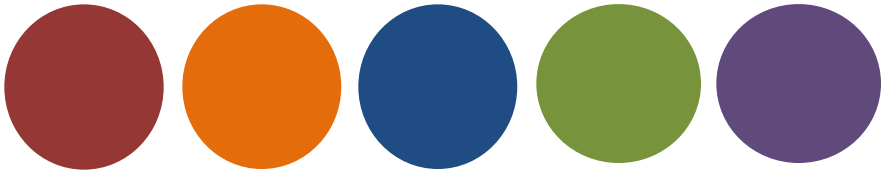
STRATEGIC ASSESSMENT OF TRANSPORTATION AND LAND USE PLANS



Corvallis Area Metropolitan Planning Organization

July 2014

Corvallis Area
Metropolitan Planning Organization

Oregon Department of Transportation

Oregon Department of Land Conservation and Development

About This Report:

This report was prepared by staff from the Corvallis Area Metropolitan Planning Organization (CAMPO), working with staff from the Oregon Department of Transportation (ODOT) and the Department of Land Conservation and Development (DLCD). The report summarizes the purpose, scope, and key findings from an analysis of the region's adopted land use and transportation plans that was prepared using ODOT's Regional Strategic Planning Model. The report is intended to help inform the region's decision-makers and the public as they consider how to update the region's land use and transportation plans.

The Corvallis Area Metropolitan Planning Organization (CAMPO) coordinates regional transportation planning and programming for the Corvallis Metropolitan Planning Area which includes the cities of Corvallis, Philomath and Adair Village, as well as portions of Benton County.

Further information about CAMPO is available on the web at: www.corvallisareampo.org

Please note that this report is for informational purposes only and is not intended to make or express policy decisions by either the metropolitan planning organization or its member local governments.

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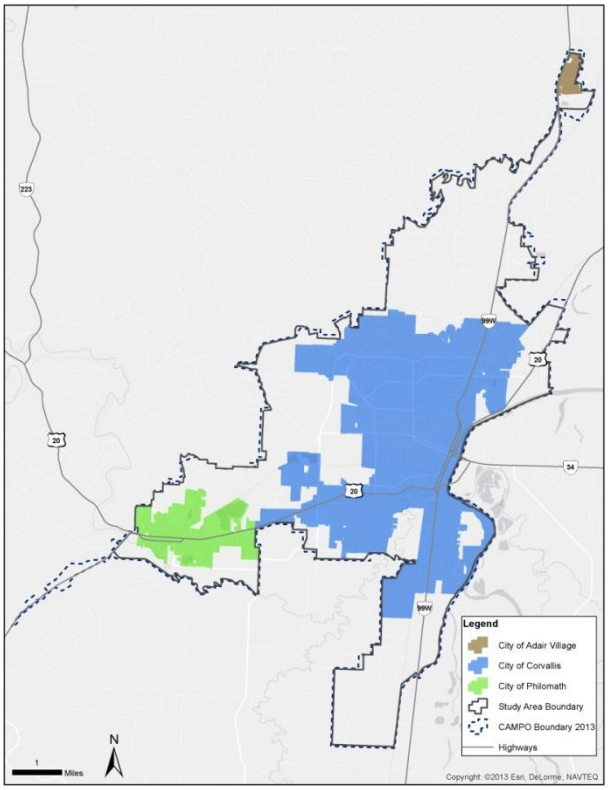
CAMPO Strategic Assessment Study Area



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EXECUTIVE SUMMARY

Background

The Corvallis Area Metropolitan Planning Organization (CAMPO) engaged in a voluntary planning effort, known as a strategic assessment. A strategic assessment estimates how close the region's existing plans come to reaching greenhouse gas emissions reduction targets, and other important outcomes of regional interest, including changes to vehicle miles traveled and air pollutants.

Prepared by CAMPO, ODOT and DLCD, this strategic assessment report presents the likely outcomes of implementing existing plans in CAMPO combined with other demographic and technology changes expected over the next 20 years. The report also identifies potential actions that the region may want to consider to reduce greenhouse gas emissions or achieve other important regional outcomes. This report is intended to inform local officials and policymakers as they update land use and transportation plans, and to help evaluate whether to conduct additional work, such as more detailed scenario planning.

ODOT and DLCD have supported this work as an effort to both enhance the overall transportation and land use planning process and explicitly consider greenhouse gas emissions reduction in planning efforts. Strategic assessments are a component of the Oregon Sustainable Transportation Initiative (OSTI), a multi-agency effort designed to reduce greenhouse gas emissions from the transportation sector. For more information on OSTI and other state-led efforts aimed at reducing greenhouse gas emissions, please refer to Appendix 1. Oregon's Strategy for Reducing Greenhouse Gas Emissions. While greenhouse gas emissions are a primary aspect of the strategic assessment, several other outcome areas were also measured.

Major Findings

The major findings of the strategic assessment include the following:

- By implementing adopted plans, greenhouse gas emissions will decline. Implementing the region's adopted plans alone results in a 2.1 percent reduction in greenhouse gas emissions per capita. In combination with potential state-led actions, such as ambitious pricing strategies that are currently not being implemented, but may be in the future, an 18.5 percent reduction could be achieved.

- Additional analysis, called sensitivity testing, indicates that reaching the region's 21 percent reduction target adopted by the Land Conservation and Development Commission is feasible. There are a variety of policies and actions that the region could pursue that would enable it to meet the greenhouse gas emissions target.

- Implementation of adopted plans is expected to result in other important benefits for the region:
    - Total fuel consumption per capita is expected to drop by 53 percent
    - Criteria air pollutants are expected to drop by 60 percent
    - Walking and cycling trips will continue to increase

    - Improvements to air quality and expanded options for transportation are likely to improve public health and reduce health care costs for area residents

- The assessment highlights other issues that the region may want to consider further either through plan updates or more detailed scenario planning. These include:
    - Household transportation costs are expected to increase, due to increases in vehicle ownership and operating costs
    - Vehicle miles are expected to increase slightly, by 3 percent

Possible Next Steps for the Region

The state, through ODOT and DLCD, encourages metropolitan areas to conduct scenario planning. To support these efforts, metropolitan areas negotiate financial assistance with ODOT and both ODOT and DLCD provide technical support. If the region chooses to move ahead with scenario planning, local staff, officials, stakeholders, and the public would work together to evaluate a more detailed set of land use and transportation actions and programs that address greenhouse gas reduction and other important regional goals. Recognizing the multiple planning efforts currently being undertaken in the region, ODOT and DLCD would work with the region to determine how scenario planning could be incorporated with and complement these other efforts.

This strategic assessment report is intended to help to start this conversation. The assessment shows that the greenhouse gas reduction target can be met and identifies potential paths. Through scenario planning, the region can more fully evaluate the combination of actions that best meet regional needs and objectives.

STRATEGIC ASSESSMENT PURPOSE

The Corvallis metropolitan planning area has a long history of planning for livable communities where residents can get around by car, bike, on foot, or by bus. The purpose of the strategic assessment is to estimate travel and emissions likely to result if these plans are implemented and current trends continue. The assessment also estimates other outcomes, including transportation and energy costs and air quality impacts. Overall, the assessment provides a picture of what the area may look like given plans, recent trends, and information about future conditions.

State Greenhouse Gas Emission Reduction Goals

In 2007, the Oregon Legislature adopted House Bill 3507 establishing a statewide goal to reduce greenhouse gas emissions. The goal applies to all emission sectors, including energy production, buildings, solid waste and transportation, and call for:

- *Stopping increases in emissions by 2010*
- *Reducing emissions to 10 percent below 1990 levels by 2020*
- *Reducing emissions to 75 percent below 1990 levels by 2050.*

The results of the assessment will help local governments better understand issues and options as they review and update the area's transportation plans and make investment decisions. In addition, the information provided in the assessment is intended to help local officials decide whether to pursue a more comprehensive analysis of land use and transportation options through formal scenario planning.

2035 GHG targets for Oregon metropolitan areas

per capita light vehicle GHG emissions reduction

Metropolitan area	Adopted target[1]
Portland Metro[2]	20%
Salem-Keizer	17%
Corvallis	21%
Eugene-Springfield[3]	20%
Bend	18%
Rogue Valley	19%

[1] Adopted by the Land Conservation and Development Commission in May 2011
[2] Required scenario planning and adoption
[3] Required scenario planning

In short, this strategic assessment evaluates the region's adopted plans, assesses how far those plans help to reach the region's identified goals over the next 20 years, and identifies alternative paths to achieving future goals. Largely a technical exercise, the assessment provides information to help inform decisions about next steps, such as a decision about scenario planning, or about how best to update or implement existing land use and transportation plans, including the regional transportation plan, the Corvallis Transit Master Plan, and the Oregon State University Campus Master Plan.

