembly Bill 32, the California Global Warming Solutions Act, setting the goal to reduce statewide GHGs by 2020 to 1990 levels.

In 2008, the legislature passed Senate Bill 375, the Sustainable Communities and Climate Protection Act, directing the California Air Resources Board (CARB) to develop targets for each MPO to reduce GHGs from light-duty vehicles as a result of local actions. In 2011, after coordinating a bottom-up effort, CARB issued Executive Order G-11-024 setting achievable targets for each of California’s 18 MPOs.

In 2007, the legislature passed House Bill 3543, setting statewide GHG reduction goals exceeding those in California’s AB32.

In 2009 and 2010, the legislature passed House Bill 2001, the Jobs and Transportation Act, and Senate Bill 1059, directing the Land Conservation & Development Commission (LCDC) to set targets for MPOs to reduce GHGs from light-duty vehicles as a result of local actions. Meeting these targets, in combination with anticipated federal and state actions, would result in reductions consistent with Oregon’s statewide GHG reduction goals. In 2011, LCDC adopted OAR 660-044, setting targets for each of Oregon’s 6 MPOs. But achieving the targets is voluntary for all but the Portland MPO.

In 2007, Governor Gregoire issued Executive Order 07-02 and the legislature passed Senate Bill 6001, setting statewide GHG reduction goals exceeding those in California’s AB32.

In 2008, the legislature passed House Bill 2815, setting statewide VMT reduction targets for light-duty vehicles. Although HB2815 directs the Department of Ecology to “convene a collaborative process to develop a set of tools and best practices to assist state, regional, and local entities in making progress towards the [targets],” the statute does not impose a requirement on MPOs. Indeed, in 2013 the Washington State Court of Appeals ruled that “the current statutory framework does not require that the [Seattle MPO] adopt a transportation plan … that achieves its proportional share of the state’s goals for reducing GHGs” (23).
GHGs and include scenarios into the 2040 California Transportation Plan to show how Caltrans will achieve maximum feasible emissions reductions to reach GHG reduction targets, as described below.

CARB anticipates that 29% of the total GHG reductions needed to meet California’s 2020 goal will come from the transportation sector (18). SB375 requires each MPO to create a SCS for achieving its GHG reduction target. While CARB sets the GHG reduction target for each MPO, the implementation strategy to achieve the target is left completely up to the MPO. SB375 is explicit in maintaining the delegation of land-use authority to local governments, and thus whether an MPO will meet its GHG goal depends, in part, on its ability to coordinate with local governments to implement the SCSs.

Senate Bill 391 (2009) directs Caltrans to update the California Transportation Plan every five years to address how the state will achieve maximum feasible emissions reductions in order to meet the GHG reduction goals. SB391 specifically directs the state’s transportation agencies, California State Transportation Agency (CalSTA) and Caltrans, to reach GHG reduction goals from the transportation sector. SB391 called for Caltrans to conduct scenario planning on how the agency will meet the transportation sector GHG reduction goal of 80% below 1990 levels by 2050. The 2040 California Transportation Plan will be adopted in late 2015.

To implement SB375, California adopted several incentive and regulatory programs to encourage and compel implementation of Sustainable Communities Strategies. A CARB regulation, called the AB32 Cost of Implementation Fee Program, created a mandatory cap-and-trade program based on mandatory emissions reporting from the state’s largest industrial GHG emitters. Fees collected from the cap-and-trade program are used to fund the various state agencies charged with achieving GHG reduction goals. Because transportation causes 35–40% of California’s GHGs, a large portion of funds collected from the cap-and-trade program are allocated for the implementation of SCS projects by MPOs aimed at reducing GHGs from the transportation sector (24). The Strategic Growth Council is the administrator of these cap-and-trade funds and is responsible for allocating them to projects that are consistent with the SCSs through its Affordable Housing and Sustainable Communities grant program. In June 2014, the California legislature passed Senate Bill 862, the Budget Act of 2014, which secured 35% of revenue from the cap-and-trade program for SB375 projects and the state’s high-speed rail program. Senate Bill 743 calls for a change in the way transportation impacts are measured in the California Environmental Quality Act (CEQA) review process. The Office of Planning and Research’s (OPR) draft guidelines recommend using a VMT threshold to determine whether development requires CEQA review. If the development is near existing transit and VMT is expected to be low, the development can forego CEQA review, effectively streamlining and promoting infill development and decreasing statewide VMT. New CEQA criteria for transportation projects are meant to “promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses” (Cal. Public Resources Code §21099). OPR promulgated rules for SB743 implementation in 2014.

