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Building Planner Commitment: Are California's SB 375 and Oregon's SB 1059 Models for Climate-Change Mitigation?

Keith Bartholomew
University of Utah

David Proffitt
University of Utah

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Final Report

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by

Keith Bartholomew

David Proffitt

University of Utah

for

National Institute for Transportation and Communities (NITC)

P.O. Box 751

Portland, OR 97207

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16. Abstract

California's Sustainable Communities and Climate Protection Act (SB 375) and the Oregon Sustainable Transportation Initiative (SB 1059) have made them the first states in the nation to try and reduce greenhouse gas (GHG) emissions using the transportation-planning process. Evaluating how these pioneering laws have changed local planning processes – as well as plans themselves – in each state provides insight into the laws' effectiveness at changing development patterns in a way that reduces GHG emissions, without waiting decades to see the effects in the built environment. Both states' laws require metropolitan planning organizations (MPOs) and the municipalities that comprise them to plan development scenarios that reduce per capita GHG emissions from private automobiles. The emissions-reductions targets for each metro are determined through negotiation with state agencies and are updated periodically. Planning researchers (Burby et al., 1997) categorize laws like these as state planning mandates because they require local-level governments to incorporate state-specified goals into their plans. A host of empirical studies (Berke & French, 1994; Bunnell & Jepson, 2011; Burby & Dalton, 1994; Burby & May, 1998; Burby, 2005; Burby et al., 1993; Dalton & Burby, 1994; Hoch, 2007; May, 1993) suggest that the structure of state planning mandates, particularly the way their "carrots" and "sticks" encourage full adoption of the mandate's goals and objectives or allow for just minimal compliance, are key to their success in changing development patterns. This is because greater planner commitment tends to result in higher-quality local plans and better plan implementation (Alterman & Hill, 1978; Berke & French, 1994; Berke & Godschalk, 2009; Berke, 1996; Brody & Highfield, 2005; Brody, 2003; Laurian et al., 2004; Talen, 1996), effectively acting as a multiplier that increases the plan's influence on the built environment and other development outcomes. Therefore, we believe that evaluating the degree to which state planning mandates in California and Oregon have changed local planning documents and practices is the best available indicator of how the mandates will influence development patterns in the future. Furthermore, tracing how the mandates affect decisions made by local planners informs the suitability of California and Oregon's planning mandates to serve as a model for policy in other states, or at the national or international scale. This study fits the NITC themes of taking long-term action on transportation emissions and climate change and integrating multimodal transportation and land use. We employ content analysis to evaluate SB 375 and SB 1059's influence on regional transportation plans (RTPs) produced by MPOs. Conducting content analyses of RTPs approved before and after the planning mandates took effect will produce scores that allow us to compare how much the plans have changed due to the laws. It will also allow us to group MPOs based on their performance and identify characteristics of the metro areas they represent that predict their scores. For instance, some RTPs may shift from a weak focus on emissions reduction to a strong focus, while others may have a strong focus both before and after the planning mandates took effect. Building case studies in this way will allow us to ascertain which aspects of the laws are working as intended and which are not, and answer whether the laws can serve as models for climate change-mitigation policy.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

EXECUTIVE SUMMARY

Action on climate change in the United States has largely stalled in recent years, pushing states, counties, and municipalities, as well as corporations and civil-society organizations, to act on an individual level to reduce greenhouse gas (GHG) emissions that cause climate change and adapt to the already inevitable impacts, even in the absence of a federal mandate to do so (Bansard, Pattberg, and Widerberg 2017; Leck and Roberts 2015).

Broadly, this study seeks to understand how transportation planning can help slow climate change. Specifically, it assesses how state laws in California and Oregon aimed at reducing GHG emissions from driving have affected the quality of regional transportation plans (RTPs) produced by metropolitan planning organizations (MPOs), the regional planning bodies tasked by the federal government with planning regional transportation infrastructure. If the laws are effective, they could be models for climate-change mitigation policy in other states, or even the nation as a whole.

Specifically, we compare RTPs produced before the laws took effect to plans produced afterward to systematically evaluate how plans and planning processes comply with state-mandated emissions-reduction targets for each metropolitan area. Specifically, we answer two questions to assess whether SB 375 and SB 1059 are models for climate-change policy.

- **Question 1:** Do RTPs focus more on climate change following the implementation of regional GHG emissions-reduction targets?

- **Question 2:** Does the quality of climate-related planning within the RTP improve following the implementation of regional GHG emissions-reduction targets?

The content analysis of the RTPs proceeds in two stages. The first seeks to categorize all mentions of climate change and related issues in the RTPs into three broad categories: awareness, analysis, and actions. The first category, or node, refers to awareness of the science underpinning global warming and the problems a changing climate will create in the MPO area. Analysis refers to the analytical tools and methods the MPO used to determine how to respond to climate change. Actions refer to the measures proposed in the RTP to reduce GHG emissions from the MPO area. The second stage of the content analysis evaluates the quality of RTP components related to climate change.

Overall, our findings indicate that SB 375 and SB 1059 have increased the salience of climate change in RTPs. The focus on climate change in RTPs increased following the implementation of emissions-reduction targets in each metro area. Similarly, the quality of climate change-related plan components also improved in post-implementation RTPs. Post-implementation RTPs tend to exhibit greater awareness of climate science and the impacts of climate change on the MPO area, provide more detailed analysis of impacts and mitigation strategies, and propose stronger actions to reduce GHG emissions. They also tend to mention climate change and related issues more often.

However, the increased focus on climate change and increases in plan quality are not universal for all RTPs. A subset of seven plans actually saw a drop in post-implementation plan-quality scores. Among California MPOs, scores fell for post-implementation RTPs in Chico (-10.24 points), Sacramento (-27.98), San Francisco (-6.21), Stockton (-8.37), and Visalia (-4.76). Among Oregon MPOs, scores fell for Central Point (-2.18) and Salem-Keizer (-2.09). The drop in plan-quality scores runs counter to findings in previous studies that state mandates improve the quality of plans (Pendall 2001; Burby and Dalton 1994; Burby 2005).

The plan-quality scores for Sacramento and San Francisco's post-implementation RTPs in particular are unexpected and raise questions about how these MPOs are responding to SB 375's mandate to plan future development scenarios that reduce GHG emissions from driving. We develop several hypotheses to explain these results, but content-analysis methods do not allow us to prove or disprove these hypotheses. Determining why San Francisco's Metropolitan Transportation Commission and Sacramento's SACOG – and all the other MPOs – made specific planning decisions requires direct explanations from planners and decision-makers. We look forward to conducting interviews with planners at a range of California and Oregon MPOs in the next stage of this project.

1.0 INTRODUCTION

1.1 PROBLEM

Action on climate change in the United States has largely stalled in recent years. The Trump administration's decision to renege on U.S. commitments made as part of the Paris climate agreement is a continuation of this trend that will make it difficult to keep global warming to 2 degrees Celsius or less (Sanderson and Knutti 2017). This abnegation by the federal government to plan for – or often even acknowledge – the dangers posed by climate change have put U.S. leadership on the issue in doubt, and encouraged other actors to take the reins. Globally, the European Union and China are establishing leadership roles on the international stage (Wu 2017). Within the United States, corporations and civil-society organizations – as well as states, counties, and municipalities – are acting on an individual level to reduce greenhouse gas (GHG) emissions that cause climate change and adapt to the already inevitable impacts even in the absence of a federal mandate to do so (Bansard, Pattberg, and Widerberg 2017; Leck and Roberts 2015).

1.2 APPROACH

Broadly, this study seeks to understand how transportation planning can help slow climate change. Specifically, it assesses how state laws in California and Oregon aimed at reducing GHG emissions from driving have affected the quality of regional transportation plans produced by metropolitan planning organizations (MPOs), the regional planning bodies tasked by the federal government with planning regional transportation infrastructure. If the laws are effective, they could be models for climate-change mitigation policy in other states, or even the nation as a whole.

California and Oregon are aiming to reduce GHGs from driving using similar, but not identical, legislation. California's Sustainable Communities and Climate Protection Act (SB 375) and the Oregon Sustainable Transportation Initiative (SB 1059) are unique in the United States. No other states have set specific GHG emissions-reduction targets for regional agencies to reduce GHGs through coordinated planning for land use and transportation (Barbour and Deakin 2012; Eaken, Horner, and Ohland 2012). The goal of both laws is to cut emissions by changing development patterns in a way that encourages more compact development that allows people to walk, bike or take transit instead of driving – and to make shorter trips when they do drive. To do this, SB 375 and SB 1059 have to reach through multiple layers of government to change what gets built and where (Rose 2011; Vurlumis 2014; Urban Habitat 2009). State agencies have to set emissions-reduction targets for individual metros. MPOs have to produce RTPs that meet these goals. Cities have to curb sprawl by pushing new development to walkable neighborhoods with good transit.

SB 375 and SB 1059 also tackle two major problems with transportation planning in the United States. The first is that transportation networks and land uses are planned separately despite the

fact they are functionally dependent on one another (Ewing et al. 2011; Handy 2005). MPOs have responsibility for planning regional transportation infrastructure, including freeways, major transit lines, regional trail systems, and often some arterial streets. Municipalities, on the other hand, plan land uses such as the location of new residential, commercial, and industrial areas (Hirt 2013). The second problem is this rational process is not always how transportation planning actually works. Cities desperate to increase tax revenue will often approve car-dependent sprawl no matter the long-term effects on climate change (Innes and Gruber 2005). This puts political pressure on MPOs to produce regional transportation plans that favor driving rather than discouraging it. Therefore, if SB 375 and SB 1059 are going to change development patterns, they must change planning processes first.

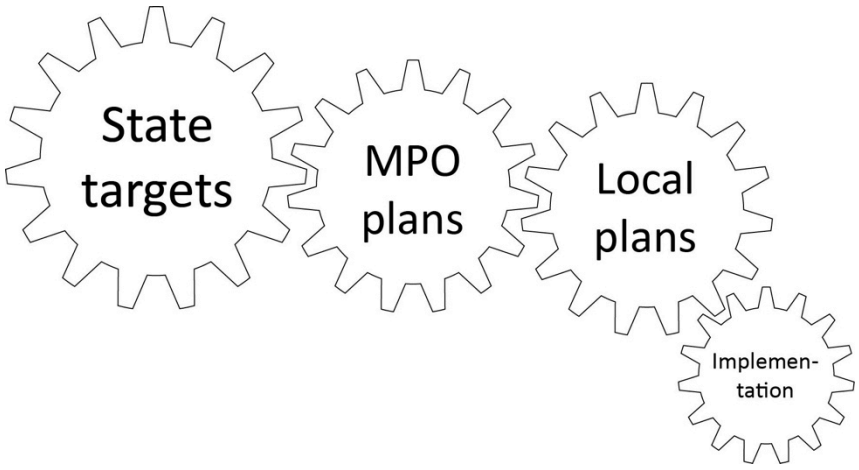

Figure 1.1 California's SB 375 and Oregon's SB 1059 seek to change development patterns in a way that reduces greenhouse gas emissions from driving by mandating closer coordination between land-use and transportation planning. But both laws must reach through multiple layers of government to implement state priorities.

In this report, we compare RTPs produced before the laws took effect to plans produced afterward to systematically evaluate how plans and planning processes comply with state-mandated emissions-reduction targets for each metropolitan area. Specifically, we answer two questions to assess whether SB 375 and SB 1059 are models for climate change policy.

- **Question 1:** Do RTPs focus more on climate change following the implementation of regional GHG emissions-reduction targets?

- **Question 2:** Does the quality of climate-related planning within the RTP improve following the implementation of regional GHG emissions-reduction targets?

1.3 BACKGROUND/LITERATURE REVIEW

The major aim of both SB 375 and SB 1059 is to introduce an element of climate action planning – reducing GHG emissions from driving – into the existing process of regional transportation planning. This is a major change to conventional transportation planning as practiced in the United States. For the past half century, the federal government has looked to MPOs to plan for, prioritize, and often channel funding for regional transportation infrastructure in all U.S. metros with a population of 50,000 or more people. States can add programs and priorities to MPOs' purview – planning for housing and social programs are common – but California and Oregon are the first to mandate that they look at climate-change mitigation.

1.3.1 Legal Context of SB 375 and SB 1059

Both SB 375 and SB 1059 are part of larger packages of legislation aimed at reducing GHG emissions statewide. California's process started earlier than Oregon's, but the legal frameworks in the two states are substantively similar.

1.3.1.1 SB 375 – California's Sustainable Communities and Climate Protection Act

Under SB 375, each of California's 18 MPOs must prepare a "sustainable communities strategy" (SCS) as part of its regional transportation plan (RTP) that shows how the metropolitan area can reduce per capita GHG emissions from automobiles. The SCS describes a coordinated land-use and transportation development scenario that, if implemented, would allow the region to meet its GHG emission-reduction targets as set by CARB and meet state requirements for accommodating new housing. Once adopted by the MPO, the RTP/SCS guides the transportation policies and investments for the region.

CARB must review the adopted SCS to confirm and accept the MPO's determination that the SCS, if implemented, would meet the regional targets for reducing GHGs from transportation. If the SCS would not meet the regional targets, the MPO must prepare an "alternative planning strategy" (APS) that details the steps necessary for the MPO to meet the targets. In this case, the APS is prepared separately from the RTP.

SB 375 identifies MPOs' travel-demand models as essential tools for estimating GHG emissions from SCS development scenarios. As a result, the state has taken steps to update modeling guidelines, provide funding for model development, daylight existing modeling practices, and improve modeling capacity at all MPOs (Newmark and Deakin 2012).

SB 375 also establishes incentives to encourage local governments and private developers to implement the SCS or the APS. Housing and transportation projects consistent with the SCS (or APS) can get relief from some or all environmental review requirements under the California Environmental Quality Act (CEQA) (Cal. Public Resources Code §§ 21155, 21155.1, 21155.2, 21159.28). (See http://www.arb.ca.gov/cc/sb375/sb375.htm for more details).

Table 1.1: California legislative timeline

Year	Legislative action
2002	Assembly Bill 1493 (AB 1493), the "Pavley Act," becomes the first law in the world to regulate GHGs from automobiles. The U.S. Environmental Protection Agency first denied the regulations before finally approving them in 2009.
2005	Gov. Arnold Schwarzenegger signs an executive order (EO S-3-05) setting statewide emissions reduction targets at 2000 levels by 2010, 1990 levels by 2020, and 80 percent of 1990 levels by 2050.
2006	Assembly Bill 32 (AB 32), The Global Warming Solutions Act, requires the California Air Resources Board (CARB) to develop regulations and market mechanisms to reduce California's greenhouse gas emissions to 1990 levels by 2020.
2007	Assembly Bill 118 (AB 118), Alternative Fuels and Vehicles Technologies, creates the Alternative and Renewable Fuel and Vehicle Technology Program to provide funding to public projects to develop and deploy innovative technologies that transform California's fuel and vehicle types to help attain the state's climate-change policies.
2007-2008	CARB determines that vehicle efficiency and low-carbon fuels would result in just 86 percent of 2020 GHG reductions (CARB, 2011). This leads directly to the passage of SB 375.
2008	Senate Bill 375 (SB 375), The Sustainable Communities and Climate Protection Act, sets out the process for reducing GHG emissions through coordinated land use and transportation planning.