CHANGING CIRCUMSTANCES, NEW CHALLENGES

While CAMPO's strategic assessment is triggered by the state's interest and efforts to reduce greenhouse gas emissions, it is also intended to provide information about a range of other important regional issues. For example, the strategic assessment also evaluates household spending on transportation; mobility measures such as vehicle miles traveled and delay; and certain public health indicators, such as air quality, and trips made by walking and biking. This information supported by the analysis, can help the region evaluate how well existing plans prepare the region and its residents for a changing future.

Below are some issue areas considered in the strategic assessment, as well as the corresponding output measures.

Climate Change and Reducing Greenhouse Gas Emissions

Strategic Assessment Output Measure:
Greenhouse Gas Emissions

Mounting scientific evidence indicate that the global climate is changing. Although there is no general consensus around the issue of climate change, many of the strategies suggested to combat climate change will help create more livable communities.

Over the next several decades, existing federal and state-led policies will significantly change the vehicle emissions. Building communities and a transportation system that enable people to drive less and use alternative modes of transportation are also necessary to help reduce emissions. Corvallis has a rich tradition of bicycle- and pedestrian-friendly development, with higher density residential developments near the downtown core and Oregon State University. According to the U.S. Census Bureau's 2009 American Community Survey, 9.3 percent of Corvallis residents bike to work, the largest percentage in the nation.

Keeping Transportation Affordable

Strategic Assessment Output Measure:
Household Travel Costs

Transportation is second only to housing as the biggest expense for Oregon families. The average household spends about 18 percent of its income, or more than $12,000 a year, on transportation.[1] In some areas, lower-income households spend even more.[2] Over time, the cost of driving keeps going up. The American Automobile Association (AAA) estimates that the cost of driving has increased by 20 cents per mile, from 41 cents to 61 cents, between 1995 and 2012.[3]

The move toward more fuel efficient vehicles will decrease the fuel price per mile; however, gas price increases may offset much of the cost savings. In addition, new high efficient electric and plug-in vehicles are still cost prohibitive for much of the driving public. Therefore, building communities that reduce reliance on auto trips and promote walking, cycling, and transit usage are

[1] U.S. Census Bureau, Bureau of Labor Statistics, *Consumer Expenditure Survey*.
[2] Portland Planning and Sustainability Commission, *Housing and Transportation Cost Study*, 2010.
[3] American Automobile Association, *Your Driving Costs*, 1995 and 2013 Editions.

needed to help families cut their transportation costs and provide alternatives when gas prices increase and until the cost of new vehicles is reachable by all.

Improving Public Health and Reducing Health Care Costs

A growing body of research demonstrates the connections between biking, walking, and other active travel and improved health. A national obesity epidemic poses individual health concerns while causing health care costs to skyrocket. Since 1990, Oregon's adult obesity rate has risen by 121 percent. Today, about 60 percent of Oregon adults are overweight or obese, which can be mitigated by a more active lifestyle. Obesity also leads to other health problems, including diabetes, heart disease, stroke, arthritis and cancer. In 2006, the cost of obesity-related illnesses in Oregon exceeded $1.5 billion.[4]

Strategic Assessment Output Measures:
Air Quality Pollutants
Walk Trips Per Capita
Daily Miles Traveled by Bicycle Per Capita

The 2013-2018 Benton County Community Health Improvement Plan (CHIP) notes that transportation policies affect public health and cites best practices such as promotion of transportation options and cross-sector collaboration between public health professionals and the transportation industry. The CHIP aims to increase the number of commuters in Benton County who use active transportation from 18 percent to 23 percent by 2018 and increase the number who use public transit to get to school or work from 3 percent to 7 percent (according to U.S. Census data).

Improving Energy Efficiency and Reducing Energy Use

Strategic Assessment Output Measures:
Road Congestion
Daily Vehicle Miles per Capita
Fuel Consumption

Oregonians drive about 39 billion miles and consume 1.5 billion gallons of gasoline every year. The fuel cost alone accounts for 7 percent of their disposable income.[5] The federal Energy Information Agency estimates that by 2035, the price of gasoline is expected to almost double to nearly $6 a gallon. Additionally, all of Oregon's gasoline is imported meaning the profits from its sales are not re-invested in the state's economy. Studies have also shown that reducing auto use frees up road capacity, which enables more efficient freight operations. For example, if a delivery truck can make a couple additional stops each day due to reduced congestion, fewer routes can be scheduled to serve the same deliveries. Therefore, reducing energy use can help households, businesses, and the state's economy save money.

Transportation planning can provide options that reduce the need to drive and encourage use of energy efficient vehicles and modes of travel.

[4] Oregon Health Authority, *Oregon Overweight, Obesity, Physical Activity and Nutrition Facts*, 2012.
[5] Oregon Energy Task Force, *Recommendations to Governor John Kitzhaber*, 2012.

Assuring Adequate Transportation Funding

Maintaining and expanding the transportation system will require more revenue than current funding arrangements generate. Over the last 10 years, state and federal funding for transportation has been flat. Recent trends also show that people are driving less and driving more fuel efficient vehicles, which reduces transportation revenue from gas taxes. While this reduces infrastructure needs, there is still a growing gap between available funding and the improvements called for in transportation plans. Public support for increased fees or taxes is also uncertain; in short, there is a perfect storm of declining revenues and increasing costs, at the same time that plans call for more resources.

Switching to a road user fee would help stabilize this important revenue source. Additionally, land use and transportation planning can help make the case for increased public investment in transportation. Carefully integrating planning for land use with planning for streets and transit allows for land use patterns that make efficient use of the transportation system. Land use and transportation plans that make communities more livable by improving public health and keeping transportation affordable may help make the business case that expanded transportation funding will generate a high return on investment.

Housing Options for Changing Demographics

Strategic Assessment Output Measures:
Population Living in Mixed-Use Area
Single-Family to Multi-Family Ratio

Households are shrinking and the population is aging. These demographic changes combined with the collapse of the housing market in 2008 affect the demand for multi-family housing and single-family attached housing. Responding to these changes by providing more housing options in urban, walkable areas with convenient access to goods and services could also profoundly affect transportation needs.

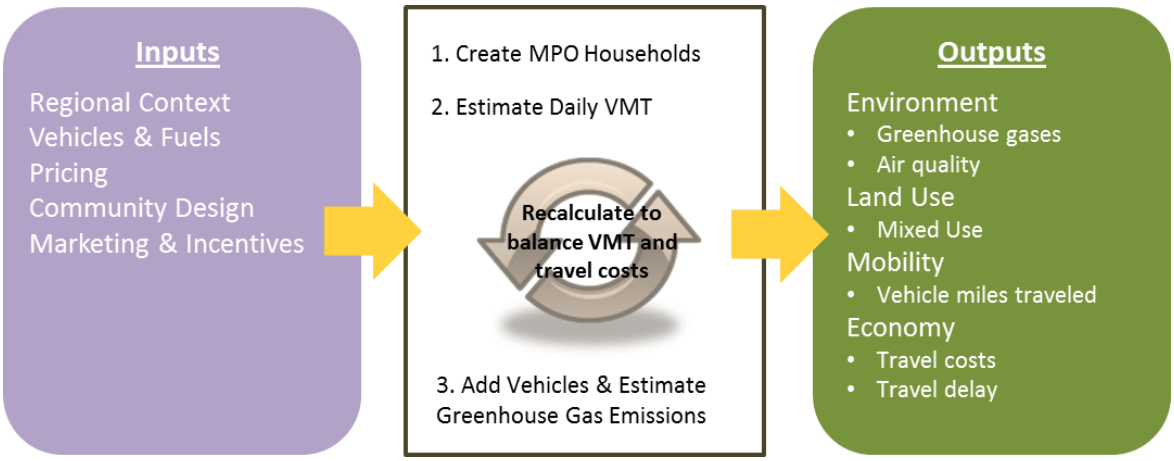
Commuting by employees who work in the region but do not live here places a burden on the transportation system, increases congestion, and contributes to greenhouse gas emissions. The City of Corvallis is currently conducting a housing study in order to identify and analyze the characteristics and magnitude of the housing market's supply and demand balance/imbalance.

STRATEGIC ASSESSMENT OVERVIEW

Analysis Tool

The strategic assessment uses ODOT's Regional Strategic Planning Model (RSPM), developed specifically for metropolitan areas. The RSPM enables smaller geographic areas, like metropolitan areas, to evaluate the potential effects of existing or new policies. This modeling tool is strategic, that is, it supports planning when there are a number of unknowns about the future. It can help develop regional visions and identify actions needed to meet greenhouse gas and other goals.