In 2011, the legislature passed Senate Bill 226, which exempts certain infill development projects from CEQA review. The development project must be surrounded by 75% existing urban development, comply with an existing SCS, and meet density guidelines for residential development. When outside of an MPO boundary, review developments must meet the rule’s definition of a “small walkable community project” to be exempt from CEQA review. Rules for SB226 were promulgated by OPR and are based off of a VMT performance measure.
California’s approach requires a certain degree of monitoring. AB32 requires that CARB update a Scoping Plan every five years that evaluates progress and identifies strategies for reaching GHG reduction goals. Related to transportation and land use planning, SB375 requires the updating of targets every 8 years and plans every 4 years. Although CARB reviews and accepts SCSs under SB375, the statutes do not require CARB or other agencies to monitor and evaluate the implementation of SCSs. While MPOs update regional transportation plans (RTPs) and SCSs every four years, there is not a systematic approach to monitoring the implementation of SCSs.

The May 2014 First Update Scoping Plan presents key accomplishments made by California thus far in reducing GHG from all sectors, including transportation, which saw an overall decrease of 1.7% from 2000 to 2012 (18). While these reductions are partly attributable to decreased driving concurrent with the economic recession of 2008, the continued decrease in GHGs from the transportation sector since its 2005 peak is poised to continue. A nearly 11% decrease in GHGs from the transportation sector between 2000 and 2012 points towards early success in achieving the state’s ambitious overall GHG reduction goals.

Oregon
HB2001 (2009) and SB1059 (2010) set Oregon’s approach to reducing GHGs from transportation: 1) develop a Statewide Transportation Strategy (STS) for reducing GHGs from all modes, and 2) develop land use and transportation scenarios for reducing GHGs from light-duty vehicles in some MPOs.

In 2013, the Oregon Transportation Commission (OTC) “accepted” the STS, but did not formally adopt it as part of the Oregon Transportation Plan. The STS contains 18 strategies related to vehicle and engine technology advancements; fuel technology advancements; transportation options; efficient land use; and pricing, funding and markets. In 2014, the Oregon Dept. of Transportation (ODOT) detailed strategies to begin implementing the STS within 2-5 years. ODOT has updated several modal and topical plans to incorporate the STS (25).

In 2014, the Portland MPO adopted a scenario to meet its target for reducing GHGs from light-duty vehicles. Implementing this scenario will require new funding to support investments in transit, bicycling and walking (26). In its 2015 session, the legislature tried but failed to pass a new transportation-funding package. The 2015 legislature did not address efforts to reduce GHGs from transportation through scenario planning established in HB2001 and SB1059, though relevant provisions expire at the end of 2015.

As of mid-2015, no other MPOs have made significant progress towards meeting their (voluntary) targets.

Under HB3543 (2007), the Oregon Global Warming Commission (OGWC) is required to report biennially on progress in achieving the GHG reduction goals. In 2010, OGWC adopted an interim plan to achieve Oregon’s goals for 2020. But as HB3543 gave OGWC no statutory authority, this plan does not set state policy (19). The 2013 OGWC progress report concludes that “Oregon is not on track” to meet its 2020 goal (27). The report relies, in part, on a detailed biennial inventory of Oregon’s GHGs (28).

Washington
Washington’s intended centerpiece policy for reducing GHGs is to implement the cap-and-trade program the Western Climate Initiative proposed in 2008 (20, 29). But as of 2015, it has yet to do so.
Washington is the first state to adopt statutory targets for reducing VMT for light-duty vehicles. HB2815 (2008) set targets for reducing statewide VMT. To achieve these targets, HB2815 directed the departments of Transportation, Ecology, and Commerce to convene a collaborative process to develop tools and best practices to assist MPOs in achieving the targets. But as noted above, MPOs are not required to achieve the targets.

In 2008, Senate Bill 6580 called for a study of how Washington’s Growth Management Act, first adopted in 1990, could be used or revised to address climate change. But the legislature did not embrace the recommendations.

In 2009, Governor Gregoire issued Executive Order 09-05, directing the Department of Transportation to work with the four largest MPOs (Seattle, Olympia, Vancouver, and Spokane) to “cooperatively develop and adopt” regional transportation plans to achieve the VMT targets.

In 2010, the Seattle MPO adopted a RTP that includes a four-part strategy for reducing GHGs from transportation: 1) build upon the VISION 2040 Regional Growth Strategy to promote compact development, 2) transition to a user fee/roadway pricing system, 3) promote multi-modal transportation, and 4) recognize the role of vehicle and fuel improvements (30). But as noted above, HB2815 does not impose a requirement on any MPO to achieve a particular target (23).