1.3.1.2 SB 1059 – The Oregon Sustainable Transportation Initiative

Oregon's approach is similar to California's in that it encourages MPOs to reduce emissions by planning coordinated transportation and land use scenarios that lower vehicle miles traveled (VMT). But Oregon's process differs from California's in important ways. First, only two Oregon MPOs, Portland's Metro and Eugene's Central Lane, are required to engage in the scenario planning process, and only Metro is required to implement its preferred alternative. Other MPOs are encouraged to engage in scenario planning but are not required to do so. These tiered requirements differ from California, where all MPOs are required to develop either an SCS or an APS. Second, Oregon has a more standardized process for evaluating development scenarios than does California. In Oregon, all scenarios are evaluated using ODOT's strategic assessment process. According to ODOT,

> A Strategic Assessment can give metropolitan areas an opportunity to evaluate how their region's transportation system will perform in the future assuming that current plans are carried out and current trends continue. Strategic Assessments can be used to help to inform long-range planning and through sensitivity testing, help metropolitan areas understand how different aspects of the transportation system, land use, and other factors affect future performance.
>
> Metropolitan areas can use the results of a Strategic Assessment to inform development of land use and transportation plans and investment priorities. In addition, a Strategic Assessment can help the metropolitan area governments to develop a long-range vision for their region which addresses community goals and prepares the community for the future. …
>
> Strategic Assessments utilize the Regional Strategic Planning Model (RSPM). The model is run by ODOT, using data from a variety of sources. ODOT provides statewide data and assumptions for the model, and local jurisdictions contribute

> locally specific data. … The Regional Strategic Planning Model (formerly the GreenSTEP Model) is an innovative model that was built to support scenario planning and Strategic Assessments for greenhouse gas emissions reduction. It is a tool which fills needs that are not filled by standard urban travel models.

Oregon's processes also are designed to consider economic and societal impacts to households and businesses while moving the state's MPOs closer to achieving the 2050 GHG-reduction goal.

Table 1.2: Oregon legislative timeline

Year	Legislative action
2007	House Bill 3543 (HB 3543), The Global Warming Actions Act, set statewide GHG-reduction targets and codified GHG reduction goals; namely, beginning to reduce GHG emissions by 2010, cutting statewide GHG emissions by 10 percent of 1990 levels by 2020, and cutting statewide GHG emissions by 75 percent of 1990 levels by 2050. The law also established the Oregon Global Warming Commission, an advisory board tasked with recommending strategies to reduce GHG emissions in the state. The commission is responsible for assessing cap-and-trade systems, developing a public-education strategy for global warming issues, and tracking impacts on Oregon and other states. The bill also created the Oregon Climate Research Institute in the state university system.
2009	House Bill 2001 (HB 2001), the Jobs and Transportation Act, directs Oregon MPOs to develop regional transportation and land-use approaches that reduce GHG emissions from transportation. Only Portland (Metro) and Eugene-Springfield (Central Lane) are required to develop scenarios. Both MPOs must select a preferred scenario, but only Metro is required to implement it.
2010	Senate Bill 1059 (SB 1059) directs the Oregon Transportation Commission to develop, in cooperation with state MPOs, a statewide transportation "roadmap" that shows how the state can reduce GHG emissions from transportation and support the goal of a 75 percent reduction below 1990 levels by 2050 (Oregon Department of Transportation and Oregon Department of Land Conservation and Development 2013). It also directs the Oregon Department of Transportation (ODOT) and the Oregon Department of Land Conservation and Development (DLCD) to support the reduction of GHG emissions from the transportation sector through land use and transportation planning.

1.3.1.3 Regional emissions-reduction targets

California's Air Resources Board (CARB) and Oregon's Land Conservation and Development Commission (LCDC) have set emissions-reduction targets for metropolitan regions in their state. Metros are expected to meet the first round of emissions-reduction targets by 2020 in California and 2035 in Oregon (California Environmental Protection Agency and Air Resources Board 2011; Oregon Department of Land Conservation and Development 2015).

Table 1.3 California Air Resources Board (CARB)-approved regional GHG emissions-reduction targets – percent reductions from 2005 emissions levels

Metro	MPO	2020 Emissions Reduction Target (%)	2030 Emissions Reduction Target (%)
Bakersfield	Kern Coalition of Governments	-5%	-10%
Chico	Butte County Association of Governments	1%	1%
Fresno	Council of Fresno County Governments	-5%	-10%
Hanford	Kings County Association of Governments	-5%	-10%
Los Angeles	Southern California Association of Governments	-8%	-13%
Madera	Madera County Transportation Commission	-5%	-10%
Merced	Merced County Association of Governments	-5%	-10%
Modesto	Stanislaus Council of Governments	-5%	-10%
Monterey	Association of Monterey Bay Area Governments	0%	-5%
Redding	Shasta County Regional Transportation Planning Agency	0%	0%
Sacramento	Sacramento Coalition of Governments	-7%	-16%
San Diego	San Diego Association of Governments	-7%	-15%
San Francisco	Metropolitan Transportation Commission	-7%	-15%
San Luis Obispo	San Luis Obispo Council of Governments	-8%	-8%
Santa Barbara	Santa Barbara County Association of Governments	0%	0%
South Lake Tahoe	Tahoe Metropolitan Planning Organization	-7%	-13%
Stockton	San Joaquin Coalition of Governments	-5%	-10%
Visalia	Tulare County Association of Governments	-5%	-10%

Oregon's LCDC decided in June 2015 to update emissions-reduction targets to set 2040 GHG emissions-reduction targets for the state's metro areas; however, these updates have not yet been approved. Until then, the targets set for 2035 are the most current.

Table 1.4 Oregon Land Conservation and Development Commission (LCDC)-approved GHG emissions-reduction targets for Oregon metros – percent reductions from 2005 emissions levels

Metro	MPO	2035 Emissions-Reduction Target (%)
Albany	Albany Area Metropolitan Planning Organization	0%
Bend	Bend Metropolitan Transportation Organization	-18%
Corvallis	Corvallis Area Metropolitan Planning Organization	-21%
Eugene-Springfield	Central Lane Metropolitan Planning Organization	-20%
Grants Pass	Middle Rogue Metropolitan Planning Organization	0%
Medford	Rogue Valley Metropolitan Planning Organization	-19%
Portland	Portland Area Comprehensive Transportation System	-20%
Salem	Salem-Keizer Area Transportation Study	-17%

1.3.2 State Mandates

State planning mandates are requirements for planning documents and processes set by state governments that must be met by regional and local governments. Ideally, state mandates are a means of collaboration between states and local governments on land-use and environmental priorities. Functionally, mandates offer a way for the state to set overall policies and goals while leaving details and implementation to the local governments. Mandates tend to either set guidelines for the form and content of local comprehensive plans (comprehensive mandates) or to require localities to address specific issues within an existing planning framework (single-issue mandates).

California's Sustainable Communities and Climate Protection Act (SB 375) and the Oregon Sustainable Transportation Initiative (SB 1059) are two of the latest examples of state planning mandates in the United States. In both states, priorities are set at higher levels of government – in this case, state-level goals for lower GHG emissions that are translated into emissions-reduction targets for every MPO area – and passed on first to MPOs, and then to municipalities in the form of a mandate to produce coordinated development scenarios for land use and transportation that lower per capita GHG emissions from driving. The laws are single-issue mandates in that they focus solely on reducing GHG emissions.

There is a long history in the United States of using state mandates to influence local actions. California became the first state to impose a planning mandate in 1937, when it passed legislation requiring all cities and counties to adopt comprehensive plans. It added requirements for land use and circulation elements in 1955, a housing element in 1967, conservation and open-space elements in 1970, and seismic safety and two other elements in 1971 (Burby et al. 1997).

Since then, legislatures in a number of other states approved various planning mandates, including laws requiring local governments to prepare plans. Florida passed legislation in 1972 that required municipalities to prepare local plans and mandated state review and approval of those plans, and Oregon followed suit with a similar law in 1973 (Daniels 1999). Maine adopted legislation mandating the preparation of local plans in 1985, followed by Rhode Island in 1988. Georgia's legislature mandated the creation of regional plans in 1989 but left local plans voluntary (Bunnell and Jepson 2011; Daniels 1999).

During the 1990s, more states adopted legislation mandating localities to prepare plans. Washington State passed such a law in 1990, Maryland in 1992, Tennessee and Arizona in 1998, and Wisconsin in 1999. Arizona's mandate to prepare general plans applied to counties and cities with populations above 50,000, as well as smaller cities and towns (with populations less than 50,000) that had been experiencing sustained rapid growth. Wisconsin's 1999 Smart Growth Act mandated municipalities with populations of 12,500 people or more to prepare comprehensive plans (Bunnell and Jepson 2011).

In addition to mandates requiring preparation of comprehensive plans, states have also imposed single-purpose mandates requiring localities to plan for specific issues of concern. California, North Carolina, and Florida have all had laws on the books requiring municipalities to prepare local plans for natural hazards mitigation (Burby et al. 1997). Washington, Maine, Vermont, and a few other states mandate that local governments assure adequate citizen involvement in the process of preparing plans (Brody, Godschalk, and Burby 2003). Illinois passed a law in 2003 mandating planning for affordable housing (Hoch 2007).

1.3.2.1 State Mandates and Planner commitment

The goal of all state mandates is to translate state priorities into local action. As Hoch (2007) puts it, "Effective plans turn beliefs into intentions that guide practice" (p. 97). Quality plans breed commitment to state priorities both through the plan-making process – when the necessity of forging a shared vision of a desirable future forces local stakeholders to come to some sort of consensus on what that future looks like – and through the force and communicative power of the plan itself.

Burby & Dalton (1994) define local planning agency commitment as planners' willingness to support state planning goals. But how do mandates affect local planner commitment? A review of plans in 176 communities across five states found that commitment is enhanced by strong, single-purpose mandates, by support from elected officials, and by local political activism (Dalton and Burby 1994). A similar study identified the key factors associating local commitment with state natural-hazard goals as local plan quality, previous natural disasters in the region, and constituency demands for protection from natural hazards (Burby and May 1998). This combination of factors suggests that recognizing the problem and the need to do something about it – because of political pressure or previous planning efforts or both – are necessary preconditions for building planner commitment. There is also evidence that mandates can accelerate this recognition. In a review of 139 community plans, Berke (1996) found that state mandates substitute for, rather than create, local planning agency commitment in states that mandate natural-hazards plans. This finding suggests that planners' own priorities have little

influence on their actions: Planners follow mandate guidelines regardless of whether they are committed to mandate and exercise limited influence in non-mandate communities (Berke 1996).

However, state planning mandates can backfire when they are seen as unwelcome or detrimental to local economic-development goals, especially when the mandates do not include financial and other incentives for local jurisdictions to plan. Previous studies have found that state and local officials complain about the failure of higher-level governments to fund implementation costs, the lack of flexibility in the required actions, and the tendency for higher-level decision-makers to shift political blame for infringement of property rights down to the local level (Burby and Dalton 1994; Burby and May 1998). As a consequence of these concerns, lower-level governments can sometimes be reluctant partners in implementing state priorities that come through mandates. A mandate that localities in Illinois plan for affordable housing sparked just such a backlash. A survey of local planners "uncovered widespread resistance and grudging compliance" to the mandate, largely because it was seen as an imposition on local control and did not come with additional funding or other incentives (Hoch 2007).

The secret to the success of state mandates may be more in the incentives and capacity-building measures built into the mandate than the existence of the mandates themselves. Municipalities in Maine were less likely to submit plans but more likely to make them consistent with state law following the state's shift from a mandatory to a voluntary comprehensive-planning regime (Pendall 2001), suggesting that the combination of incentives, assistance, and a qualified state agency with professional staff can build on previously existing commitment to state priorities in some. When state law requires plans, it does focus attention and compliance. But planning requires more than this: "Coercion inspires procedural compliance, but incentives lead to greater commitment" (Bunnell & Jepson, 2011, p. 98).

Solving the "commitment conundrum" created when there is a lack of local buy-in for state priorities is necessary if planning mandates are going to be effective. Two important steps higher-level governments can take to solve the commitment conundrum are improving the quality of local plans and building local support for the objectives sought by planning mandates. These are not easy solutions, but as scholars have noted, they "can be mutually supportive, if in the process of producing higher quality plans local planners take steps to involve citizens and other stakeholders in the planning process" (Burby & May, 1998, p. 103).

1.3.2.2 State Mandates and Plan Quality

Defining what makes a "good plan" has been a matter of much debate in the planning field (Norton 2005; Baer 1997; Berke and Godschalk 2009). Plan quality was initially conceptualized as factual basis, goals, and the plan's policy components (Baer 1997; Berke and French 1994; Burby et al. 1997). The plan's fact basis describes the existing local conditions and development trends. Goals represent general statements regarding problems to be solved, needs to be met, and desirable end states to be achieved. Policy components suggest methods to be used in achieving the plan's intended goals (Berke et al. 2006). Subsequent studies extended conceptions of plan quality by adding interjurisdictional coordination and implementation measures (Brody 2003), as well as the communicative and persuasive qualities of the plan (Bunnell and Jepson 2011). An effort to update previous approaches specifically for environmental plans looked at five

components: (1) factual basis; (2) goals and objectives; (3) interorganizational coordination; (4) policies, tools, and strategies; and (5) implementation and monitoring (Tang and Brody 2009).

At minimum, a good plan is one that exhibits a sound analysis of the facts, formulates clear policy goals, and sets forth appropriate recommendations to achieve these goals (Burby et al. 1993). Sound analysis and effective communication are important because plans are designed to spur action by communicating key principles and ideas about what makes for a desirable future. In other words, "the extent to which plans persuasively connect with readers, and elicit their positive participation, should constitute the core notion of what constitutes a good plan" (Bunnell & Jepson, 2011, p. 338).