Figure 1. Regional Strategic Planning Model



The RSPM is a household-based model. As shown in Figure 1, after inputs are collected the model generates a database of every household in the metropolitan planning area and assigns specific attributes that determine travel behavior. For example, the model identifies the household's income, size, ages, auto ownership, and participation in demand management programs. The model also identifies the land use characteristics of the household, such as the density and mixed-use character. Areas with higher densities and access to services reduce the distances people need to drive and make walking, cycling, and transit convenient.

Using this detailed information, the model estimates vehicle miles traveled. Unlike urban travel models, the RSPM does not estimate the number of trips and does not include a roadway network. Instead, the attributes of the household determine travel. The household's travel is then assigned to specific vehicles to determine greenhouse gas emissions. The household's choice of how many and what type of vehicles influences travel costs and the amount of driving. For instance, when gas prices increase, driving frequency decreases. When a more fuel efficient vehicle is purchased, driving increases. Additionally, given the existing range limitations of electric vehicles, households in compact, mixed-use areas, who make shorter trips, are more likely to buy an electric vehicle. To reflect these important effects, an iterative loop in the model balances travel costs with the amount of travel. When complete, the model forecasts greenhouse gas emissions, as well as other outcomes such as total fuel consumption, walk trips, bike miles, and household travel costs.

Process

There are three main steps to the strategic assessment process:

1. Establishing the study area and other geographies,
2. Collecting input data for the base year and future year, and
3. Interpreting the RSPM outputs.

Figure 2 outlines the study area used for the CAMPO strategic assessment, which defines the extent of the area that is included in the model. This generally aligns with the CAMPO boundary. Figure 3 identifies a breakdown of the study area into districts, which are smaller geographic units used for assigning the projected households. The CAMPO strategic assessment includes 15 districts, which generally align with Census Tract boundaries. These districts capture the mix of demographic and land use conditions across the region.

Within the RSPM, land area is characterized by a combination of the district boundaries and assigned development type, which are also depicted in Figure 3. The urbanized portion of each district distinguishes *Metropolitan* and *Town* from *Rural* development types, further helping to determine travel choices and behavior in the RSPM.

Figure 2. CAMPO Strategic Assessment Study Area

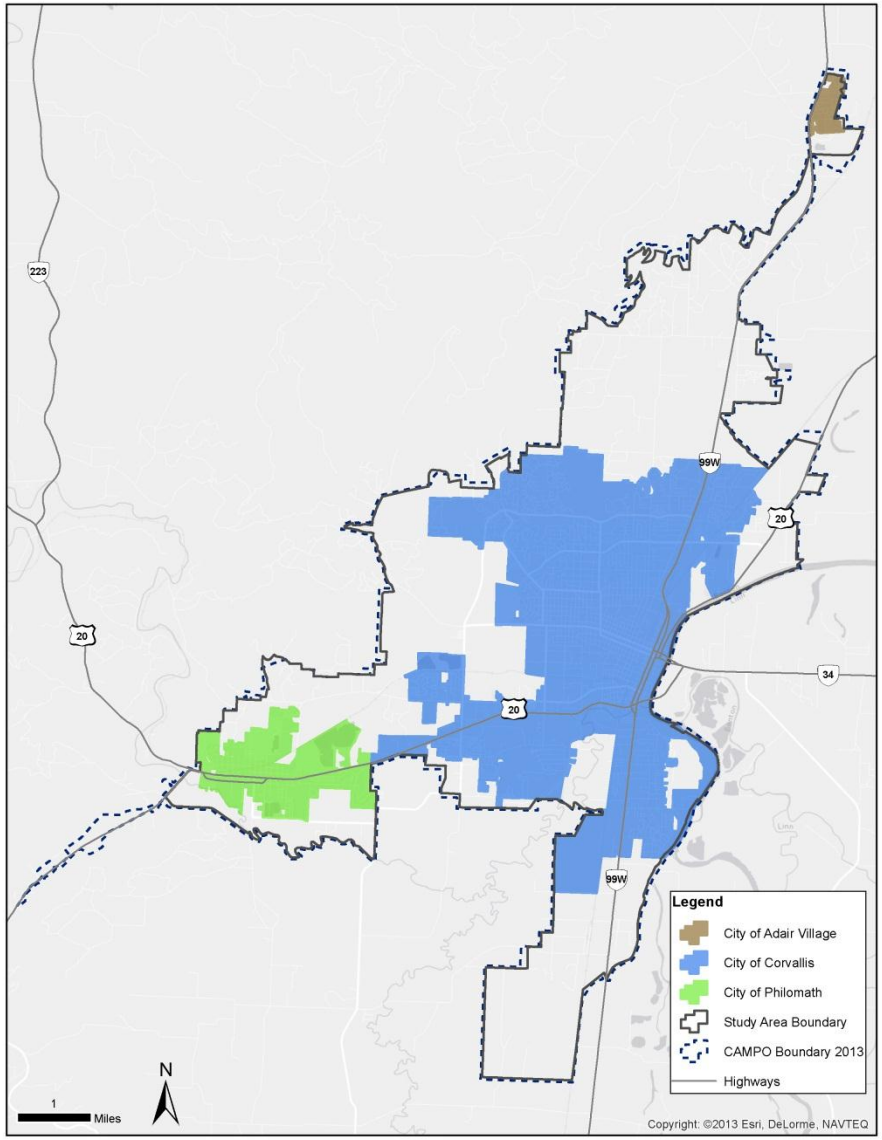
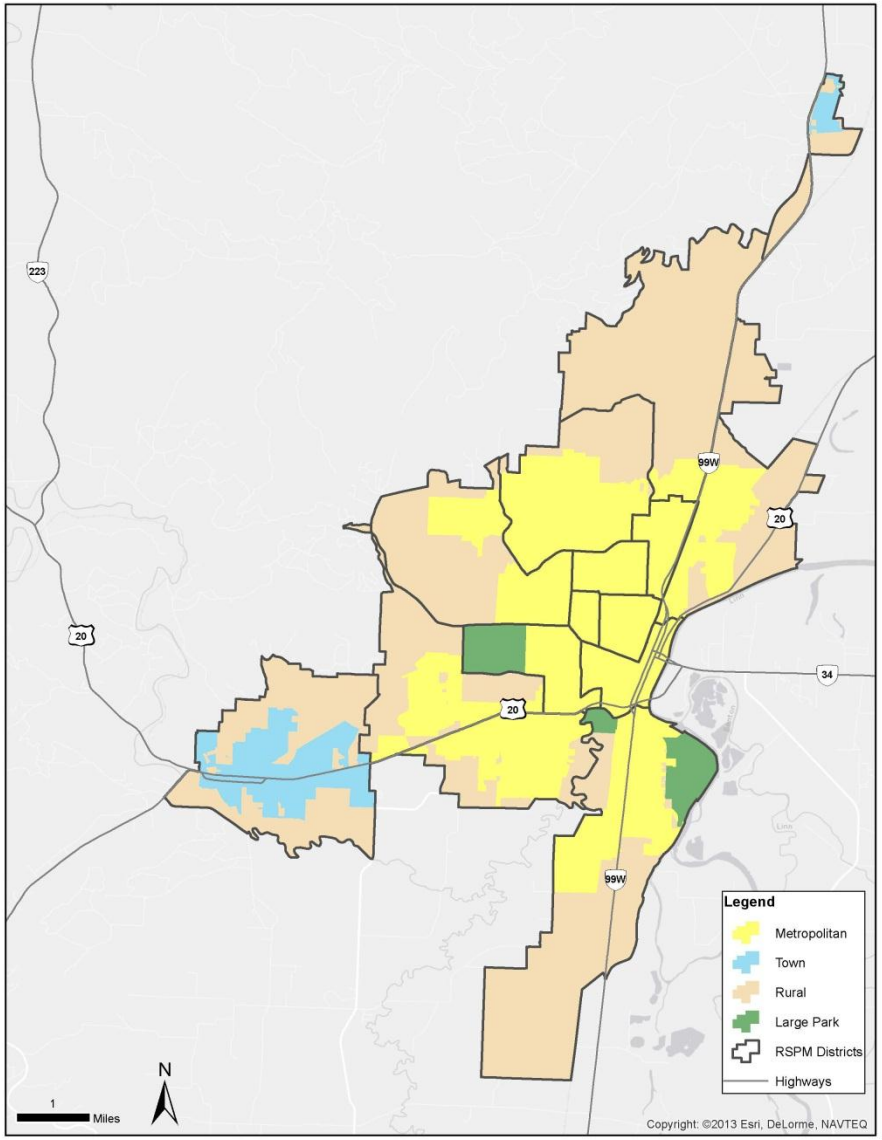


Figure 3. CAMPO Strategic Assessment Districts* & Development Types



*These analysis districts roughly approximate the following 2010 Census Tracts: 41003010200, 41003000500, 41003000600, 41003000400, 41003000900, 41003001001. 41003001002. 41003001101. 41003001102. 41003010600. 41003010702. 41003010900. 41003000202. 41003010800. 41003000100.