In 2015, the Washington State Transportation Commission released the policy-level Washington Transportation Plan 2035. The plan recommends promoting bicycling and walking as viable transportation options, and making significant progress toward meeting statewide GHG reduction goals through vehicle and fuel technology, system management and operations, land use, transportation options, and pricing strategies (31).

Washington’s Commute Trip Reduction program aims to reduce drive-alone commute trips through employer-based programs. When first adopted in 1991, it aimed to improve air quality, reduce traffic congestion, and reduce fuel consumption; now it has the added result of reducing GHGs.

Under HB2815 (2008), the departments of Ecology and Commerce are required to report biennially on Washington’s GHGs. The latest report indicates a decrease in GHGs from the transportation sector, but attributes this to a weak economy. The report does not compare the progress to Washington’s GHG reduction goals (32).

SYNTHESIS

Though each of these states began with a common origin under the West Coast Governors’ Global Warming Initiative and each state had established GHG reduction goals in statute by 2007, their approaches to reducing GHGs from transportation vary considerably. This section synthesizes information described in individual case study sections above to illuminate key similarities and differences among case study states. This section also provides a description of key strengths and weaknesses among state approaches to reduce GHGs from transportation.

All case study states established ambitious statutory goals for reducing GHGs and require some level of monitoring, although the type of progress report varies significantly across states. California and Oregon require periodic reports including GHG monitoring and progress on policy implementation. Washington simply monitors GHG and VMT levels, but does not report on progress towards meeting goals.

The policies by which these states plan to reduce GHGs vary tremendously. California and Oregon set a different target for each MPO and delegate each responsibility for developing strategies to reduce GHGs from transportation. California and Oregon rely on land use and
transportation scenario planning, although only California requires all MPOs to participate. Washington is unique in establishing VMT targets.

In assessing state approaches, specific criteria are considered: 1) policy framework; 2) state level; 3) metropolitan level; 4) implementation mechanisms, and 5) monitoring.

**Policy Framework**

All three states adopted ambitious goals to reduce GHGs in statute. The goals vary across states, but all of these states seek to reduce statewide GHGs by 50–80% below a 1990 baseline by 2050. However, as Wheeler concluded in describing first generation climate action plans, the shorter-term goals are still conservative. Washington and California seek to reach 1990 levels by 2020, while Oregon seeks a 10% reduction below 1990 levels (10). California and Oregon also set targets for MPOs to reduce GHGs from transportation.

Oregon and Washington stakeholders described the importance of collaboration amongst western states in adopting legislation and learning from one another. In both California and Washington, stakeholders applauded the leadership of the governor. In Oregon, the impetus for adopting climate change provisions into HB2001 was not championed by the governor or legislators but was a political push by advocacy groups, so stakeholders noted a lack of leadership or ownership over the approach.

In examining transportation-specific targets, in California, stakeholders described the effectiveness of using a performance metric to guide planning and noted that allowing MPOs flexibility in reaching targets was a key strength. Rather than mandating that MPOs implement specific policies or programs, MPOs were granted flexibility in deciding how to reach targets through a combination of transportation and land use strategies.

**State Level**

Since transportation-specific legislation was adopted, California and Washington were the only states to update long-range transportation plans (LRTPs). Oregon created the STS and Implementation Plan and has updated modal plans to be consistent with the STS, but it is unclear to what extent these plans guide investments. California is the only state that requires its DOT to illustrate how the LRTP reaches a specific GHG target. In Washington, several studies have been commissioned by the legislature related to coordinating state agencies in efforts to reduce GHGs, but little policy has emerged from these studies.

After transportation-specific legislation went into effect, some California stakeholders noted improved coordination among state agencies and described a shift of culture in the state DOT related to an increased focus on GHGs, but in all states, shifting the culture of transportation agencies is slow. Other state agencies charged with overseeing or collaborating in plans and efforts to reduce GHGs note challenges in shifting the focus of DOTs. In Oregon and Washington, long-standing state-level growth management programs were a key strength described at the state level. Because one strategy for reducing VMT relies on compact development, having state-level growth management programs set the states up for success in making progress towards goals. But, in California, the lack of state-level growth management was seen as a key obstacle in making progress towards goals.

**Regional Planning**

California and Oregon delegate some responsibility for reaching GHG reduction goals to MPOs. In Washington, HB2815 establishes statewide targets, but these are voluntary at the metropolitan and local levels (23). California requires all MPOs to create SCSs and integrate SCSs with RTPs.
In Oregon, only the Portland and Eugene MPOs were required to conduct scenario planning and only the Portland MPO was required to adopt and implement the preferred scenario. Thus, comprehensiveness varies across states.