State mandates have been found to improve the amount, character and quality of planning (Berke and French 1994; Burby and Dalton 1994; Dalton and Burby 1994; Burby et al. 1997; Brody 2003; Berke 1996; Burby et al. 1993). Explanations of how planning mandates influence plan quality vary. In some cases, a top-down regulatory approach may motivate local jurisdictions to address what they otherwise consider regional problems (Tang et al. 2010). In other cases, it may be that mandates improve the quality of local plans by providing a guideline and setting minimal requirements (Conroy and Berke 2004; Jun and Conroy 2013). Alternatively, mandates may include measures that increase the capacity of local agencies to carry out planning tasks – including budget, staffing levels, and legal authority (Burby and May 1998). When the preparation of mandated plans involves citizens in problem solving, planning mandates also may help build consensus for planning decisions. "By fostering what planning theorists term 'communicative rationality' rather than (or in addition to) 'technical rationality' plans based on participation can result in broad-based support for the recommendations developed through the planning process" (Burby & May, 1998, p. 102).

Plan quality is, in many ways, a result of local commitment to state planning goals. But plan quality is also a necessary ingredient for successful plan implementation. There is broad consensus in the literature that planning mandates stimulate higher-quality plans that, in turn, facilitate implementation of state and local planning objectives. High-quality plans are clearer and more persuasive, and persuasion is necessary to "get the policymaker's or the public's attention, to make them 'listen to reason' where they are blinded by stereotypes or by wishful thinking" (Majone, 1989, p. 39, quoted in Bunnell & Jepson, 2011). Localities that expend more resources on public education and outreach – in the arena of natural hazards, these can include flooding and storm-surge maps, recommendations for individuals to protect homes and property from natural hazards, and flood-warning systems – are twice as likely to see well-informed, active local constituencies advocating for action to mitigate natural hazards (Bunnell and Jepson 2011). Burby et al. (1993) argue that high-quality plans that formulate clear policy goals and that set forth appropriate policy recommendations based on sound analysis of the facts reinforce political commitment to act on policy problems and result in stronger growth management programs. In other words, by identifying community needs and proposing strategies to address them, quality plans provide both the opportunity and the tools to coordinate action.

2.0 METHODOLOGY

Influencing what gets built and where is the ultimate goal of California's SB 375 and Oregon's SB 1059. The fundamental assumption behind both laws is that the best way to reduce GHG emissions from driving is to get people to drive less, and that getting people to drive less requires changing the built environment. (See, for example, (Ewing and Cervero 2010) for a meta-analysis summarizing previous work on the relationships between travel and the built environment.) But changing the built environment can take decades. Therefore, we determine the laws' impact by looking for changes in the plans that shape the built environment. Specifically, we examine how climate change-related content of RTPs in California and Oregon changed after the implementation of SB 375 and SB 1059. We do this by conducting content analysis of RTPs approved before the California and Oregon set GHG reduction targets for each metro and RTPs approved afterward. Comparing the quality of climate change-related content of pre- and post-implementation RTPs provides insight into how MPOs in California and Oregon have responded to SB 375 and SB 1059 and, by extension, whether the laws can serve as models for climate-mitigation policy.

2.1 CONTENT ANALYSIS

To answer the two questions this study poses related to the way MPOs deal with the state mandates to plan for GHG-emissions reduction, we conducted content analyses in two stages. The first stage focuses on assessing how frequently individual RTPs address climate change and related issues, and where in the plans discussions of climate change appear. The second stage focuses on evaluating the quality of climate change-related sections of individual RTPs.

Content analysis is "a systematic reading of a body of texts, images, and symbolic matter" (Krippendorff, 2013). Content analysis consists of coding, or classifying, ideas found in texts into conceptual categories. Applied to planning, this means a systematic approach to measuring the characteristics of plans using content analysis techniques, which dictate methodological standards for content analysis to generate reliable and replicable data about the contents of plans (Lyles & Stevens, 2014). For this project, coding involves two main tasks. The analysts' first task is identifying individual ideas, or textual units, within the RTP and deciding whether they are relevant to climate change, either explicitly or in context. The second task of coding is assigning each textual unit to a category, or node.

Coding the climate change-related content of RTPs in this way allows us to see how MPOs changed their approach to GHG reduction following the implementation of SB 375 and SB 1059.

2.1.1 Stage 1: Climate Focus of RTPs Pre- and Post-Mandate Implementation

Content analysis for this stage consists of categorizing, or coding, material in the RTPs focused on climate change and related issues. The coding categories, or nodes, consist of what we call

section nodes and topic nodes. Analysts were instructed to code only material related to climate change and to code every relevant passage to one section node and as many topics nodes as appropriate. All analysts were trained in the coding process at the beginning of the project and given a copy of the protocol describing the goals and process of the content analysis. Analysts followed content-analysis best practices by working independently (K. Krippendorff 2004), consulting with one of the authors when they had questions or encountered problems. The content-analysis protocol and the list of nodes were updated iteratively throughout the project. Figure 2.1 summarizes the coding process for the first stage of content analysis.

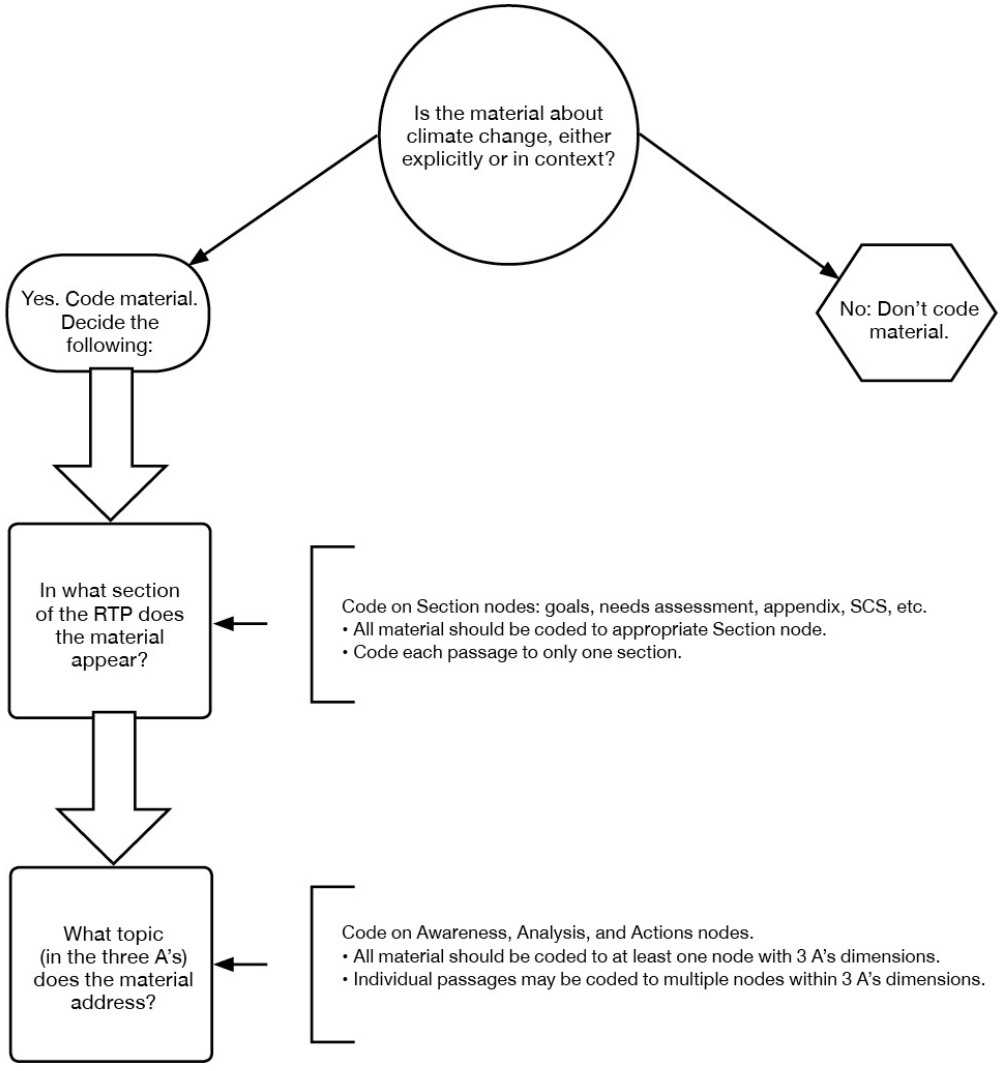

Figure 2.1 Content analysts were instructed to code only RTP material concerning climate change and to code all passages to one section node but to as many topics nodes as appropriate.

In this stage of content analysis, we identify how often and in what sections RTPs mention climate change and related issues. A team of three analysts (undergraduate and master's-level

planning and architecture students) conducted a content analysis of 48 RTPs: two plans from each of the 18 MPOs in California and six in Oregon. The first set of plans consists of RTPs approved before regional GHG emissions-reduction targets were finalized in each state. The second set consists of RTP updates approved immediately afterward. (Two of Oregon's eight MPOs were excluded from the study because they formed recently enough they do not have a "before" plan.) All three analysts coded 12 plans in common to allow for comparison of their coding. The remaining 36 plans were randomly assigned to be coded by one analyst each, meaning each analyst coded 24 RTPs in all. While we did not conduct formal calculations of inter-rater reliability for this stage, we did use the overlapping subset of plans to ensure that all analysts' coding demonstrated a shared understanding of the coding protocol and the transportation-planning process.

Section nodes are simply the section of the RTP the coded material falls into. Analysts were instructed to determine whether passages of the RTPs related to climate change appear in the introduction; goals section; needs assessment, including sections on financial-, housing-, and transport-sector needs in the MPO region; proposed projects and performance measures; or appendices, including environmental impact statements. In California RTPs, analysts also coded whether climate change-related material appears in the Sustainable Communities Strategies (SCS) section of RTPs prepared following the implementation of SB 375. Tracking the sections where material related to climate change appears in the RTP allows us to determine whether the material applies to the key components of internal plan quality: the issues and vision statement, fact base, goals, policy framework, and implementation and monitoring framework (Berke and Godschalk 2009; Berke et al. 2006).

Table 2.1 Section nodes' relationship to internal plan-quality components

Section nodes	Plan component
Needs assessment, Environmental impact statement	Fact base, Issues & vision statement
Goals	Goals
Projects	Policy framework
Performance measures	Implementation & monitoring framework

Topics nodes describe the thematic content of RTP passages related to climate change. These follow a framework developed by Tang et al. for evaluating climate action plans (Tang et al. 2010). The framework consists of what Tang et al. call the "3As": awareness, analysis, and actions.

Tang et al. describe awareness as the degree to which plans demonstrate an understanding of the concepts of climate change. Therefore, our content analysis identifies passages of RTPs that describe the scientific underpinnings of climate change, climate variability, and global warming. We also seek to identify text in RTPs that discusses current and future impacts from climate change on the MPO region, as well as text covering long-term goals and detailed targets for GHG-emissions reduction. Components comprising the second "A," analysis, describe the methods and tools used to determine climate change-related goals and actions. Therefore, our content analysis identifies RTP text mentioning GHG emissions inventories that cover the major

drives, sources, and contributors of climate change in the MPO region. We also look for passages discussing vulnerability analyses that identify the most vulnerable places and populations in the MPO region, cost estimates for reducing regional GHG emissions, and the analysis tools and software used to aid in the planning process. Finally, actions components spell out how MPOs will reduce GHG emissions in their regions. Typically, this means establishing policies and programs to address climate-change mitigation and adaptations in the natural environment, built environment and human health. The framework developed by Tang et al. includes a full range of local planning sectors, from intergovernmental collaboration to energy and waste. However, because this analysis is concerned with climate action planning conducted within RTPs, we focus on a subset of sectors, namely communication and collaboration policies, financial tools, land use policies, transportation policies, and implementation and monitoring strategies.

2.1.1.1 Pre-coding for climate change-related concepts

Because RTPs can stretch to several hundred pages each (some in this study ran well over 1,000 pages including appendices), we used Nvivo 11 Pro qualitative analysis software to highlight sections of each plan related to climate change. Relevant passages were identified by keyword searches on climate change, greenhouse gas emissions, and VMT reduction. Table 1 details the queries that comprise each concepts node. Content analysts then coded, or categorized, sections of the plan pertaining to climate change according to topic and plan section.

Table 2.2 Queries used to create concepts nodes

Concept node	Queries
Climate change	An agglomeration of individual text queries for the words “climate” and “change” appearing within five words of one another; the terms “solar radiation,” and “temperature”; and the words “warm,” “warming,” or “warmer.”
VMT reduction	An agglomeration of individual text queries for the words “reduce” and “driving” appearing within five words of one another and the terms “vehicle miles traveled” and VMT
Emissions	An agglomeration of individual text queries for the terms co2, “carbon dioxide,” “greenhouse gas,” “greenhouse gases,” ghg, ghgs, and the words “emissions” or “emission.”

2.1.1.2 Climate focus index creation and analysis

To compare the focus on climate change between plans from different MPOs and between before plans and after plans developed by the same MPO, we assigned each RTP a score based on an index of how frequently key words and phrases appear in the RTPs. The index score is comprised of the frequency of references to climate change-related issues in the concept nodes, the 3As, and the goals section. We selected these nodes for the index because they reflect the fact base, goals, and actions elements of plan-quality evaluation (Baer 1997; Berke and French 1994). Index scores were transformed to a using the percentage of maximum scaling (POMS) method. POMS transforms results from different scales into a comparable metric from 0 (=minimum possible) to 1 (=maximum possible). A key characteristic of this method is that it is a monotonous transformation that preserves the proportional distance between observation, as well as the multivariate distribution and covariance matrix of longitudinal variables (Moeller 2015). It is calculated by dividing the difference between the observed score and the maximum score in the sample by the difference between the maximum and minimum scores. .

$$POMS = \frac{(observed - minimum)}{(maximum - minimum)}$$

Difference of means tests were used to confirm that the differences between pre-implementation and post-implementation RTPs are statistically significant.

2.1.2 Stage 2: Plan Quality of RTPs Pre- and Post-Mandate Implementation

For the second stage of content analysis, we evaluated the quality of climate change-related sections of RTPs using an evaluation protocol that employed 57 separate indicators focused on climate change. Analysts were instructed to read their assigned plan and identify passages that pertain to each indicator, or question. After finding a relevant passage in the RTP, analysts assigned a score for each indicator based on its strength and detail. Each question encompasses one indicator – a concept or idea related to climate action planning – that reveals the RTP's focus on reducing GHG emissions from automobiles as required by SB 375 and SB 1059. The protocol is based on the 3As framework (Tang et al. 2010): *awareness* of climate change demonstrated by the RTP text, descriptions of the plan's *analysis* of climate change-related issues, and *actions* taken by the MPO to reduce GHG emissions from driving. Table 2.3 details the questions in our evaluation protocol.