RSPM INPUTS AND ASSUMPTIONS

Inputs and assumptions for the RSPM came from a number of sources, including:

- Census data,
- CAMPO's travel demand model, and
- Adopted local plans, including:
  - Comprehensive plans and zoning from Adair Village, Corvallis, Philomath, and Benton County; and
  - Oregon State University Campus Master Plan.

Assumptions about future state and federal policies and conditions are drawn from state-level sources, including:

- Greenhouse gas target rule adopted by the Land Conservation and Development Commission, and
- Oregon's Statewide Transportation Strategy.

Absent specific, adopted policies for some inputs, CAMPO staff worked in partnership with the Corvallis Transit System and local jurisdictions to develop realistic and financially reasonable assumptions. Table 1 summarizes the inputs and assumptions used for the analysis. For more detailed information on the inputs and assumptions, please refer to Appendix 2. Explanation of Key RSPM Inputs and Assumptions.

Statewide Transportation Strategy

In 2010, the Oregon Legislature directed ODOT to prepare a statewide strategy for achieving emission reductions in the transportation sector. In 2012, the Oregon Transportation Commission accepted the Statewide Transportation Strategy, which identifies the following 18 strategies effective in reducing greenhouse gas emissions:

Strategy 1 – More Efficient, Lower-Emission Vehicles and Engines

Strategy 2 – Cleaner Fuels

Strategy 3 – Operations and Technology

Strategy 4 – Airport Terminal Access

Strategy 5 – Parking Management

Strategy 6 – Road System Growth

Strategy 7 – Transportation Demand Management

Strategy 8 – Intercity Passenger Growth and Improvements

Strategy 9 – Intercity Transit Growth and Improvements

Strategy 10 – Bicycle and Pedestrian Network Growth

Strategy 11 – Carsharing

Strategy 12 – More Efficient Freight Modes

Strategy 13 – Compact, Mixed-Use Development

Strategy 14 – Urban Growth Boundaries

Strategy 15 – More Efficient Industrial Land Uses

Strategy 16 – Funding Sources

Strategy 17 – Pay-As-You-Drive Insurance

Strategy 18 – Encourage a Continued Diversification of Oregon's Economy

More information about the Statewide Transportation Strategy is available at:
http://www.oregon.gov/ODOT/TD/OSTI/pages/sts.aspx

Table 1. Summary of RSPM Inputs and Assumptions

Category	Measure	2010	2035[6]
Regional Context	MPO population, including group quarters	65,041	78,953
	Average household size	2.27	2.27
	Average annual per capita income (excludes group quarters)	$23,185	$28,414
Vehicles & Fuels	Light truck share of household vehicles	37%	30%
	Vehicle turnover (years)	10	8
	Plug-in hybrid/all electric vehicles (by year built)	2%	8%
	Fuel economy for autos (miles per gallon)	24	54
	Bus fuels, share of bio-diesel in transit fuel usage	5%	20%
Pricing	Fuel price (dollars per gallon)	$2.43	$5.53
	Pay-as-you-drive insurance (at $0.05 per mile)	0%	0% / 99%*
	Gas tax (dollar per gallon)	$0.424	$0.484
	Road user fee (dollar per mile)	$0	$0 / $0.03*
	Social costs recovered (at $50 per CO2e ton)	0%	0% / 69.4%*
	Electricity costs (dollar per kilowatt-hour)	$0.08	$0.204/ $0.303*
Community Design	Persons per acre	6.18	6.44
	Single-family to multi-family ratio (SF:MF)	63:37	59:41
	Single-family attached and multi-family (2-4 units) – 40% of new units	3,726	6,527
	Population living in mixed-use areas	14.3%	14.9%
	Share of workers subject to parking fee	1.5%	16%
	Share of non-work trips subject to parking fee	6.5%	13.7%
	Single occupant vehicle trips diverted to bicycles	9%	12%
	Transit service miles per capita	6.24	6.24
Marketing & incentives	Workers covered by transportation demand management	2.1%	2.2%
	Households covered by individualized marketing programs	1%	5%
	Car sharing vehicles	2	50
	Households eco-driving	0%	0% / 83.3%*
	Low rolling resistance tires	0%	0% / 82.2%*
	Household miles per gallon optimization	0%	0% / 82.2%*

Note: All dollars values are reported in 2005 dollars, accounting for inflation.

[6] Two different sets of assumptions are provided for state-level policies and actions that may be in place in the year 2035. The first column/figure represents a continuation of existing policies and trends, the second column/figure represents implementation of policies or actions identified in the Statewide Transportation Strategy. The target rules allow metropolitan areas to count actions identified in the Statewide Transportation Strategy (e.g. pay-as-you-drive insurance) when evaluating whether or not the metropolitan area is likely to meet the adopted target. **Denotes inputs allowed per the greenhouse gas target rules adopted by the LCDC (Oregon Administrative Rules 660-044).* Local inputs for the strategic assessment came from adopted policies and staff estimates of reasonable implementation of adopted plans.

RSPM OUTPUTS[7]

Unlike most planning processes, the strategic assessment quantifies the effect of implementing plans and policies. In other words, if the Corvallis metropolitan planning area implements its current adopted plans, the region can expect the outcomes that are outlined in Table 2. For ease, these outcomes are organized into five categories. The results contrast current conditions, in the year 2010, with expected outcomes from implementation of adopted plans and the continuation of expected trends in the year 2035.

Table 2. Summary of RSPM Outputs, Adopted Plans Analysis

Category	Output	2010	2035	% Change
Environment	Annual greenhouse gas emissions per capita from light vehicles including reductions from vehicle changes (metric tons)	2.2	0.9	-61%
	Reduction in greenhouse gas emissions per capita from implementation of adopted plans[8]	n/a	n/a	2.1%
	Reduction in greenhouse gas emissions per capita from implementation of adopted plans and potential state-led actions[8]	n/a	n/a	18.5%
	Clean Air Act[9] criteria pollutants (million kilograms per day)	17.7	7.1	-60%
Land Use	Urbanized Area (acres)	9,615	11,014	15%
	Core districts share of total dwelling units	39%	37%	
	Residents living in mixed-use areas	14.4%	14.7%	-
	Housing type (Single-family : Multi-family)	63:37	59:41	-
Mobility	Daily vehicle miles traveled per capita	22.0	22.7	3%
	Annual walk trips per capita	131	134	2%
	Daily miles traveled by bicycle per capita	0.4	0.5	35%

[7] RSPM is a strategic model initially built to estimate greenhouse gas emissions. The model was supplemented with additional output indicators that are less robust, but sufficient to gauge relative impacts between scenarios. More detailed models should be used in implementation.

[8] The greenhouse gas emissions reduction target for the Corvallis metropolitan planning area is 21% per capita. The RSPM results indicate that implementation of local plans alone will reduce emissions by 2.1% between 2005-2035. Incorporating actions identified in the Statewide Transportation Strategy, which are not currently adopted, will reduce emissions by 18.5%, Two versions of the 2035 results are presented to illustrate the importance of coordinated and comprehensive actions by both state and local governments to achieve the emissions reduction targets. The remaining outputs in Table 2 represent results for implementing adopted plans only.

[9] Clean Air Act criteria pollutants include ozone, particulate matter, carbon monoxide, nitrogen oxides, sulfur dioxide, and lead.

Economy	Annual all vehicle delay per capita (hours)	20.2	23.0	14%
	Daily household parking costs	$0.24	$1.04	330%
	Annual household vehicle operating costs (fuel, taxes, parking)	$2,369	$2,684	13%
	Annual household vehicle ownership costs (depreciation, vehicle maintenance, tires, finance charges, insurance, registration)	$5,975	$7,198	20%
Energy	Annual all vehicle fuel consumption per capita (gallons)	374	173	-54%
	Average all vehicle fuel efficiency (miles per gallon)	24	54	122%
	Annual external social costs per household (unpaid)	$1,062	$819	-26%