In describing key strengths, several stakeholders in California and Oregon noted that MPOs were a logical focus for undertaking planning. But California’s MPOs and the Portland MPO have more authority than typical. In California, several stakeholders described improved models and plans coordination as a result of the requirements of SB375. In Oregon, requiring Portland to adopt a plan and making the process voluntary for other MPOs was seen as a good way to provide an example to other MPOs and show that goals could be met by implementing current plans. But, this means that progress in Oregon has been confined to the Portland area. While the Eugene and Corvallis MPOs have taken some steps, neither has adopted a plan for reducing GHGs from transportation. Though all MPOs in California must participate, the process does not adequately recognize that MPOs vary in planning capacity. Further, because MPO boards are controlled by local officials, gaining buy-in from some MPOs has been challenging. In both California and Oregon, several stakeholders described how there was not enough funding set aside for planning. In Washington, there is no comprehensive approach to addressing GHGs in metropolitan plans, and only the Seattle MPO has voluntarily embedded reducing GHGs into its plans (30).

Implementation
Implementation mechanisms adopted by states have varied considerably. Only California has adopted new legislation and policies aimed at implementing SB375. In Oregon and Washington, programs that predate GHG legislation like Oregon’s urban growth boundaries (UGBs) and Washington’s Commute Trip Reduction serve as key elements in the approach. In Oregon, Portland’s Climate Smart Communities Scenarios effort found that implementing existing transportation plans would achieve the GHG reduction targets, but there is insufficient funding to do so.

Unrelated to GHG legislation, Washington is making investments in mass transit expansion. California is investing in high-speed rail and offering competitive funding for SB375 implementation through cap-and-trade funds. However, the lack of funding was overwhelmingly the most discussed obstacle in all states. Even in states making investments, there was not enough funding, funding sources are often constrained, and states and MPOs must balance needs for maintenance with expansion of transit. In California, stakeholders offered some examples of jurisdictions that changed the transportation project prioritization process, but overall noted that there seems to be a time lag in shifting RTP funding, likely owing to the sometimes decades-long project time frame in transportation planning.

Monitoring and Results
All three states rely on tracking the levels of GHG and VMT to monitor progress towards goals. California and Oregon require reports that evaluate progress towards goals and describe implementation mechanisms like policies, programs and incentives. Both California and Oregon revise targets on a periodic basis. California is unique in requiring periodic updates of MPO plans to reduce GHGs from transportation. Washington develops regular GHG inventories, but there is no requirement to describe policy implementation to the legislature or executive on an ongoing basis. Often GHG tracking occurs within an environmental agency while the actions that affect GHG emerge from state, regional and local transportation agencies. While states are generally on track to reach 2020 goals, progress to date is partially attributed to high gas prices
and high unemployment during Great Recession. Recent VMT data raise questions about the longevity of recent trends (3).

Though states are tracking levels of GHG and VMT, states are not monitoring the implementation of plans to examine whether policies and programs are having their intended effects and whether transportation choices and land use patterns are shifting as a result. No state has a comprehensive monitoring program in place. In California, CARB is a strong agency and is given responsibility for approving SCS plans, but has no role in tracking implementation. MPOs have to show that adopted plans will meet targets (unless the MPO adopts Alternative Planning Strategies) but are not held accountable for actually reaching the targets. In Oregon, OGWC publishes biennial report cards but has no real oversight or authority. In Washington, state agencies are required to report biennially on Washington’s GHGs.

Lessons Learned
The states examined are unique in adopting statutory GHG reduction goals and legislation targeting the transportation sector. In each of these states, there is public support and political will for climate change policy. While national climate legislation is lacking, these states are exemplars in adopting state-level legislation to reduce GHGs. In these states, the initial legislation setting goals and requiring plans to determine how goals will be met is a starting place for making progress towards reducing GHGs from transportation. But this research finds that sustained leadership and momentum on common legislation and policies is key to successful implementation. In states (like California) where the governor or executive took ownership over legislation, implementation has been strong and consistent. In states where the executive and legislature did not take ownership over the programs and the players are changing, focus has waned since legislation went into effect. Though scenario planning models and resulting plans are improving, plans will not be successful without adequate funding and a reorientation of transportation funding. In an era when transportation funds are sparse and several funding sources are constitutionally or statutorily constrained, finding adequate funding for plans designed to reduce GHGs is a major obstacle. Though these states possess general public support for climate change policies, it can be difficult to gain enough support to reverse ingrained policies and institutions that encourage driving.