A new team of three coders (also comprised of master's- and undergraduate-level planning students) used the evaluation protocol to score all 48 RTPs. All three analysts evaluated 15 RTPs in common to allow for calculation of inter-rater reliability, which is reported in the Findings section of this report. The remaining 23 plans were evaluated by one analyst each. We use Krippendorff's Alpha to measure inter-rater reliability because it is robust in research designs such as this one using multiple analysts with a minimum 10 percent of plans in the fully crossed subsample used for comparison (K. Krippendorff 2004; Klaus Krippendorff 2011; Hayes and Krippendorff 2007).

When answering the questions, coders first determined which of the excerpted passages best answer the question and confirmed that the text is relevant to climate change. Then they scored the strength of the RTP statements according a three-point scale. Coders were instructed to score the specificity of the reference to each concept using the following scale:

(0) <u>not mentioned</u>: None of the coded references mention the concept in question.

(1) <u>present but vague</u>: A vague, confusing, or weakly expressed explanation of the concept. The language used in the plan is not clear, and does not demand definite action. Policies and programs mentioned may use "weasel" words such as "should," "can," or "may."

(2) <u>expressed in detail</u>**:** A detailed explanation of the concept that is clear and forceful. The language used to describe the need to act on climate change is certain, and policies and programs that do so demand action. These will use words like "must," "shall," and "will."

For all answers scored (1) or (2), coders recorded the text from the plan that best exemplified why they chose that score. The quoted text serving as evidence for the assigned score may come

from different sections of the plan, but the protocol requires analysts to indicate that they drew from non-contiguous passages using ellipses.

Table 2.3 Evaluation protocol questions and instructions for scoring each indicator

Awareness (17 indicators)
1. Background science: Does the plan indicate an awareness of the scientific underpinnings of climate change, climate variability, and global warming? Score (1) if the plan mentions the background science of climate change; score (2) if the explanation is detailed enough that you would understand the basics of climate science after reading the plan even if you knew nothing beforehand (the "veil of ignorance"); score (0) if background science is not mentioned at all in the RTP.
2. Impacts: Does the plan address current or potential impacts of climate change on the MPO region? The direction of causation matters for the following subquestions. Consider only references that discuss how climate change will impact the MPO service area, <u>not</u> how actions within these sectors will contribute to greenhouse gas emissions.
2a. Is climate change affecting or expected to affect air quality (no criteria pollutants unless they mention climate change) within the MPO service area?
2b. Is climate change causing or expected to cause displacement of human populations (due to storm damage, increased risk of wildfires or flooding, etc.) within the MPO service area?
2c. Is climate change causing or expected to cause economic impacts, including to agriculture, within the MPO service area?
2d. Is climate change affecting or expected to affect demand for or supply of energy (e.g. increased electricity for cooling, changing modes of production, etc.) within the MPO service area?
2e. Is climate change causing or expected to cause flooding from storm or sea-level rise (or both) within the MPO service area?
2f. Is climate change affecting or expected to affect food security for human populations within the MPO service area?
2g. Is climate change affecting or expected to affect the intensity or frequency of heat waves, including long-term changes in temperatures, within the MPO service area? A reference stating that climate change is expected to cause/is causing higher temperatures in the region would merit a (1), while a reference describing how much temperatures are expected to increase, when they're expected to increase, or the probability they will increase would merit a (2.).
2h. Is climate change causing or expected to cause damage to infrastructure (from heat, flooding, etc.) within the MPO service area? Mentioning that climate change is expected to cause damage merits a (1). Explaining which facilities are most vulnerable or describing the climate-impacts (flooding, fires, etc.) most likely to damage infrastructure in the MPO region merits a (2).
2i. Is climate change affecting or expected to affect the probability or location of landslides and mudslides within the MPO service area?
2j. Is climate change affecting or expected to affect natural areas, including plant and animal habitat, within the MPO service area?

2k. Is climate change affecting or expected to affect precipitation patterns, including drought and snowpack, within the MPO service area? This question potentially overlaps with Q2m on water supply (below). For this question, focus on references that describe changes to precipitation and the effect on snowpack or water levels, not the ultimate impacts on water supply or people.

2l. Is climate change affecting or expected to affect public health, including impacts from heat and changing disease vectors, within the MPO service area?

2m. Is climate change affecting or expected to affect demand for or supply of water (e.g. stream runoff, increased irrigation needs, etc.), within the MPO service area? This question potentially overlaps with Q2k (above). For this question, focus on references that describe how climate change will impact water availability for human use, especially drinking and irrigation.

2n. Is climate change affecting or expected to affect the probability, extent, or frequency of wildfires within the MPO service area?

3. Targets: Does the plan describe targets for reducing emissions (mitigation) from the regional transportation system?
Emissions-reduction targets related to California's SB 375 or Oregon's SB 1059 count here. A reference describing a target with a specific percent reduction and deadline year for the MPO region merits a (2), while stating either one alone merits a (1). Not mentioning specific targets merits a (0), even if the plan states a desire to reduce emissions but without setting a specific target date or emissions total.

4. Regulations: Does the plan describe laws and regulations that direct the planning agency to reduce GHG emissions or adapt to climate-change impact?
Score (1) if the plan mentions or simply names any legal requirements that the MPO direct its planning efforts to reduce GHG emissions. (Mentioning California's SB 375 or Oregon's SB 1059 would count here.) Score (2) if the plan describes the laws or the laws' requirements in any detail. Score (0) if the plan does not mention laws relating to climate change or GHG reduction.

Analysis (10 indicators)

5. GHG inventories: Does the plan provide an emission inventory that covers the major drivers, sources, or contributors to climate change within the MPO service area (not a statewide inventory, for instance)?
An emissions inventory describes historical or observed emissions, not projections. Inventories can cover many sectors or just a single sector such as transportation, for instance. Inventories also can cover multiple years or just a single year. All inventories will describe GHG emissions in terms of tons of carbon dioxide or tons of carbon-dioxide equivalent. The more detailed the inventory, the higher the score. An inventory that breaks down GHG emissions from freight transport by mode, for instance, is rather limited and merits only a (1), while an inventory that breaks down total emissions across modes likely merits a (2), especially if it stretches several years in the past.

6. Emissions trends (past and current): Does the plan identify current emissions trends, including a base year of emissions, within the MPO service area? (Note: This question is about observed emissions levels, not projected emissions.)
To merit a (1), plans must identify a trend, which means describing both current emissions and at least one year in the past. To merit a (2), the plan must set one of the past years as a baseline to use when comparing future emissions reductions (i.e. 10 percent of 1990 levels, etc.), and include multiple past years as well as the current year.

7. Emissions projections (future): Does the plan predict future levels of emissions within the MPO service area? In other words, does the plan describe expected emissions for future years? To merit a (2), the plan would have to predict emissions levels for one or, even better, multiple years in the future and describe how this was modeled. Simply mentioning the model used would suffice. To merit a (1), the plan must mention expected future emissions levels.
8. Cost/benefit analysis: Does the plan estimate costs and/or benefits of GHG emission reduction within the MPO service area? A plan that simply states the existence of benefits or costs would merit a (1). A plan that quantifies costs and benefits in monetary or other numeric terms and explains how this analysis was done merits a (2).
9. Vulnerability assessment: Does the plan include a vulnerability assessment that identifies the most vulnerable places and populations within the MPO service area? A plan that simply states some populations or locations are more vulnerable merits a (1). A plan that describes how these conclusions were reached (via a formal vulnerability analysis, for instance) merits a (2). **[Node: Analysis/vulnerability]**
10. Models: Does the plan identify the analysis tools and software used by the agency? (Answer only the subquestions.) Simply mentioning a model merits a (1). Describing how the model works or how it was used merits a (2).
10a. Trip-based TDM: Does the plan mention using a trip-based travel-demand model (even if it's not specifically in the context for GHG reduction)? See the *project wiki page* for a description of different kinds of travel-demand models.
10b. Activity/tour-based TDM: Does the plan mention using an activity-based or tour-based travel-demand model (even if it's not specifically in the context for GHG reduction)? See the *project wiki page* for a description of different kinds of travel-demand models.
10c. Air-quality models: Does the plan mention using an air-quality model, such as California's EMFAC model or another model, to predict future emissions levels?
11. Land use: Does the plan analyze the effects of land-use decisions on GHG emissions within the MPO service area? Assign a (1) for this question if the plan simply states that land-use patterns affect VMT and, hence, GHG emissions. Assign a (2) if it models differences in GHG emissions among various land-use scenarios. Hint: Both SB 375 and SB 1059 require most MPOs to do just this type of modeling.
12. Performance metrics: Does the plan identify the performance metrics that will be used to prioritize projects or assess the overall success of the plan? This question asks only about performance metrics justified in terms of climate change. For instance, a plan that states priority projects were chosen with climate-change goals in mind but doesn't explain how merits a (1), while a plan that explicitly states what metrics were used and where climate issues fall in the hierarchy merits a (2).
Actions (29 indicators)
Outreach: Does the plan outline education and outreach efforts aimed at convincing residents or municipal government officials of the importance of reducing GHG emissions in the MPO region?

13a. Detail: How detailed are the programs described in the plan? Assign a (1) to plans that simply mention the existence of public education/outreach programs. Assign a (2) to plans that describe who the programs target or how they will be conducted (such as providing a timeline).
13b. Budget: Is funding for these programs specified and budgeted? Scores for this question will most likely be a (0) or a (2). Assign a (2) if the plan provides a budget and a (0) if it does not mention a budget. In rare cases, the plan may mention some sort of process for setting a budget or prioritizing public education/outreach programs. Assign a (1) in these cases.
Collaboration: Does the plan outline policies or procedures to coordinate efforts between the MPO and municipal-level agencies when addressing climate change? Assign a (1) to plans that simply state the desire or intention to work with municipalities on climate change issues. Assign a (2) if the plan describes specific programs designed to facilitate collaboration.
15a. Coordination: Do policies or programs calling for coordination between MPOs and municipalities on efforts to reduce GHG emissions focus on any of the following topics? Assign a (1) to plans that simply state the desire or intention to work with municipalities on the following tasks related to climate change issues. Assign a (2) if the plan describes specific programs designed to facilitate collaboration.
15b. Data coordination, such as cross-jurisdictional efforts to produce maps, population projections, traffic and emissions analyses, or other data?
15c. Planning coordination such as cross-jurisdictional efforts to produce development scenarios, zoning codes, or other joint planning efforts?
15d. Policy coordination such as cross-jurisdictional efforts to implement complete streets, increased fuel taxes, or other policies to reduce GHG emissions?**]**
15e. Program coordination such as cross-jurisdictional public-education efforts, joint programs to encourage transit use or active transportation, or regional programs to reduce idling or other behaviors as a way to reduce GHG emissions?**]**
Behavior change: Does the plan describe behavior-change actions (policies, programs, or strategies) the MPO will undertake explicitly to reduce GHG emissions in the region in any of the following areas?
16a. Transit improvements: Does the plan propose transit expansion (i.e. more routes or more frequent service) as a way to reduce GHG emissions? Assign a (1) if the plan mentions that improving transit service can reduce GHG emissions generally. (One example would be stating that increasing transit mode share can decrease VMT and associated GHG emissions.) Assign a (2) if the RTP justifies specific projects, programs, or other transit improvements in the region in terms of reducing GHG emissions.
16b. Transit subsidies: Does the plan propose providing subsidies to individuals who use transit (either directly from the MPO or from employers) as a way to reduce driving and associated GHG emissions (not just congestion)? Assign a (1) if the plan mentions that rider subsidies can increase transit mode share can reduce GHG emissions generally. (One example would be stating that increasing transit mode share can decrease VMT and associated GHG emissions.) Assign a (2) if the RTP details how specific programs or other subsidies that will be implemented in the region to increase transit ridership will reduce GHG emissions.

16c. Parking reduction: Does the plan propose parking-reduction policies (e.g. setting parking maximums/limits, exemptions to minimums, allowing shared parking, etc.) as a way to reduce GHG emissions? Assign a (1) if the plan mentions that parking reduction can reduce driving and associated GHG emissions generally (i.e. simply stating that limiting parking capacity can decrease VMT and associated GHG emissions). Assign a (2) if the RTP details how specific parking-reduction policies that will be implemented in the region will reduce GHG emissions.
16d. TDM: Does the plan propose travel demand-management strategies (e.g. VMT fees, congestion pricing, restrictions on car use based on license-plate numbers or other methods, etc.) as a way to reduce GHG emissions? Assign a (1) if the plan mentions that TDM can reduce driving and associated GHG emissions generally (i.e. simply stating that reducing VMT can decrease associated GHG emissions). Assign a (2) if the RTP details how specific TDM strategies that will be implemented in the region will reduce GHG emissions.
Infrastructure: Does the plan describe infrastructure projects the MPO will undertake explicitly to reduce GHG emissions in the region in any of the following areas?
17a. Pedestrian: Does the plan encourage municipalities to complete pedestrian infrastructure projects (e.g. walkability, sidewalks, crossings, traffic calming, road diets, etc.) as a way to reduce GHG emissions in the region? Assign a (1) if the plan mentions that improving pedestrian infrastructure can reduce GHG emissions in the region. Assign a (2) if the MPO details a specific program to encourage municipalities to take action.
17b. Bicycling: Does the plan describe bicycle infrastructure projects (e.g. bike lanes, intersections, etc.) the MPO will undertake explicitly to reduce GHG emissions? Assign a (1) if the RTP mentions that improving bicycling infrastructure can reduce GHG emissions in the region. Assign a (2) if the RTP sets out specific projects or programs to encourage municipalities to take action.
17c. Complete streets: Does the plan encourage municipalities to adopt complete streets policies as a way to reduce GHG emissions in the region? Assign a (1) if the RTP mentions that complete streets can reduce GHG emissions in the region. Assign a (2) if the MPO details specific programs to encourage municipalities to take action.
17d. HOT lanes: Does the plan call for carpool/HOT lane expansion explicitly to reduce GHG emissions in the region? Assign a (1) if the RTP mentions that expanding HOT/HOV lanes in the region can reduce GHG emissions. Assign a (2) if the RTP sets out specific projects or programs to encourage municipalities to take action.
17e. Street connectivity: Does the plan encourage municipalities to adopt street connectivity policies as a way to reduce GHG emissions in the region? Assign a (1) if the RTP mentions that improved street connectivity (on arterial, collector, or local streets) in the region can reduce GHG emissions. Assign a (2) if the RTP sets out specific projects or programs to encourage municipalities to take action.

17f. Pedestrianization: Does the plan encourage municipalities to adopt pedestrianization policies (e.g. road closures, pedestrian zones, etc.) as a way to reduce GHG emissions in the region?
Assign a (1) if the plan if the RTP mentions that establishing pedestrian zones in the region can reduce GHG emissions. Assign a (2) if the RTP sets out specific projects or programs to encourage municipalities to take action.