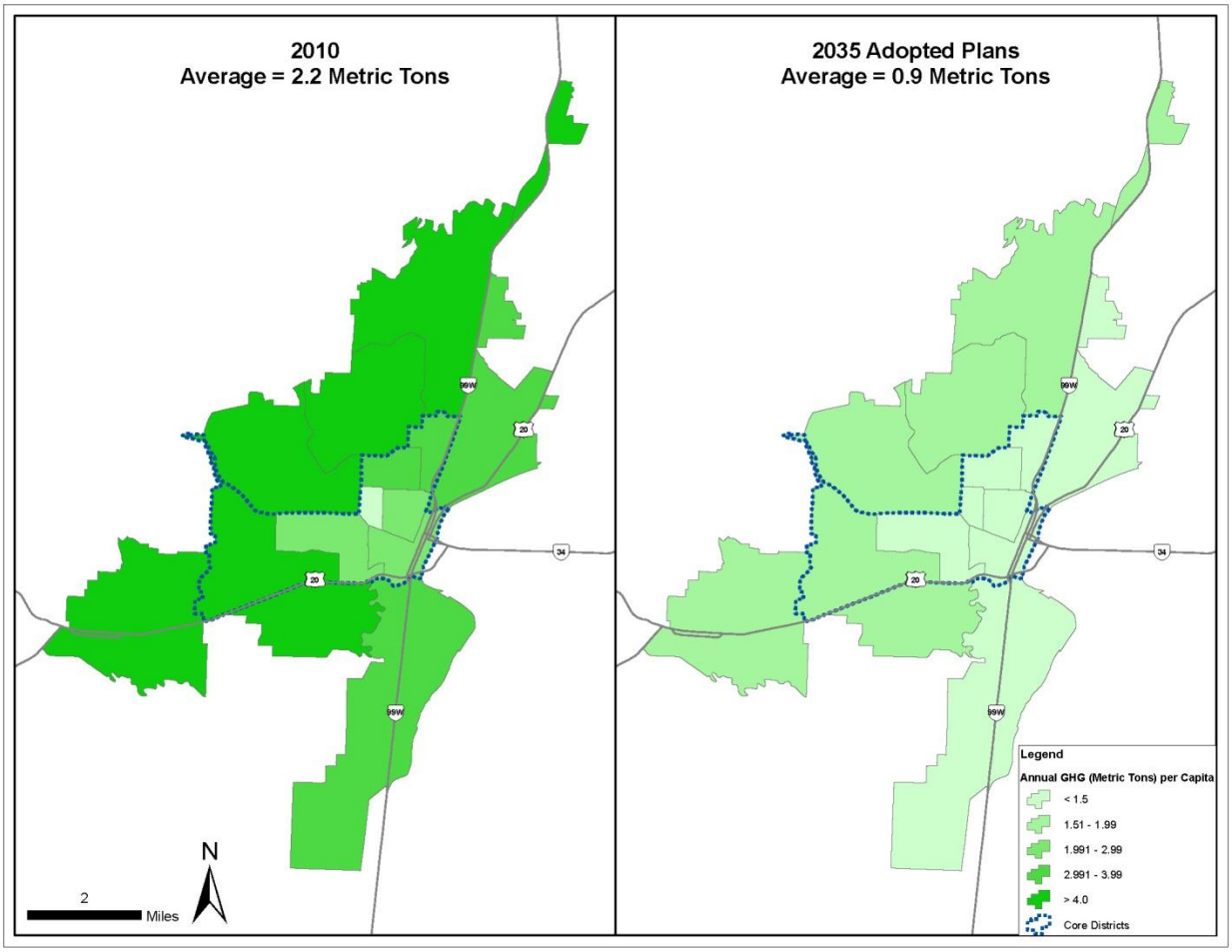
Note: Per capita includes both household and group quarter residents. All costs reported per household only. Greenhouse gas emissions cover all light vehicle travel on MPO roads. All dollar values are reported in 2005 dollars, accounting for inflation.

Greenhouse Gas Emissions

The analysis shows that the region can expect a reduction in greenhouse gas emissions:

- As shown in Figure 4, total greenhouse gas emissions are expected to drop by about 60 percent, due mostly to expected improvements in vehicles and fuels between now and 2035.
- For the greenhouse gas reduction target, which measures reductions above and beyond improvements in vehicles and fuels, the expected per capita reductions are as follows:
    - 2.1 percent when adopted plans and actions are considered alone.
    - 18.5 percent when adopted plans are considered in combination with certain state-led actions, such as ambitious pricing strategies (e.g. carbon tax), which are not currently being implemented by the state, but may be in the future.

Figure 4. Annual Greenhouse Gases Per Capita



Energy

The results show that a shift to cleaner vehicles and alternative modes of transportation result in reduced energy use:

- Energy use is expected to decline (53 percent drop in fuel consumption). Energy use falls as new vehicles are significantly more fuel efficient, including up to 5 percent electric and plug-in electric vehicles expected by 2035. The region's shift to more biofuels and the phase-out of coal-driven electricity, as well as the state's low carbon fuel standards also contribute to this reduction. The reduction in fuel consumption accounts for the drop in social costs, representing air, water, and noise impacts from transportation.

Health

The analysis also shows that reduced emissions, more efficient vehicles, and increases in active travel may improve health:

- Air quality is expected to improve. In fact, the analysis estimates a 60 percent reduction in criteria air pollutants.
- An increase in walk trips (2 percent) and bike miles traveled (35 percent) reflect the continuation of strong policies in the region for these modes. Walking to transit, not reflected in the walk results, due to model limitations, is also a key strategy to increase health through active lifestyles.

Travel Costs

The results suggest that increased vehicle ownership and operating costs, as well as parking fees, impact travel costs:

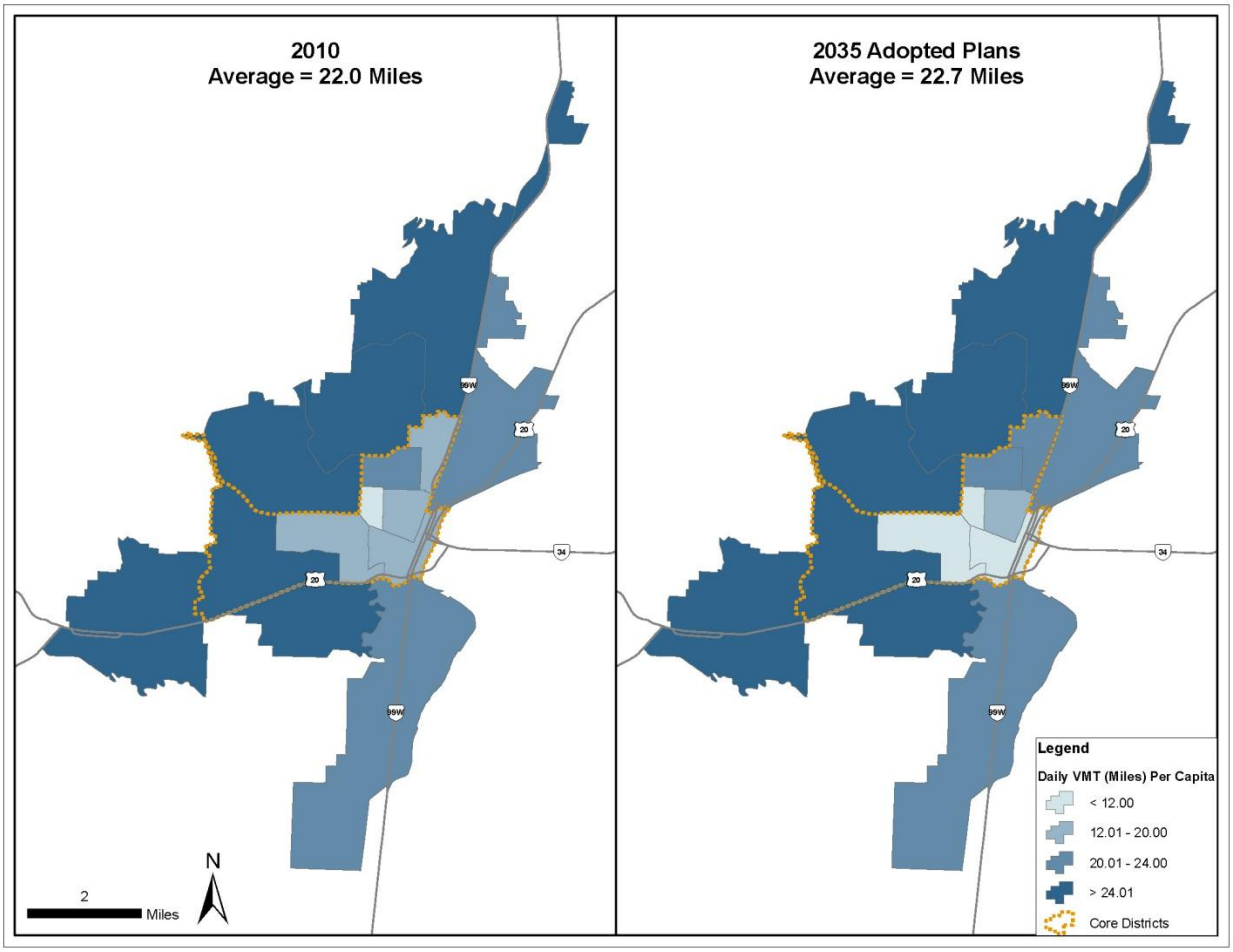
- The forecast rise in travel costs for the region reflects both the purchase of new vehicles, assuming vehicle turnover every 8 years rather than the historical 10 years, and parking fees, which are assumed to impact more work and shopping trips, as analyzed in CAMPO's Regional Transportation Plan.
- Despite the rising costs of travel (13 to 20 percent by 2035), this price increase is key to rationalizing auto travel and supporting shifts to other modes where possible. Nonetheless, the impact of increased transportation costs cannot be overlooked, especially for lower-income households.