However, several stakeholders talked about how selling the public on GHG reduction efforts were more successful when framed in a discussion of “co-benefits.” By describing the benefits related to public health, walkable communities, and affordable housing that occur when reducing GHGs, it is easier to get public buy-in while broadening the focus beyond just climate change.

In adopting policies, environmental groups have been important players in pushing legislation and sustaining emphasis on implementation. In California and Washington, environmental groups have filed lawsuits against MPOs related to their responsibilities under state law. In crafting a policy designed to reduce GHGs, it was logical to rely on MPOs and allow for flexibility to reach targets. In monitoring progress, states currently lack strong oversight over implementation. While state agencies are involved in target setting and plan approval, there is little oversight of the plans once adopted. Providing authority, budget, and staff to an agency charged with oversight could improve the monitoring of plans.

DISCUSSION
This study describes efforts of three innovative west coast states to mitigate GHGs from the transportation sector. With the impetus of the West Coast Governors’ Global Warming Initiative,
California, Oregon, and Washington adopted GHG reduction goals into statute. While this study focuses explicitly on transportation, these states have been leaders in adopting a broad range of plans and policies to reduce GHGs across sectors. Each state adopted legislation focused on GHGs from transportation, though the approach varies by state.

This study describes the key similarities and differences between state approaches to reduce GHG from transportation. Distinguishing elements of state approaches include:

- California and Oregon set GHG reduction targets for each MPO, but California is the only state that requires all MPOs to show how they will reach targets.
- Washington is the only state that sets VMT reduction targets.
- California and Oregon require that DOTs illustrate how the state will reach GHG targets.
- California provides cap-and-trade funding and uses regulatory relief to incentivize implementation.
- All states require periodic GHG inventories and California and Oregon require periodic reports.
- No states consistently monitor implementation of plans.

This study relies on over 30 interviews from stakeholders representing state agencies, MPOs and nonprofit groups to assess strengths and weaknesses of state’s approaches to reducing GHG from transportation. Findings are organized along dimensions including planning, oversight, and implementation mechanisms. Key findings from interviews include:

- Planning: Because MPOs vary in capacity, it is important to provide technical support and funding for planning, especially in smaller MPOs. This is particularly true in California where MPOs range drastically in size.
- Planning: Requiring MPOs to integrate RTPs with plans to reduce GHGs can be an effective tool, if MPOs have authority over project selection. Relying on RTPs is effective in California because MPOs have a high level of oversight over project selection. Oversight: States need an agency with authority and staff to provide oversight and monitoring of implementation of plans. Oregon created a Global Warming Commission to oversee GHG reduction efforts but failed to provide adequate legislative authority or staff.
- Implementation mechanisms: State authority over land use planning offers an opportunity to encourage compact development to reduce VMT, but MPOs can use incentives (or holdback funding for transportation) to persuade locals to participate. States must work with in the existing land use policy framework as strengthening the state role is unlikely in many states.
- Implementation mechanisms: States and MPOs lack flexible funding sources to implement plans. Constitutional restrictions on gas tax money limits the amount of funding available to fund transit and bicycle or pedestrian projects.
- Implementation mechanisms: Cap-and-trade programs can provide a flexible funding source to implement plans. California provides an example of using competitive cap-and-trade funding to implement plans and projects.

As these states continue to implement and modify policies and plans to reduce GHGs from transportation, they should consider the following recommendations in four categories:

1. Planning Authority:
   - Require MPOs to show how RTPs will reduce GHGs.
   - Require performance measures related to GHGs and other metrics in the transportation project selection process.

2. Performance-Based Funding and Approval:
• Make provision of transportation funding contingent on approval of land use plans focused on compact development to reduce GHGs.

• In states with strong land use planning like Oregon, make land use plan revision or urban growth area/boundary expansion contingent on engaging in scenario planning to reduce GHGs.

• Institute a cap-and-trade (or carbon tax) program and set aside funds to be used for implementation through a competitive process.

• Remove constitutional and statutory limitations on the use of transportation revenue sources.

• Relax regulations to incentivize compact development and bicycle and pedestrian and transit infrastructure.

3. Oversight:

• Provide monitoring and enforcement authority to a state agency with staff and authority.

4. Regional and Local Support:

• Build broad public support for actions that reduce GHGs from transportation by emphasizing concurrent benefits such as sustainable economic development, public health, reduced congestion, and greater accessibility.

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