Land use: Does the plan describe changes to the built environment or to land uses that will be needed to reduce GHG emissions in the region in any of the following areas?

18a. TOD: Does the plan encourage municipalities to adopt transit-oriented development (TOD) policies (i.e. zoning for higher densities and mixed uses near major transit stops) as a way to reduce GHG emissions in the region?
Assign a (1) if the plan mentions TOD as a way to reduce GHG emissions, even if the reference is vague or lacks detail. Assign a (2) if the RTP details a specific policy encouraging municipalities to take action. (The detail of the description matters more than the strength of the program here since no MPO can require municipalities to adopt TOD policies.).

18b. Mixed use: Does the plan encourage municipalities to adopt mixed-use zoning (i.e. neighborhoods where both commercial and residential activity are allowed) as a way to reduce GHG emissions in the region?
Assign a (1) if the plan mentions mixed-use development as a way to reduce GHG emissions, even if the reference is vague or lacks detail. Assign a (2) if the RTP details a specific policy encouraging municipalities to take action. (The detail of the description matters more than the strength of the program here since no MPO can require municipalities to adopt infill policies.)

18c. Infill: Does the plan provide incentives for municipalities to encourage infill development (i.e. development on vacant or underused parcels of land in existing neighborhoods - not greenfield sites) as a way to reduce GHG emissions in the region?
Assign a (1) if the plan mentions infill development as a way to reduce GHG emissions, even if the reference is vague or lacks detail. Assign a (2) if the RTP details a specific policy encouraging municipalities to take action. (The detail of the description matters more than the strength of the program here since no MPO can require municipalities to adopt infill policies.)

18d. Growth controls: Does the plan encourage municipalities to adopt growth controls (urban growth boundary, urban service boundary, impact fees, etc.) as a way to reduce GHG emissions in the region?
Assign a (1) if the plan mentions any kind of growth control measure as a possible way to reduce GHG emissions, even if the reference is vague or lacks detail. Assign a (2) if the RTP details a specific policy encouraging municipalities to take action. (The detail of the description matters more than the strength of the program here since no MPO is able to require municipalities to adopt growth controls.)

19. Emissions reduction: Does the RTP establish programs to encourage local governments (municipal or county) or local businesses to reduce GHG emissions by reducing employee VMT?
Assign a (1) if the description if the program description specifically mentions reducing GHG emissions as a goal but is otherwise vague or simply states a desire that governments and businesses take action. Assign a (2) if the RTP describes a detailed program encouraging action on the part of municipalities/businesses. A detailed description can include a timeline for action, a description of who the program targets with what incentive or coercive measures, or a budget/funding source.

20. Carbon fees: Does the plan set up taxes or fees on GHG emissions (such as a regional GHG reduction fee, carbon tax, etc.) as a way to reduce emissions or pay for climate change-related costs within the MPO region?
Assign a (1) if the RTP merely discusses such programs using weak language such as "should" or "may" or fails to require specific action. Assign a (2) if the RTP describes setting up or maintaining such a program using strong language such as "shall" or "will" or includes specific details such as a budget or an implementation timeline.

Implementation: Does the plan spell out specific and actionable steps for the implementation and monitoring of sections related to climate change?

21a. Milestones: Does the plan prioritize actions or set "milestones" for achieving GHG-reduction targets?
Assign a (1) if the RTP sets milestones and priorities for plan elements related to climate change using weak language such as "should" or "may." Assign a (2) if the RTP includes specific details such as a timeline or a prioritized list of tasks/deliverables or describes actions using strong language such as "shall" or "will."

21b. Implementation funding: Does the plan commit funds to programs or efforts that will reduce GHG emissions?
Assign a (1) if the RTP mentions that funding for implementation of climate change-related sections of the plan "should" or "may" be identified. Assign a (2) if the RTP provides a budget for emissions-reduction efforts or describes actions using strong language such as "shall" or "will."

21c. Task assignment: Does the plan assign responsibility for climate change-related tasks to specific agencies or individuals?
Assign a (1) if the RTP mentions that a climate change-related task (including programs, analyses, plan updates, monitoring, etc.) "should" or "may" be done by agencies or individuals. Assign a (2) if the RTP spells out task assignment using strong language such as "shall" or "will" or includes details such as a list of departments/individuals responsible for specific tasks.

21d. Monitoring: Does the plan spell out monitoring procedures for climate change-related tasks?
Assign a (1) if the RTP mentions any kind of system for monitoring post-approval progress on plan actions related to climate change. Vague mentions fail to require specific actions and can include expressions of desire for action or weak language such as "should" or "may." Assign a (2) if the RTP describes specific monitoring actions using strong language such as "shall" or "will" or includes specific details on monitoring procedures.

21e. Plan updates: Does the plan spell out updating procedures for sections of the plan related to climate change?
Assign a (1) if the RTP mentions updating climate-related data or analyses in the plan. Assign a (2) if the RTP describes the update process using strong language such as "shall" or "will" or includes specific details such as a timeline for updates or a list of agencies/individuals responsible for updating specific sections or data.

21f. Performance metrics: Does the RTP establish performance metrics/measures that define success for climate change-related elements or sections of the plan?
Assign a (1) if the RTP mentions climate change-related metrics, including emissions-reduction targets. Assign a (2) if the RTP describes how the metrics are calculated or their importance in the overall success of the plan.

Instructing the analysts to read all 26 RTPs in their entirety – which amounts to several thousand pages of text for each analyst – was infeasible, so we grouped excerpts from the plans in separate documents according to the topic nodes developed during the first stage of content analysis. We parsed or added to the existing nodes using text-search queries in Nvivo Pro 11 qualitative analysis software to create nodes related to each of the 57 metrics in the evaluation protocol. Text coded to each of these nodes was exported from Nvivo into Microsoft Word documents and HTML files that showed only text related to a single evaluation question, or metric. Analysts were instructed to read through the Word files to identify passages from each RTP that best answer the individual evaluation question. If the context of these passages was not clear (i.e. if the analyst was not sure the excerpted text concerned climate change or related issues, they consulted the HTML documents, which show the full page of the RTP where highlighted passages appear).

2.1.2.1 Reliability and validity testing

Reliability of coding is a particularly important concept in content analysis because, without an empirically "true" measure independent of the coding process, agreement among analysts is often the only way to assess validity (K. Krippendorff 2004; Klaus Krippendorff 2011; Stevens, Lyles, and Berke 2014). To ensure that the analysts applied the evaluation protocol consistently, the authors audited their scores throughout the evaluation process. Obvious errors were corrected and discussed with the analyst so that the protocol would be followed correctly on subsequent questions and plans. To detect systemic disagreements in scoring individual questions, we calculated inter-rater reliability for all indicators using subset of 16 RTPs that all three analysts coded in common. Krippendorff's Alpha is a standard test of reliability that, unlike percent agreement and similar measures, accounts for agreement due to chance. Alpha also is robust in study designs such as this one that use multiple analysts to code overlapping subsets of data (Gamer et al. 2015; Hayes and Krippendorff 2007).

When agreement on scores was low, we reviewed the text that each coder cited as evidence for the score to look for obvious mistakes – such as passages attributed to the incorrect RTP – and instructed the analyst to correct them. When the disagreement among scores was not based on an obvious mistake, we clarified the questions and instructions in the evaluation protocol and instructed the analysts to recode questions with low inter-rater reliability as identified by Krippendorff's Alpha. It proved necessary to go through three rounds of coding, with improvements made to the evaluation protocol each round.

3.0 FINDINGS

3.1 STAGE 1: CLIMATE FOCUS OF RTPS PRE- AND POST-MANDATE IMPLEMENTATION

The first stage of content analysis shows that – in most cases – MPOs in both California and Oregon mention climate change and related issues more frequently in plans approved after the implementation of regional GHG-reduction targets. We measure this by creating a climate focus index based on the number of times content in all the RTPs are coded to five key nodes:

1. Awareness
2. Analysis
3. Actions
4. Goals
5. Concepts

As discussed in section 2.1.1.2 Climate focus index creation and analysis, these five nodes are used in the index because they are the key determinants of plan quality. In this case, they are good indicators of the focus on climate change-related issues in the RTP.

With a few exceptions, scores on our index of climate focus are higher in post-implementation RTPs than in pre-implementation RTPs. (See Figure 3.1.) The exceptions are Bend, Central Point, and Portland in Oregon, and Hanford, Stockton, and Sacramento in California. These unexpected results are due in part to the way the index scores are scaled. Longer plans – such as the Fresno Council of Governments' 2014 RTP, which totals 2,375 pages including appendices – reasonably can be expected to mention climate change-related issues (as well as all topics) more times than shorter plans such as Portland Metro's 2014 plan, which is a relatively succinct 331 pages including the glossary. In absolute terms, the number of times Metro's RTPs mention climate change-related issues does not change substantially from its pre-implementation plan in 2010 to its post-implementation plan in 2014. Therefore, we urge caution in interpreting the first-stage content-analysis results as a reflection of plan quality. Instead, they should be seen as descriptive of broad trends that allow for comparison between MPOs.

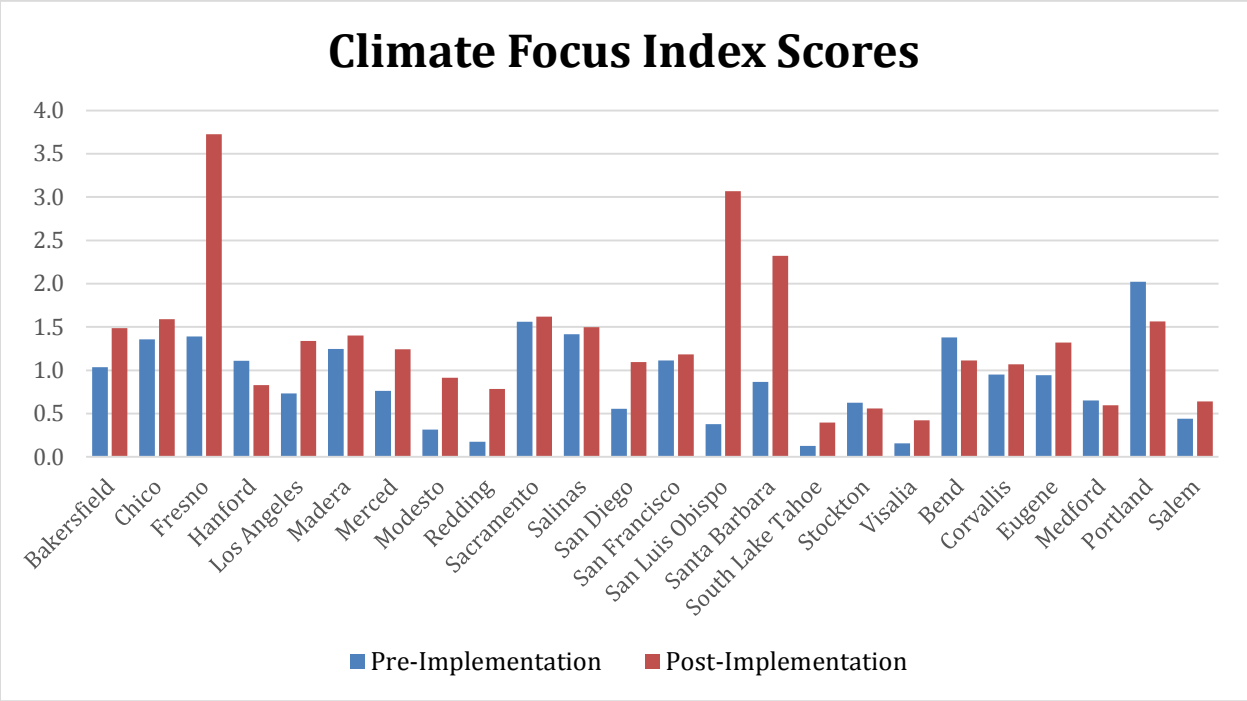

Figure 3.1 A climate focus index based on the frequency of coding to key nodes affecting plan quality, including the 3As – Awareness, Analysis, and Actions – Goals, and Concepts nodes. All counts were transformed using the proportion of maximum scaling method, which allows for comparison of various scales using a common metric ranging from 0 to 1 while maintaining proportional distances between observations.

The magnitude of the change from before to after scores varies widely. Figure 3.1 shows the differences in climate-focus index scores for pre-implementation RTPs and post-implementation RTPs in each metro. T-tests show that the changes from before to after scores are statistically significant when California and Oregon RTPs are analyzed together. The median score for pooled (CA and OR) pre-implementation scores is much lower (m=0.225) than post-implementation (m=0.454) scores (t=2.352, p=0.025). Similarly, the median score for pre-implementation RTPs in California (m=0.207) is less than half the median score for post-implementation RTPs (m=0.508) scores, and the difference remains statistically significant (t=2.538, p=0.019).

Scores for both pre-implementation and post-implementation RTP scores vary widely by state – as shown in Table 3.1 – but the differences between RTPs scores grouped by state are not statistically significant. Scores for Oregon RTPs generally rose from pre-implementation to post-implementation plans, but the changes are not statistically significant.