Vehicle Miles Traveled

The analysis shows that vehicle miles traveled in the region may increase:

- The increase in vehicle miles traveled in the region is small (less than a mile per day per person). It is reflective of increasing incomes that lead to increased consumption and more travel, particularly by auto, and the shift to more fuel efficient vehicles, which allow drivers to go further on a gallon of gasoline. As shown in Figure 5, daily vehicle miles traveled is generally less in the core districts of the study area compared with the outer districts.
- Access to other modes in the region minimize these effects; however, new growth located outside of the Corvallis metropolitan planning area's core have less access to other modes. The increased miles per person combined with expected population growth contribute to an increase in delay of 14 percent, which may affect commute and the movement of goods and services.

Figure 5. Daily Vehicle Miles Traveled Per Capita



Community Design

Unlike pricing, vehicles, and technology considerations, metropolitan areas exert a strong influence over the design of communities. In combination, increasing mixed-use, encouraging transit ridership, expanding the incentives for the use of alternatives modes, and managing parking are especially effective in emissions reduction. CAMPO and its member jurisdictions have been successful in implementing many of the community design factors that decrease emissions. However, the analysis suggests that further incentives that promote growth in the region's core may benefit the region:

- The region's mix of single-family attached and multi-family housing types (over 40 percent of new housing) recognizes the need for downsizing by the aging boomers (expected to increase from 10 to 16 percent according to state forecasts) and millennials' preference for living in more compact communities with access to goods and services.
- However, the share of new dwelling units drop from 39 to 37 percent in the region's core districts and the region's population living in mixed-use areas holds steady at 15 percent.

SENSITIVITY TESTING

The RSPM analysis of the adopted plans scenario (Table 2) estimates where the region is now, and where it is likely to be in the future, based on adopted plans. The natural question that follows is, what will it take to further reduce greenhouse gas emissions and to improve other important regional outcomes, such as public health? What will be the most cost-effective way to achieve these goals? Sensitivity testing using the RSPM allows the region to evaluate how changes to key factors or policies could affect various outcomes.

To better understand the possibilities and challenges facing the region, sensitivity tests were performed. Sensitivity testing analyzes different combinations of policies to identify which combinations are most effective in achieving different outcomes. Sensitivity tests represent alternative futures and demonstrate how different choices about regional growth and investment, beyond those in the region's adopted plans, affect various outcome measures.

Table 3 outlines the policy bundles and levels of ambition evaluated as part of sensitivity testing. Due to the multiple combinations that could potentially be tested in these alternative scenarios, the policies and levels of ambition were limited to those outlined in the table. If the region decides to move forward with scenario planning, many more possible combinations of policies and levels could be evaluated.

As shown in Table 3, only the community design policies were tested at the most ambitious level (i.e. level 3). The other policy bundles (i.e. state-level actions, and marketing and incentives) were only tested at level 2.

Table 3. Policy Bundles and Levels of Ambition Evaluated as Part of Sensitivity Testing[10]

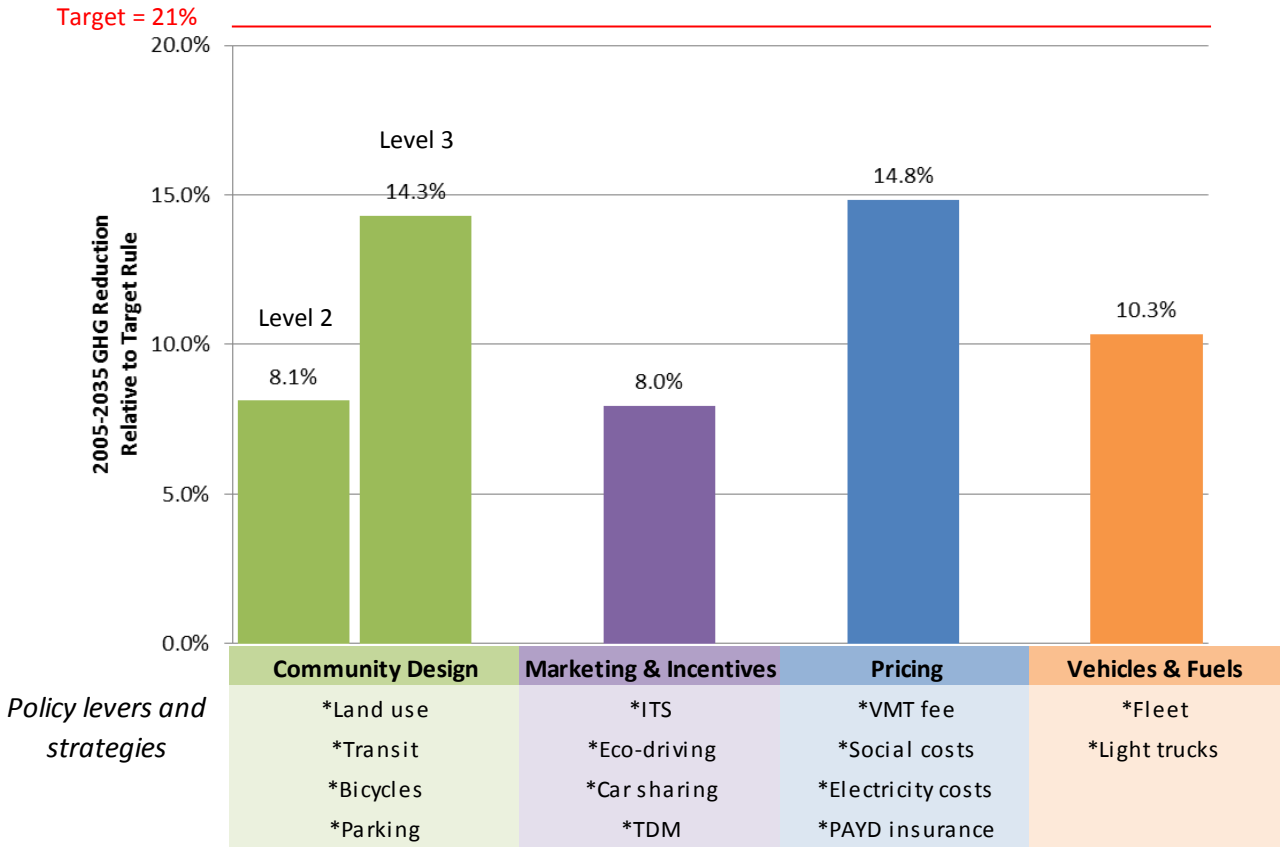
Policy Bundles		Level of Ambition		
		Level 1 Adopted Plans	**Level 2 More Ambitious**	**Level 3 Most Ambitious**
Vehicles & Fuels	*Vehicles & Fuels*	Adopted plans inputs (Table 1).	▪ Double the share of electric and plug-in electric vehicles ▪ Cut the light truck share of household vehicles by one-third	
Pricing	*Pricing*	Adopted plans inputs (Table 1).	▪ Implement 3 cent per mile road user fee ▪ Implement carbon tax-like fee to cover 70% of social costs, ▪ Shift to pay-as-you-drive insurance (at 5 cents per mile).	
Community Design	*Land Use*	Adopted plans inputs (Table 1).	▪ Channel 25% of new growth (1,983 dwelling units) to 7 core districts (out of 15 total districts) ▪ Hold urbanized land to the 2010 footprint Results in roughly 20% of residents live in mixed-use areas	▪ Beyond level 2, increased community design enhances the mixed-use character of neighborhoods in core districts. Results in nearly 30% of residents in mixed-use area
	Transit Investment	Adopted plans inputs (Table 1).	▪ More than double (2.4 times) of the region's 2010 transit service ▪ Shift to cleaner bus fuels and/or electric buses	▪ Four-fold increase in 2010 transit service, consistent with the best of peer cities similar in size to Corvallis
	Promotion of Light Vehicles	Adopted plans inputs (Table 1).	▪ Increase share of single-occupant vehicle (SOV) trips less than 20 miles roundtrip that are diverted to bicycles. Assumes 20% diversion by 2035 (12% in Adopted Plans and 9% in 2010)	▪ Double adopted plans diversion (24%) of SOV trips to light vehicles
	Parking Policies	Adopted plans inputs (Table 1).	▪ Increase parking rates to $5 near OSU, downtown core, the HP campus, and Samaritan Regional Medical Center	▪ Beyond level 2, 15% of workers (not currently subject to parking fee) participate in cash-out/buy-back parking programs
Marketing & Incentives	*Driving Efficiency*	Adopted plans inputs (Table 1).	▪ Increased deployment of Intelligent Transportation System (ITS) including automated signals and access management ▪ Nearly universal promotion of eco-driving and other fuel saving measures	
	Demand Management	Adopted plans inputs (Table 1).	▪ Triple the promotion of transportation demand management strategies targeted at workers and household ▪ More ambitious car-sharing program (from 50 to 75 vehicles).	