Table 3.1 Climate-focus index scores and index-component scores for pre- and post-implementation RTPs

MPO	Metro	State	Concepts		Awareness		Analysis		Actions		Goals		Index	
			Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pres	Post	Pre	Post
Kern COG	Bakers-field	CA	0.05	0.28	0.03	0.11	0.06	0.20	0.80	0.79	0.11	0.11	1.04	1.49
Butte County AG	Chico	CA	0.06	0.07	0.03	0.02	0.07	0.01	0.74	0.73	0.21	0.00	1.11	0.83
Fresno COG	Fresno	CA	0.00	0.16	0.01	0.06	0.01	0.13	0.68	0.68	0.05	0.21	0.76	1.24
Kings County AG	Hanford	CA	0.08	0.37	0.02	0.09	0.04	0.24	0.07	0.05	0.11	0.16	0.31	0.91
Southern Califor-nia AG	Los Angeles	CA	0.06	0.10	0.00	0.06	0.00	0.35	0.12	0.12	0.00	0.16	0.17	0.78
Madera County TC	Madera	CA	0.27	0.20	0.14	0.16	0.27	0.17	0.51	0.46	0.37	0.63	1.56	1.62
Merced County AG	Merced	CA	0.03	0.11	0.01	0.15	0.01	0.14	1.00	1.00	0.37	0.11	1.42	1.50
Stanisl-aus COG	Modesto	CA	0.04	0.17	0.02	0.03	0.02	0.01	0.42	0.41	0.05	0.47	0.55	1.10
Shasta County RTPA	Redding	CA	0.12	0.59	0.00	1.00	0.00	1.00	0.26	0.26	0.00	0.21	0.38	3.07
Sacrament o Area COG	Sacra-mento	CA	0.07	0.23	0.05	0.39	0.04	0.53	0.39	0.38	0.32	0.79	0.87	2.32
Monterey Bay Area AG	Salinas	CA	0.06	0.01	0.02	0.02	0.03	0.03	0.40	0.40	0.11	0.11	0.63	0.56
San Diego AG	San Diego	CA	0.05	0.17	0.01	0.03	0.04	0.07	0.00	0.00	0.05	0.16	0.16	0.42
Metro-politan TC	San Francisco	CA	0.04	0.04	0.13	0.05	0.03	0.06	0.97	0.96	0.21	0.00	1.38	1.11
San Luis Obispo COG	San Luis Obispo	CA	0.00	0.01	0.00	0.00	0.02	0.02	0.93	0.93	0.00	0.11	0.95	1.07
Santa Barbara County AG	Santa Barbara	CA	0.01	0.02	0.00	0.00	0.00	0.05	0.93	0.93	0.00	0.32	0.94	1.32
Tahoe MPO	South Lake Tahoe	CA	0.03	0.02	0.01	0.00	0.05	0.01	0.52	0.51	0.05	0.05	0.65	0.60
San Joaquin COG	Stockton	CA	0.17	0.09	0.06	0.10	0.18	0.17	0.61	0.57	1.00	0.63	2.02	1.56

MPO	Metro	State	Concepts		Awareness		Analysis		Actions		Goals		Index	
			Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pres	Post	Pre	Post
Tulare County AG	Visalia	CA	0.01	0.01	0.01	0.01	0.00	0.04	0.42	0.42	0.00	0.16	0.44	0.64
Bend MPO	Bend	OR	0.03	0.12	0.04	0.04	0.07	0.11	0.96	0.95	0.26	0.37	1.36	1.59
Corvallis Area MPO	Corvallis	OR	0.04	0.07	0.06	0.05	0.11	0.10	0.72	0.71	0.32	0.47	1.25	1.40
Central Lane MPO	Eugene	OR	0.08	0.15	0.01	0.20	0.02	0.06	0.30	0.30	0.32	0.63	0.73	1.34
Rogue Valley MPO	Medford	OR	0.24	1.00	0.06	0.52	0.07	0.36	0.92	0.90	0.11	0.95	1.39	3.72
Portland Metro	Portland	OR	0.10	0.08	0.03	0.04	0.06	0.11	0.66	0.64	0.26	0.32	1.11	1.18
Salem-Keizer Area TS	Salem	OR	0.02	0.14	0.02	0.03	0.01	0.11	0.02	0.01	0.05	0.11	0.13	0.40

Breaking down the index into individual components shows that most of the focus on climate change in RTPs comes in the form of goals and actions, but most of the differences in the scores from pre-implementation to post-implementation RTPs come from changes in the frequency of coding on Awareness, Analysis, and Concepts nodes. Figures 3.2-3.6 show the index-component individually. Generally, the only components receiving high scores among the pre-implementation are goals and action components, while post-implementation scores are more mixed. Goals and actions components are key areas in both periods, however. The finding that component scores for goals and actions sections are higher in earlier plans is consistent with the plan-quality literature.

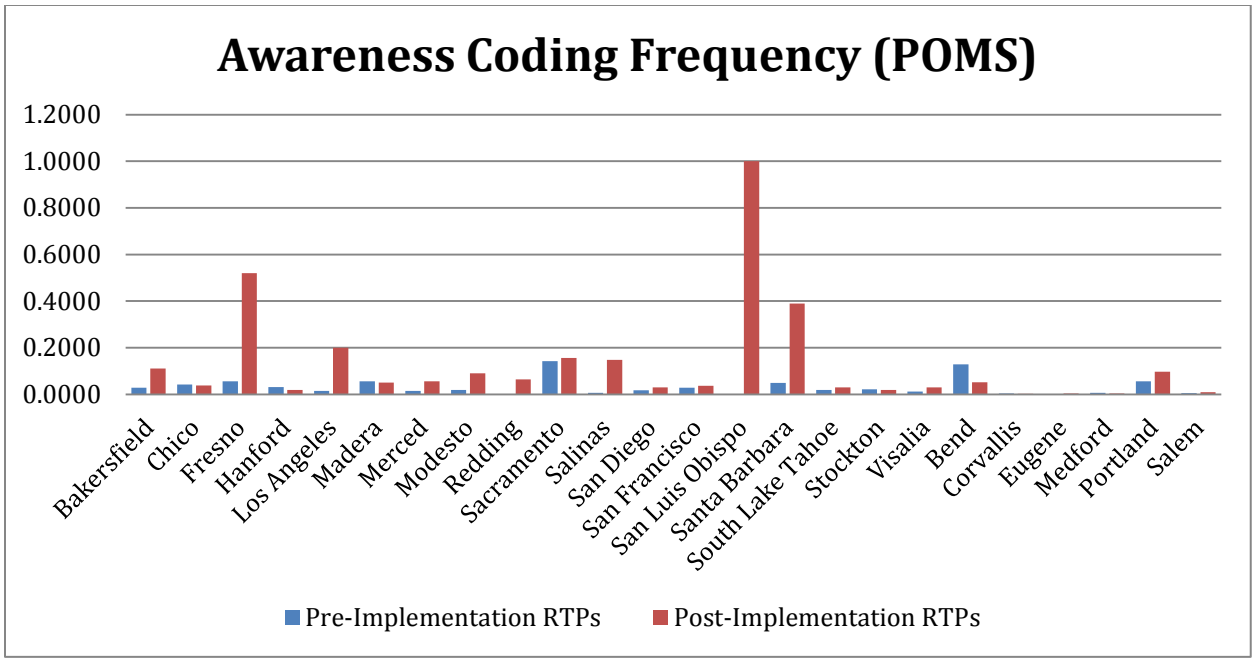

Figure 3.2 The frequency of coding to Awareness nodes rose sharply in post-implementation RTPs produced by a handful of California MPOs. Note that all scores were transformed using the proportion of maximum score (POMS) method to allow for comparison of different scales using a metric ranging from 0 to 1.

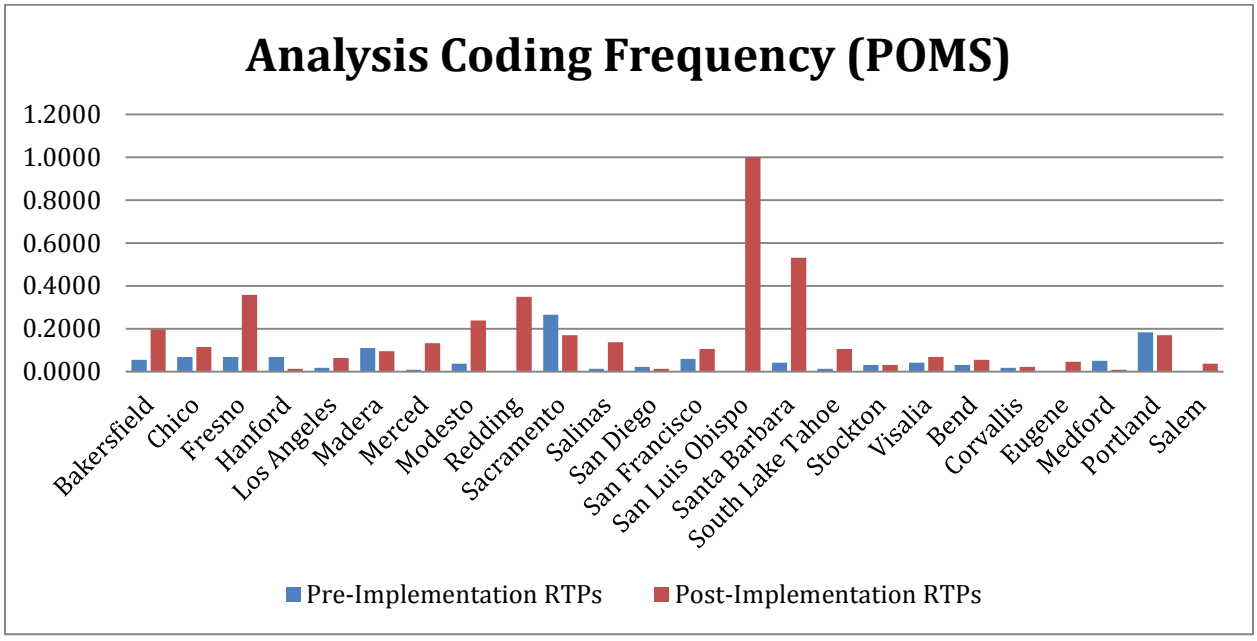

Figure 3.3 A few MPOs in California saw big increases in the frequency of coding to Analysis nodes in post-implementation RTPs. Note that all scores were transformed using the proportion of maximum score (POMS) method to allow for comparison of different scales using a metric ranging from 0 to 1.

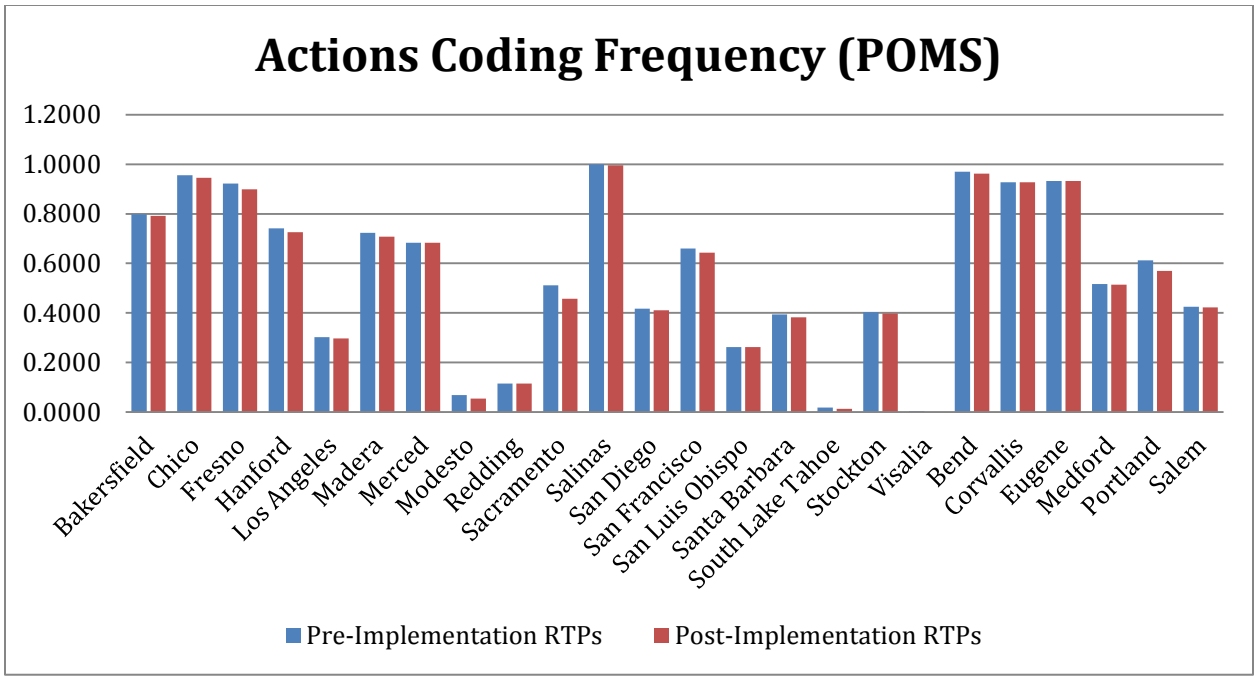

Figure 3.4 The frequency of coding to Actions nodes showed little change from pre- to post-implementation RTPs. Note that all scores were transformed using the proportion of maximum score (POMS) method to allow for comparison of different scales using a metric ranging from 0 to 1.

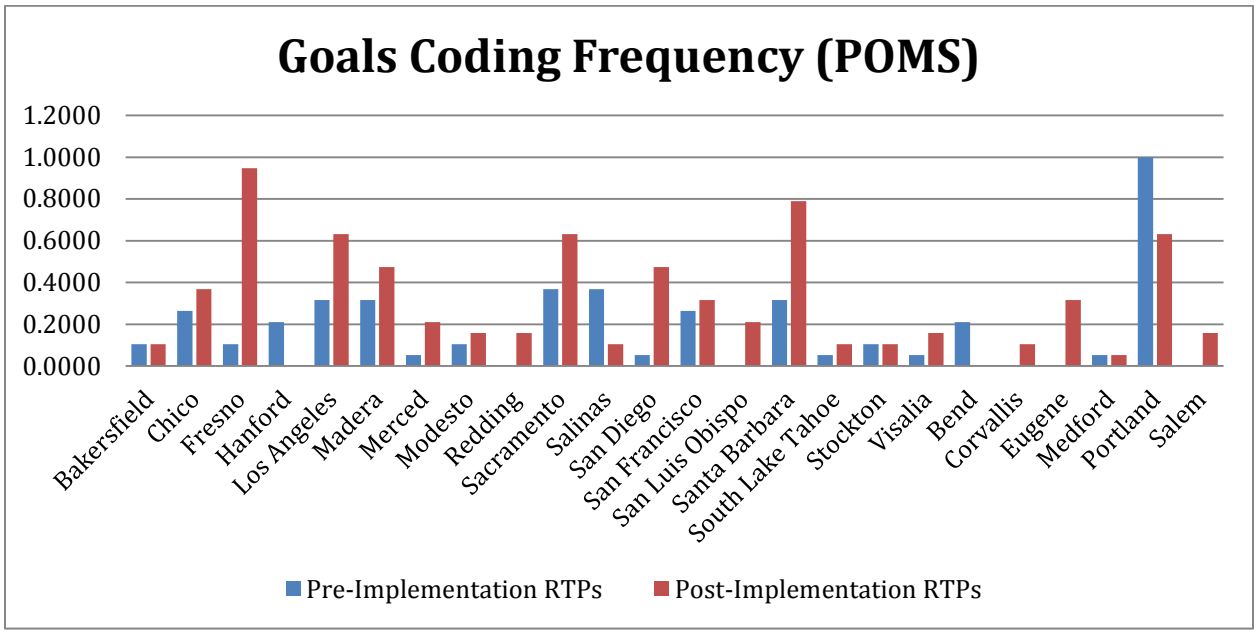

Figure 3.5 Changes in the frequency of coding to Goals nodes vary widely among MPOs. Portland, Salinas, Hanford, and Bend were the only MPOs that showed a reduction from pre- to post-implementation RTPs. Note that all scores were transformed using the proportion of maximum score (POMS) method to allow for comparison of different scales using a metric ranging from 0 to 1.