[10] See *Appendix 3. Sensitivity Tests* for a more detailed list of the inputs and assumptions.

Sensitivity Testing Results[11]

Figure 6 shows the greenhouse gas reduction potential of individual policy bundles (e.g. pricing, community design) if implemented at levels beyond adopted plans. The figure shows that no single bundle, on its own, can achieve the reduction target of 21 percent per capita. For example, assuming community design, marketing and incentives, and vehicles and fuels remain at the adopted plan level (level 1), but pricing strategies are increased to level 2, the reduction potential is around 15 percent. Pricing at level 2 and community design at level 3 demonstrate the highest levels of individual reduction potential at nearly 15 percent each. The figure also shows the gains that can be made at the local level through community design strategies and marketing and incentive programs.[12]

Figure 6. Individual Effects of Policy Bundles on GHG Reduction



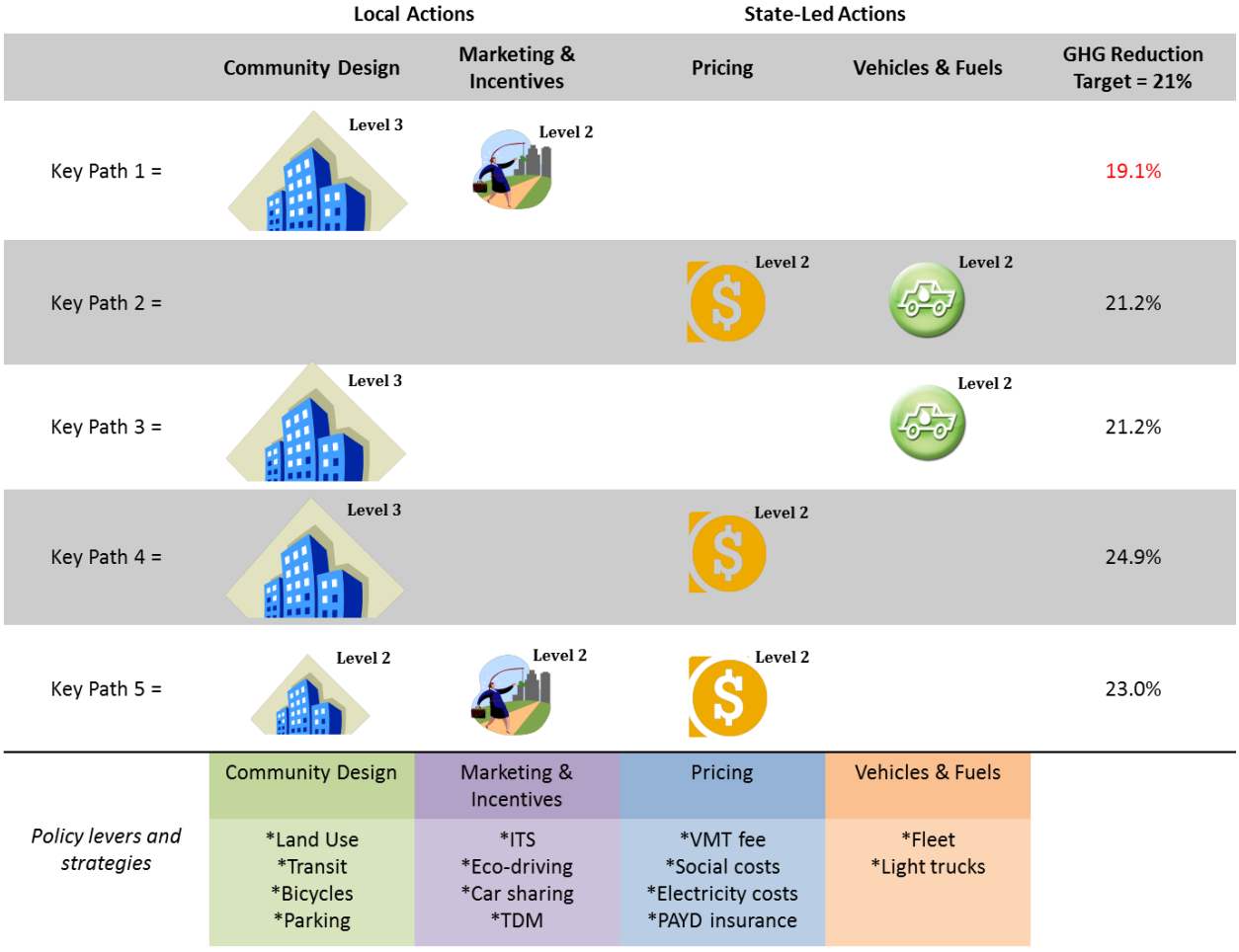
[11] RSPM is a strategic model initially built to estimate greenhouse gas emissions. The model was supplemented with additional output indicators that are less robust, but sufficient to gauge relative impacts between scenarios. More detailed models should be used in implementation.

[12] Policy effects are not additive due to overlapping benefits, but can be modeled together within RSPM as done for the sensitivity tests. More specifically, implementing all the policy bundles above amounts to a 34% greenhouse gas reduction, not at 47% reduction.

Hundreds of scenarios were run as part of sensitivity testing. The scenarios that meet the greenhouse gas reduction target generally follow four key paths (Key Paths 2-5), which are outlined in Figure 7. Key Path 1, also shown in Figure 7, demonstrates that local actions alone related to community design and marketing and incentives are just shy of reaching the target. However, these actions may reach the target when considering uncertainties in the model assumptions on context variables (e.g. forecast fuel price and income growth). Collaborative actions related to pricing and vehicles and fuels that require both state and local support can reach the target (Key Path 2), with no changes to adopted plans. This demonstrates the power of pricing and ambitious vehicles and fuels in reaching the target. Key Path 3 and Key Path 4 show that in combination, the most ambitious actions (level 3) related to community design combined with either pricing or vehicles and fuels exceed the target. Lastly, Key Path 5 demonstrates that less ambitious actions related to community design when combined with marketing and incentives and pricing strategies also exceed the target.

Sensitivity testing demonstrates that reaching the target is feasible, but it requires a collaborative effort that includes both action at the local level and the state level. It further demonstrates that the region has options for what types of strategies (i.e. community design, marketing and incentives, or a combination of both) it considers locally.

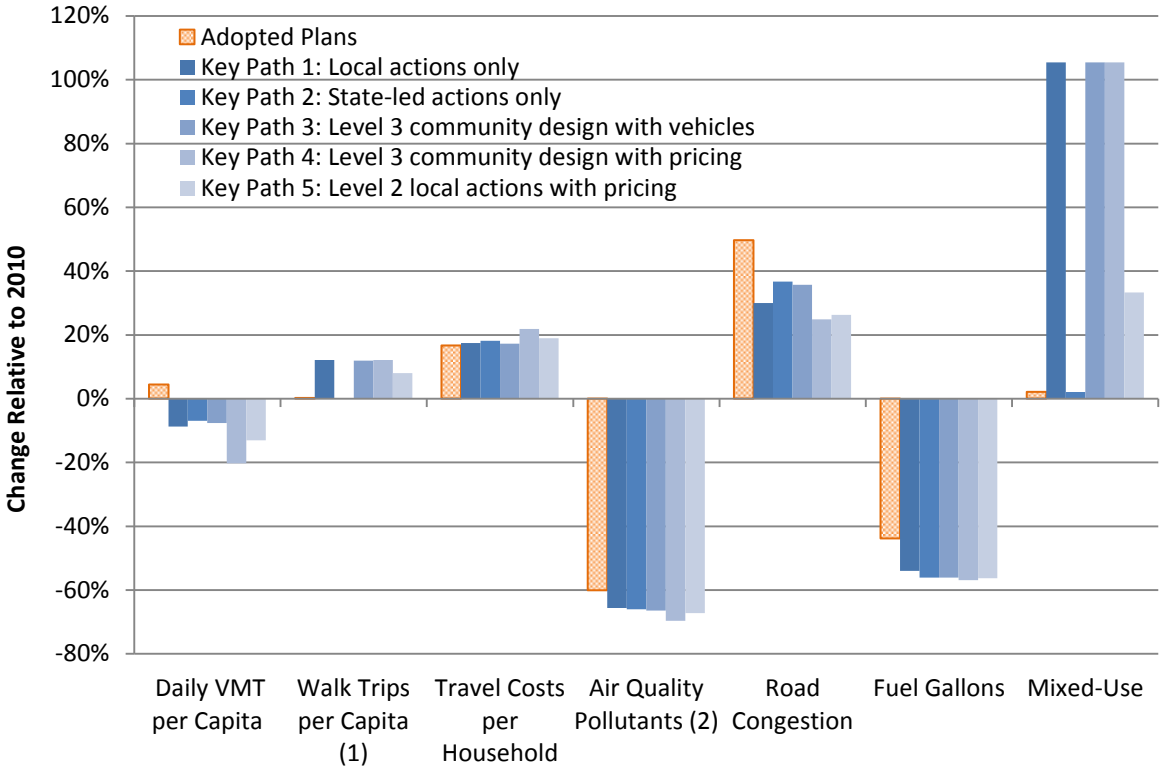
Figure 7. Key Paths to Greenhouse Gas Reduction Target, Beyond Adopted Plans



Since other outcome measures beyond the reduction of greenhouse gas emission are of interest to the region, Figure 8 shows the 2035 impact on a variety of outcome measures, contrasting adopted plans to the more ambitious Key Paths. The bars with the orange pattern in the figure show the impact of implementing adopted plans. The gradations of blue show the impact of the Key Paths 1-5.