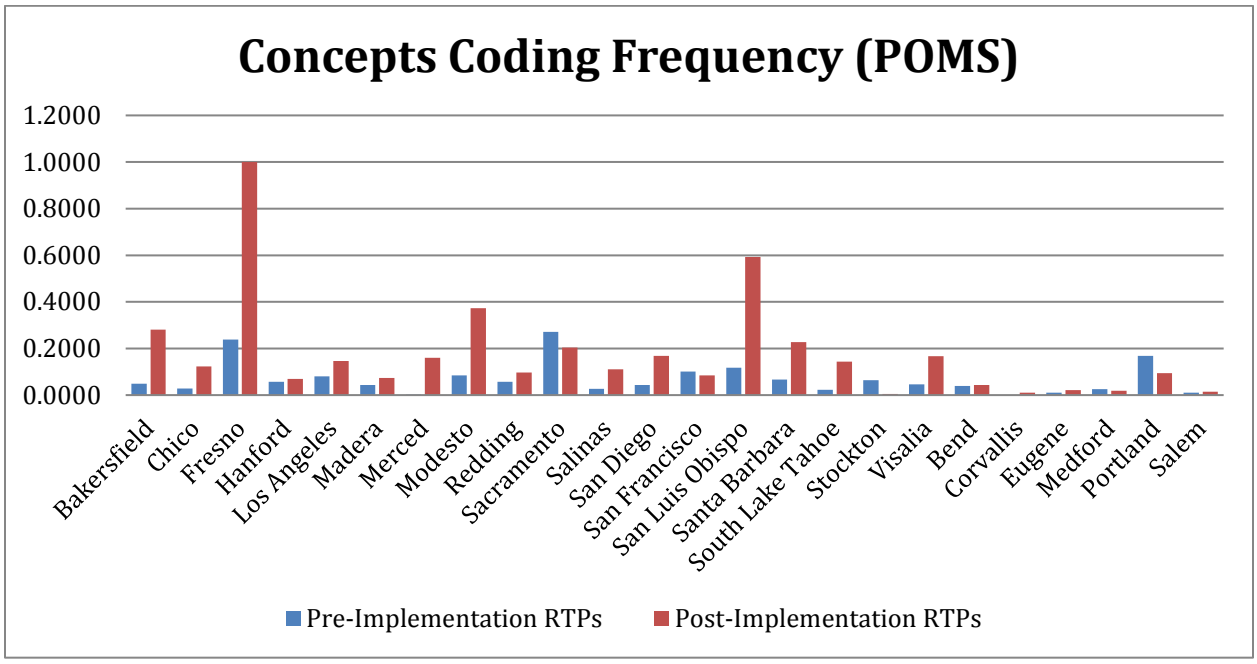

Figure 3.6 MPOs in California's Central Valley (Fresno, Modesto, and Bakersfield) and Central Coast (San Luis Obispo and Santa Barbara) account for the sharpest increases in coding to Concepts nodes from pre- to post-implementation plans. Note that all scores were transformed using the proportion of maximum score (POMS) method to allow for comparison of different scales using a metric ranging from 0 to 1.

3.2 STAGE 2: PLAN QUALITY OF RTPS PRE- AND POST-MANDATE IMPLEMENTATION

The second stage of content analysis shows that plan quality improved in the majority of MPOs after the implementation of SB 375 and SB 1059. But there are some notable exceptions to the trend. Plan-quality scores for post-implementation RTPs fell compared to pre-implementation RTPs in four of the twenty-four MPOs: San Francisco, Chico, and Stockton in California, and Medford in Oregon. .

Figure 3.7 shows the overall plan-quality score for each RTP as the sum of the subtotals for each component of the 3As: awareness, analysis, and actions. Because each component of the 3As has a different number of indicators, the subtotals were scaled using the proportion of maximum score method (POMS) used in the previous section (Moeller 2015).

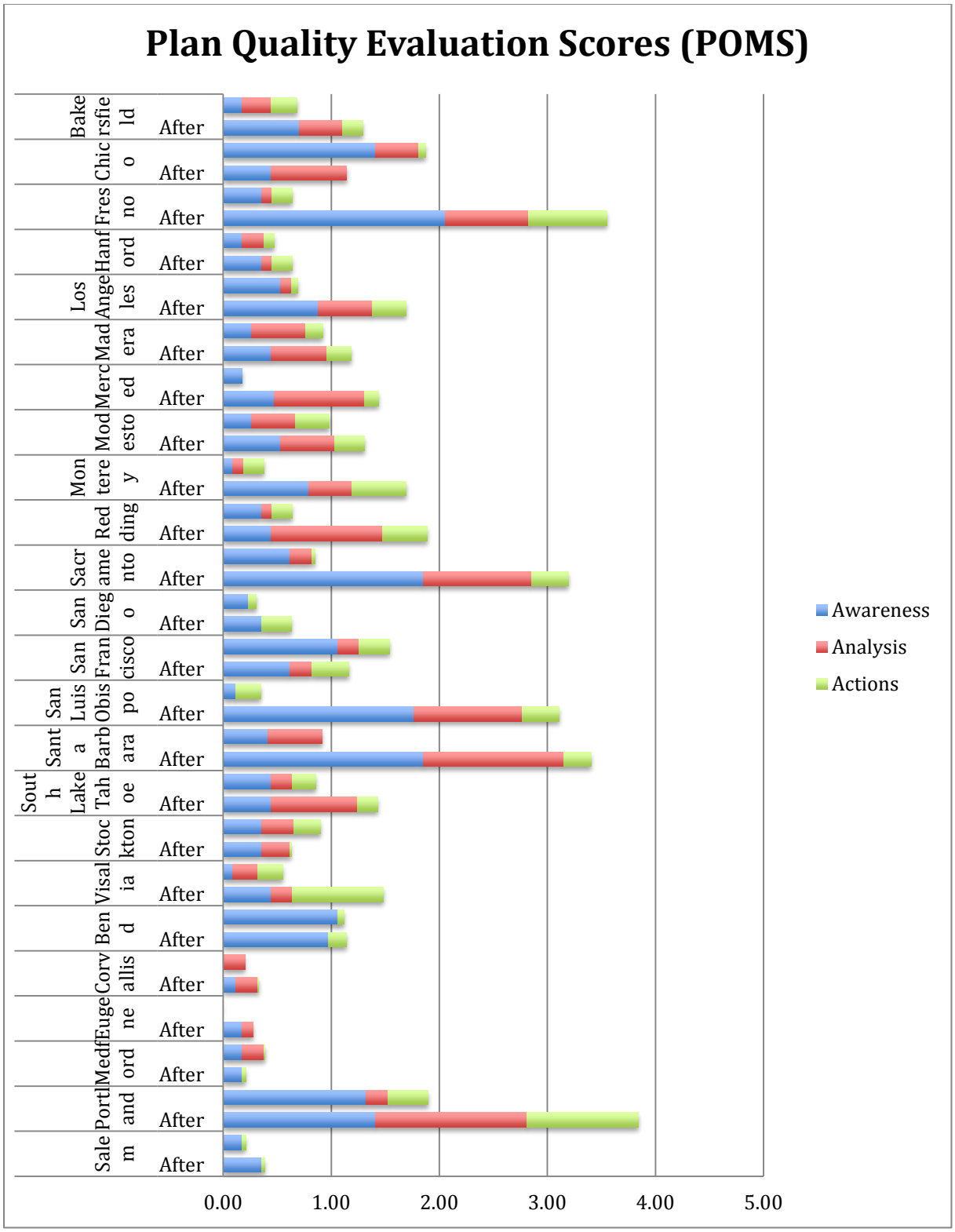

Figure 3.7 Plan-quality evaluation scores for post-implementation RTPs rose compared to pre-implementation scores in most MPOs. . Notable exceptions are San Francisco, Chico, and Stockton in California, and Medford in Oregon.

A number of plans show marked increases in plan-quality scores following the implementation of SB 375 and SB 1059. Table 3.2 shows the changes in untransformed individual scores, while Table 3.3 shows mean scores for plan quality and plan-quality components (the 3As). Fresno's post-implementation RTP increased the most, gaining 43 points for a total of 54 points. Portland's post-implementation RTP has the second-largest jump. Its post-implementation plan rose 34 points to a total of 63. Not every MPO earned a higher score for its post-implementation RTP, though. Chico, San Francisco, Stockton, and Medford all ended up with lower scores for their post-implementation plans.

Looking at untransformed plan-quality evaluation scores in Table 3.2, the first item of note is that the scores are, on the whole, quite low. Each of the 56 questions in the evaluation protocol is worth a maximum of two points, which gives a maximum possible evaluation score of 112. (The scoring scale starts at 0 if the metric is not present in the RTP or not related to climate change, 1 if it is mentioned in the context of climate change but is vague or stops at a recommendation, and tops out at 2 if the metric is discussed in detail.) However, the highest scoring RTP, Portland's post-implementation plan, earns 63 points, just over half the maximum possible score. The second highest score is Fresno's post-implementation RTP, which earns a total of 54 points on the evaluation. By contrast, several RTPs earn an evaluation score near zero, including Eugene, Medford, and Corvallis's post-evaluation plans, as well as pre-evaluation plans for Eugene, Corvallis, Salem, and Merced.

Table 3.2 Plan-quality evaluation scores for RTPs developed before and after the implementation of California's SB 375 and Oregon's SB 1059

Metro	Implement-ation	Awareness (Q1-Q4)	Analysis (Q5-Q12)	Actions (Q13-Q21)	Total	Change (After-Before)
Bakersfield	Before	2.00	2.67	7.67	12.33	5.67
	After	8.00	4.00	6.00	18.00	
Chico	Before	16.00	4.00	2.00	22.00	-10.00
	After	5.00	7.00	0.00	12.00	
Fresno	Before	4.00	1.00	6.00	11.00	43.33
	After	23.33	7.67	23.33	54.33	
Hanford	Before	2.00	2.00	3.00	7.00	4.00
	After	4.00	1.00	6.00	11.00	
Los Angeles	Before	6.00	1.00	2.00	9.00	16.00
	After	10.00	5.00	10.00	25.00	
Madera	Before	3.00	5.00	5.00	13.00	4.50
	After	5.00	5.17	7.33	17.50	
Merced	Before	2.00	0.00	0.00	2.00	16.00
	After	5.33	8.33	4.33	18.00	
Modesto	Before	3.00	4.00	10.00	17.00	3.00
	After	6.00	5.00	9.00	20.00	
Monterey	Before	1.00	1.00	6.00	8.00	21.00
	After	9.00	4.00	16.00	29.00	
Redding	Before	4.00	1.00	6.00	11.00	17.67
	After	5.00	10.33	13.33	28.67	
Sacramento	Before	7.00	2.00	1.00	10.00	32.00
	After	21.00	10.00	11.00	42.00	
San Diego	Before	2.67	0.00	2.33	5.00	8.00
	After	4.00	0.00	9.00	13.00	

Metro	Implement-ation	Awareness (Q1-Q4)	Analysis (Q5-Q12)	Actions (Q13-Q21)	Total	Change (After-Before)
San Francisco	Before	12.00	2.00	9.00	23.00	-3.00
	After	7.00	2.00	11.00	20.00	
San Luis Obispo	Before	1.33	0.00	7.33	8.67	32.33
	After	20.00	10.00	11.00	41.00	
Santa Barbara	Before	4.67	5.00	0.00	9.67	32.33
	After	21.00	13.00	8.00	42.00	
South Lake Tahoe	Before	5.00	2.00	7.00	14.00	5.00
	After	5.00	8.00	6.00	19.00	
Stockton	Before	4.00	3.00	8.00	15.00	-8.00
	After	4.00	2.67	0.33	7.00	
Visalia	Before	1.00	2.33	7.33	10.67	23.33
	After	5.00	2.00	27.00	34.00	
Bend	Before	12.00	0.00	2.00	14.00	2.50
	After	11.00	0.00	5.50	16.50	
Corvallis	Before	0.00	2.00	0.00	2.00	1.67
	After	1.33	2.00	0.33	3.67	
Eugene	Before	0.00	0.00	0.00	0.00	3.00
	After	2.00	1.00	0.00	3.00	
Medford	Before	2.00	2.00	0.33	4.33	-1.33
	After	2.00	0.00	1.00	3.00	
Portland	Before	15.00	2.00	12.00	29.00	34.00
	After	16.00	14.00	33.00	63.00	
Salem	Before	2.00	0.00	1.00	3.00	2.00
	After	4.00	0.00	1.00	5.00	

The mean plan-quality score increased from 10.9 for pre-implementation plans to 22.7 for post-implementation plans. Mean scores for the quality of individual plan components rose, as well. The average score for awareness components increased more than 3.8 points to 8.5 (out of a maximum 34). The average score for analysis components increased nearly 3.3 points to 5.1 (out of a maximum possible 20 points). And the average score for actions components increased nearly 4.8 points to 9.15 (out of a maximum possible 58 points).

Table 3.3 Mean plan-quality scores for pre-implementation and post-implementation RTPs

	Awareness	Analysis	Action	Total
Before	4.65	1.83	4.38	10.86
After	8.50	5.09	9.15	22.74

3.2.1.1 Inter-rater Reliability

Inter-rater reliability was found to be sufficiently high to draw conclusions from the plan-quality evaluation scores. We calculated Krippendorff's Alpha, a statistic showing inter-rater reliability, for every question in the 12 plans coded by three analysts each. Results for individual questions are not reported here, but all alpha measurements exceed 0.58.

Alpha measurements range from 1 to -1, with 1 measuring perfect agreement among analysts, -1 indicating perfect disagreement, and 0 indicating agreement no better (or worse) than what would be expected according to random change (Hayes and Krippendorff 2007). For planning documents that require coding many items that appear in discrete, predictable locations, alpha measurements higher than 0.70 are considered very reliable, and measurements between 0.70 and 0.58 are considered minimally reliable for tentative conclusions (Stevens, Lyles, and Berke 2014). These standards are lower than other rules of thumb for acceptable levels of agreement when using alpha (e.g. K. Krippendorff, 2004). But Stevens et al. (2014) argue that content analysis of lengthy, often technical planning documents places a greater "cognitive burden" on analysts than shorter, less technical mass-media items that are the subject of analysis outside the planning field. Therefore, a lower level of agreement is sufficient to draw conclusions from the data.

4.0 CONCLUSIONS

This study examines how RTPs produced by MPOs in California and Oregon have responded to state planning mandates requiring them to reduce greenhouse gas (GHG) emissions from driving. California's SB 375 and Oregon's 1059 task MPOs with producing coordinated land-use and transportation scenarios that reduce emissions.

We conducted content analyses of plans to assess how their focus on climate change and the quality of plan components related to climate change changed following the implementation of SB 375 and SB 1059's emissions-reduction targets for every metro in both states. The content analysis proceeded in two stages. The first sought to categorize all mentions of climate change and related issues in the RTPs into three broad categories: awareness, analysis, and actions. The first category, or node, refers to awareness of the science underpinning global warming and the problems a changing climate will create in the MPO area. Analysis refers to the analytical tools and methods the MPO used to determine how to respond to climate change. Actions refer to the measures proposed in the RTP to reduce GHG emissions from the MPO area.

Overall, our findings indicate that SB 375 and SB 1059 have increased the salience of climate change in RTPs. The focus on climate change in RTPs increased following the implementation of emissions-reduction targets in each metro area. Similarly, the quality of climate change-related plan components also improved in post-implementation RTPs. Post-implementation RTPs tend to exhibit greater awareness of climate science and the impacts of climate change on the MPO area, provide more detailed analysis of impacts and mitigation strategies, and propose stronger actions to reduce GHG emissions. They also tend to mention climate change and related issues more often. While the trend is pointing in the right direction, there is still substantial room for improvement. The maximum possible score on our index is 112, so even the higher post-implementation scores are relatively low.

Even more troubling, the greater focus on climate change and increases in plan quality are not universal for all RTPs. A subset of seven plans actually saw a drop in post-implementation plan-quality scores. Among California MPOs, scores fell for post-implementation RTPs in Chico (-10 points), San Francisco (-3), and Stockton (-8). In Oregon Medford's score fell (-1.3 points). The drop in plan-quality scores runs counter to findings in previous studies that state mandates improve the quality of plans (Pendall 2001; Burby and Dalton 1994; Burby 2005).

One possible explanation for this unexpected drop in post-implementation plan-quality scores is that California and Oregon's mandates inspired resentment among planners at MPOs instead of greater commitment to the states' goals of reducing GHG emissions from driving. As a precedent, Hoch (2007) found that overall plan quality dropped after Illinois mandated municipalities to plan for affordable housing. Instead of exhibiting commitment to the state mandate, plans met minimum requirements for compliance with the law and little else. However, the MPOs producing post-implementation plans that earned lower scores than pre-implementation plans suggest something else is going on.

The MPOs for Chico, Stockton, and Medford all cover small metros in suburban or rural areas that were assigned the least ambitious GHG emissions-reduction targets. (See Table 1.3 and Table 1.4.) In fact, meeting the targets is completely optional for all Oregon MPOs except Portland. Therefore, it should not be surprising that all earned relatively low scores for both pre- and post-implementation plans. (Chico's Butte County Association of Governments is the one exception. Its pre-implementation RTP received an above-average score of 22 but dropped to 12.) These low overall scores mean even small changes of one or two points – a single question on the evaluation protocol is worth a maximum of two points – can make a big difference in the final tally.

The low plan-quality scores for post-implementation RTPs in San Francisco are a different story, though. The Bay Area's Metropolitan Transportation Commission is known for its climate-friendly policies. Therefore, the drop in plan-quality scores from pre-implementation to post-implementation RTPs cannot be explained away as mere noise. Instead, we surmise that SB 375's mandate to develop coordinated land-use and transportation scenarios focused the discussion of climate change in the Sustainable Communities Strategies section of the RTP, which limited the number of ways it was mentioned in the plan. Analysis of the sections where climate change was mentioned in San Francisco's RTP and the plan-component scores supports this theory. The drop in its overall plan-quality scores comes almost entirely from a large decrease in the score for its awareness component. (See Table 3.2 for details.) However, this does not necessarily indicate that climate change is no longer perceived to be a problem. It is possible that the MPO shifted focus away from defining the problems stemming from climate change, which is the main purpose of the awareness components, because these problems are already well understood and accepted in the region.

The lower than expected plan-quality scores for San Francisco's post-implementation RTP in particular raises interesting questions for future research. Despite our conjecture, this result is unexpected and not readily explainable using content analysis methods. Determining why San Francisco's Metropolitan Transportation Commission – and all the other MPOs – made specific planning decisions requires direct explanations from planners and decision-makers. We look forward to conducting interviews with planners at a range of California and Oregon MPOs in the next stage of this project.

5.0 REFERENCES

Baer, William C. 1997. “General Plan Evaluation Criteria: An Approach to Making Better Plans.” *Journal of the American Planning Association* 63 (3): 329–44. doi:10.1080/01944369708975926.

Bansard, Jennifer S., Philipp H. Pattberg, and Oscar Widerberg. 2017. “Cities to the Rescue? Assessing the Performance of Transnational Municipal Networks in Global Climate Governance.” *International Environmental Agreements: Politics, Law and Economics* 17 (2). Springer Netherlands: 229–46. doi:10.1007/s10784-016-9318-9.

Barbour, Elisa, and Elizabeth a. Deakin. 2012. “Smart Growth Planning for Climate Protection: Evaluating California’s Senate Bill 375.” *Journal of the American Planning Association* 78 (1): 70–86. doi:10.1080/01944363.2011.645272.

Berke, Philip R. 1996. “Enhancing Plan Quality: Evaluating the Role of State Planning Mandates for Natural Hazard Mitigation.” *Journal of Environmental Planning and Management* 39 (1): 79–96. doi:10.1111/j.1467-7687.2010.00966.x/abstract.

Berke, Philip R., and Steven. P. French. 1994. “The Influence of State Planning Mandates on Local Plan Quality.” *Journal of Planning Education and Research* 13 (4): 237–50. doi:10.1177/0739456X9401300401.

Berke, Philip R., and David R. Godschalk. 2009. “Searching for the Good Plan: A Meta-Analysis of Plan Quality Studies.” *Journal of Planning Literature* 23 (3): 227–40. doi:10.1177/0885412208327014.

Berke, Philip R., David R. Godschalk, Edward J. Kaiser, and Daniel A. Rodriguez. 2006. *Urban Land Use Planning*. Fifth. Urbana & Chicago: University of Illinois Press.

Brody, Samuel D. 2003. “Are We Learning to Make Better Plans? A Longitudinal Analysis of Plan Quality Associated with Natural Hazards.” *Journal of Planning Education and Research* 23 (2): 191–201. doi:10.1177/0739456X03258635.

Brody, Samuel D, David R. Godschalk, and Raymond J. Burby. 2003. “Mandating Citizen Participation in Plan Making: Six Strategic Planning Choices.” *Journal of the American Planning Association* 69 (3): 245–64. doi:10.1080/01944360308978018.

Bunnell, Gene, and Edward J. Jepson. 2011. “The Effect of Mandated Planning on Plan Quality.” *Journal of the American Planning Association* 77 (4): 338–53. doi:10.1080/01944363.2011.619951.

Burby, Raymond J. 2005. “Have State Comprehensive Planning Mandates Reduced Insured Losses from Natural Disasters?” *Natural Hazards Review* 6 (2): 67–81. doi:10.1061/(ASCE)1527-6988(2005)6:2(67).

Burby, Raymond J., Philip R. Berke, C Linda, John M. Degrove, Steven P. French, Edward J. Kaiser, Peter J. May, and Dale Roenigk. 1993. “Is State-Mandated Planning Effective?” *Land Use Law & Zoning Digest* 45 (10): 3–9.

Burby, Raymond J., and Linda C. Dalton. 1994. “Plans Can Matter! The Role of Land Use Plans and State Planning Mandates in Limiting the Development of Hazardous Areas.” *Public Administration Review* 54 (3): 229–39. doi:Yes.

Burby, Raymond J., and Peter J. May. 1998. “Intergovernmental Environmental Planning: Addressing the Commitment Conundrum.” *Journal of Environmental Planning and Management* 41 (1): 95–110.

Burby, Raymond J., Peter J. May, Philip R. Berke, Linda C. Dalton, Steven P. French, and Edward J. Kaiser. 1997. *Making Governments Plan: State Experimentation in Managing Land Use*. Baltimore, Md.: The Johns Hopkins Press.

California Environmental Protection Agency, and Air Resources Board. 2011. *Senate Bill 375 Final Targets for MPO Regions: Attachement 4*. http://www.arb.ca.gov/cc/sb375/sb375.htm.

Conroy, Maria Manta, and Philip R. Berke. 2004. “What Makes a Good Sustainable Development Plan? An Analysis of Factors That Influence Principles of Sustainable Development.” *Environment and Planning A* 36 (8): 1381–96. doi:10.1068/a367.

Dalton, Linda C., and Raymond J. Burby. 1994. “Mandates, Plans, and Planners: Building Local Commitment to Development Management.” *Journal of the American Planning Association* 60 (4): 444–61. doi:10.1080/01944369708975926.

Daniels, T. 1999. *When City and Country Collide: Managing Growth in the Metropolitan Fringe*. Washington, D.C.: Island Press.

Eaken, Amanda, Justin Horner, and Gloria Ohland. 2012. “A Bold Plan for Sustainable California Communities: A Report on the Implementation of Senate Bill 375.” *12-09-A*. Los Angeles.

Ewing, Reid, and Robert Cervero. 2010. “Travel and the Built Environment.” *Journal of the American Planning Association* 76 (3): 265–94. doi:10.1080/01944361003766766.

Ewing, Reid, Gail Meakins, Grace Bjarnson, and Holly Hilton. 2011. “Transportation and Land Use.” In *Making Healthy Places: Designing and Building for Health, Well-Being, and Sustainability*, edited by A.L. Dannenberg, 50–62. Island Press. doi:10.5822/978-1-61091-036-1.

Gamer, Matthias, Jim Lemon, Ian Fellows, and Puspendra Singh. 2015. “Various Coefficients of Interrater Reliability and Agreement.” Hamburg, Germany. http://www.r-project.org.

Handy, Susan L. 2005. “Smart Growth and the Transportation-Land Use Connection: What Does the Research Tell Us?” *International Regional Science Review* 28 (2): 146–67.

doi:10.1177/0160017604273626.

Hayes, Andrew F., and Klaus Krippendorff. 2007. “Answering the Call for a Standard Reliability Measure for Coding Data.” *Communication Methods and Measures* 1 (1): 77–89. doi:10.1080/19312450709336664.

Hirt, Sonia. 2013. “Home, Sweet Home: American Residential Zoning in Comparative Perspective.” *Journal of Planning Education and Research* 33 (3): 292–309. doi:10.1002/9781119084679.ch15.

Hoch, Charles. 2007. “How Plan Mandates Work.” *Journal of the American Planning Association* 73 (1): 86–99. doi:10.1080/01944360708976138.

Innes, Judith E., and Judith Gruber. 2005. “Planning Styles in Conflict: The Metropolitan Transportation Commission.” *Journal of the American Planning Association* 71 (2): 177–88.

Jun, Hee-Jung, and Maria Manta Conroy. 2013. “Comprehensive Planning and Sustainability in Georgia’s Exurbs.” *Journal of Environmental Policy & Planning* 15 (3): 329–51. doi:10.1080/1523908X.2013.766575.

Krippendorff, K. 2004. “Reliability in Content Analysis: Some Common Misconceptions and Recommendations.” *Human Communication Research* 30 (3): 411–33. doi:10.1093/hcr/30.3.411.

Krippendorff, Klaus. 2011. “Agreement and Information in the Reliability of Coding.” *Communication Methods and Measures* 5 (2): 93–112. doi:10.1080/19312458.2011.568376.

Leck, Hayley, and Debra Roberts. 2015. “What Lies beneath: Understanding the Invisible Aspects of Municipal Climate Change Governance.” *Current Opinion in Environmental Sustainability* 13. Elsevier B.V.: 61–67. doi:10.1016/j.cosust.2015.02.004.

Moeller, Julia. 2015. “A Word on Standardization in Longitudinal Studies: Don’t.” *Frontiers in Psychology* 6 (September): 1–4. doi:10.3389/fpsyg.2015.01389.

Newmark, Gregory L., and Elizabeth Deakin. 2012. “A Climate Change for Modeling.” *Transportation Research Record: Journal of the Transportation Research Board* 2302 (1): 102–10. doi:10.3141/2302-11.

Norton, R. K. 2005. “More and Better Local Planning: State-Mandated Local Planning in Coastal North Carolina.” *Journal of the American Planning Association* 71 (1): 55–71. doi:10.1177/0739456X05278984.

Oregon Department of Land Conservation and Development. 2015. “Target Rule Review Report: Review of Metropolitan Greenhouse Gas Reduction Targets and Scenario Planning.” https://www.oregon.gov/LCD/CLIMATECHANGE/Documents/TargetsFullReport.pdf.

Oregon Department of Transportation, and Oregon Department of Land Conservation and Development. 2013. “Oregon Sustainable Transportation Initiative: Status Report and Next Steps.” Salem, Oregon.

Pendall, Rolf. 2001. “Municipal Plans, State Mandates, and Property Rights: Lessons from Maine.” *Journal of Planning Education and Research* 21 (2): 154–65. doi:10.1177/0739456X0102100204.

Rose, Eliot. 2011. “Leveraging a New Law: Reducing Greenhouse Gas Emissions Under Senate Bill 375.” Berkeley, Calif.

Sanderson, Benjamin M, and Reto Knutti. 2017. “Delays in US Mitigation Could Rule out Paris Targets.” *Nature Clim. Change* 7 (2). Nature Publishing Group, a division of Macmillan Publishers Limited. All Rights Reserved.: 92–94. http://dx.doi.org/10.1038/nclimate3193.

Stevens, Mark R, Ward Lyles, and Philip R Berke. 2014. “Measuring and Reporting Intercoder Realiability in Plan Quality Evaluation Research.” *Journal of Planning Education and Research* 34 (1): 77–93. doi:10.1177/0739456X13513614.

Tang, Zhenghong, and Samuel D Brody. 2009. “Linking Planning Theories with Factors Influencing Local Environmental-Plan Quality.” *Environment and Planning B: Planning and Design* 36 (3): 522–37. doi:10.1068/b34076.

Tang, Zhenghong, Samuel D Brody, Courtney Quinn, Liang Chang, and Ting Wei. 2010. “Moving from Agenda to Action: Evaluating Local Climate Change Action Plans.” *Journal of Environmental Planning and Management* 53: 41–62. doi:10.1080/09640560903399772.

Urban Habitat. 2009. “Sustainable Planning Under SB 375: Integrating Transportation, Housing and Land-Use.” *Race, Poverty & The Environment* 16 (2): 62.

Vurlumis, Caroline. 2014. “AB 32 and SB 375: Investigating Land Use and Transportation Policy on a Regional and Local Scale.” Scripps College.

Wu, Fengshi. 2017. “From Paris to Beijing: China, Next Champion on Climate Change?” No. 056. Singapore.

NITC
NATIONAL INSTITUTE for TRANSPORTATION and COMMUNITIES
Transportation Research and Education Center
Portland State University
1900 S.W. Fourth Ave., Suite 175
Portland, OR 97201