In comparison to the Key Paths, the adopted plans scenario falls significantly short in the following other indicators modeled: daily vehicle miles traveled per capita, walk trips per capita, road congestion, and mixed-use. All scenarios face about the same household travel costs, reduction of fuel usage, and air quality emissions. Nonetheless, implementing adopted plans does not reduce air pollutants and fuel consumption to the levels expected by the Key Paths.

Figure 8. Key Paths Impact on Other Outcome Measures



(1) In its current form, the walk model is primarily based on land use changes, without adequate sensitivity to pricing and transportation demand management measures. It also does not include walk to transit trips.

(2) Air quality pollutants is based on a simplified model reviewed by the Oregon Department of Environmental Quality and the U.S. Environmental Protection Agency, which is driven by miles driven on fueled vehicles, without direct linkages to fuel gallons.

KEY FINDINGS

The key findings of the CAMPO strategic assessment are organized into two sections to highlight the key findings of both the initial RSPM analysis (i.e. adopted plans analysis), as well as the sensitivity tests.

RSPM Analysis of Adopted Plans

Finding #1 - Greenhouse gas emissions per capita decline

Overall, total greenhouse gases decline significantly (60 percent reduction). Most of this reduction is the result of cleaner vehicles and fuels.

Per capita greenhouse gas emissions, above and beyond those expected to result from changes to vehicles and fuels, will also be reduced. The per capita decline in greenhouse gas emissions from adopted plans alone is 2.1 percent. Reaching the reduction target of 21 percent per capita requires additional efforts, but existing plans and recent trends are moving the region in the right direction. In combining adopted plans with potential state-led actions, such as more ambitious pricing strategies (e.g. carbon tax), the reduction is expected to be 18.5 percent per capita.

Finding #2 - Transportation energy use is expected to decline, significantly

Transportation energy used directly affects greenhouse gas emissions. The greenhouse gas emissions implications of using gasoline are clear, but even if everyone begins to drive an electric car, there are still emissions associated with the generation of that electricity. Therefore, larger reductions in the amount of overall energy used for transportation, results in more emissions reductions.

Much of the decline can be attributed to vehicle and fuel technology, which demonstrate a significant reduction in per capita fuel consumption from 329 gallons per year to 153. For the future year conditions, the model inputs include a reduction in the carbon intensity of fuels, the state's low carbon fuel standards, and an increase in the number of electric vehicles and plug-in hybrids on the road to about 4 to 5 percent of all household vehicles in 2035. The inputs also include a reduction in the emissions associated with electricity generation, based on statewide renewable energy source policies that have been incorporated into the regional power provider's Integrated Resource Plan.

The region has also been very successful in implementing a fareless transit system. Transportation energy use decreases as more people gain access to transit, because people who ride transit eliminate trips that would otherwise have been made in a private vehicle. Despite a funding system indexed to population growth and fuel prices, the Corvallis Transit System continues to pursue additional funding to pay for improvements to current service, as well as future service expansions or changes to the vehicles and fuels used.[13] The input assumptions used in this analysis are conservative, and reflect expected funding levels. If, in the future, additional funding sources are identified, transit service could increase beyond the assumptions used in this analysis, potentially

[13] Corvallis Transit System, http://www.corvallisoregon.gov/index.aspx?page=848, April 2014.

resulting in a larger decrease in transportation energy use. If funding becomes available, the Corvallis Transit System could also potentially begin using electric vehicles, which could reduce emissions from the transportation energy that is used by the transit system.

Finding #3 – Vehicle miles traveled increase slightly

The number of daily vehicle miles traveled per capita in the Corvallis metropolitan planning area are estimated to increase slightly from 22 miles in 2010 to 22.7 miles in 2035, a 3 percent increase. Three key reasons help explain this. One factor is expected growth in per capita income. As per capita income goes up, households have more money to spend on vehicle travel and therefore travel more. Between 2010 and 2035, the Statewide Transportation Strategy assumes statewide income will increase by 21 percent (0.8 percent compounded). A second factor is the shift to more fuel efficient vehicles. Studies show that people drive more when transportation costs drop. As people can drive further on a gallon of gas; driving is expected to rise. In the analysis, this fact is muted by the assumption that gas prices will double by 2035. Finally, despite success in reducing vehicle miles traveled in core areas of the region, new development by 2035 may not occur in these core areas. Growth outside of the core provides residents with fewer transportation options. Higher income, the rebound effect of more efficient vehicles, and the location of population growth are key causes of the increased vehicle travel predicted by the model.

Finding #4 - Household transportation costs are likely to increase

Annual household transportation costs – mostly driven by the cost of owning and operating an automobile – are expected to increase by 15 percent from an average of $8,300 per year in 2010 to $9,900 per year in 2035. Ownership costs include vehicle financing, registration, maintenance, and repair costs. Operating costs include fuel costs, taxes, and parking fees. Under the 2035 conditions, annual household vehicle operating costs increase by approximately 13 percent over 2010 costs and the costs to own a vehicle increase by 20 percent. The increase in ownership costs reflects the assumption of a shift to new vehicles more quickly (i.e. vehicle turnover from 10 years to 8 years). The increase in operating costs can be attributed to parking costs, which are assumed to impact more work and shopping trips, as analyzed in CAMPO's Regional Transportation Plan. Furthermore, despite improvements to vehicle and fuel technology (i.e. 29 to 68 miles per gallon), fuel price increases from $2.43 to $5.53 over time, a 128 percent increase, off-set these technological improvements.

Finding #5 – Public health is likely to improve

RSPM estimates public health using information about two important public health indicators: air pollutant emissions and active transportation trips.

Improving air quality helps reduce chronic diseases and premature deaths, and thereby lower health care costs. Exposure to air pollutants associated with driving has been linked to increased rates of asthma, heart disease and some types of cancer.[14] For these reasons alone, reducing emissions is for the good of the region. The good news is that all types of emissions from

[14] Oregon Health Authority, *Climate Smart Communities Scenarios Health Impact Assessment*, April 2013.

transportation sources decrease in the future year. RSPM estimates that Clean Air Act criteria pollutants drop from roughly 18 to 7 million kilograms per day – a reduction of about 60 percent. Emissions in the region decrease in the future year in spite of increased driving, which is due mainly to improvements in fuel economy, lower carbon content of the auto fuel, and vehicle technology.

Increased physical activity can also contribute to improved public health outcomes. Regular physical activity lowers the risk of stroke, diabetes, heart disease, and obesity. Obesity is second only to tobacco as the state's leading cause of preventable death.[15] The results show that walking and biking trips continue to build on the region's strong emphasis on providing alternative transportation options. Specifically, annual walk trips per capita increase 2 percent, a small increase, but daily miles traveled by bicycle increases by 35 percent, a relatively large increase that does not come as a surprise given how hard the region has worked to build strong bicycle infrastructure. Members of the community who can make trips on foot or by bike get incidental exercise as they go about their day, and as communities continue to struggle with obesity and other side effects of a sedentary lifestyle, this additional exercise may improve overall health.

Finding #6 – Social costs from driving are likely to decline

As emissions decline and air quality improves the costs to society decline. Social costs refer to the unintended consequences of transportation, which include carbon emissions that contribute to climate change and air pollution that cause health and environmental problems. In addition, the analysis includes other undesirable effects such as safety, noise, water pollution, and the costs of maintaining secure energy sources globally.

Sensitivity Tests

Finding #7 - Reaching the target is feasible and requires combinations of strategies

Sensitivity testing demonstrates that reaching the region's greenhouse gas reduction target of 21 percent per capita by 2035 is feasible. Over one third of the different alternatives analyzed with more ambitious policies than those currently adopted by the region meet the target.

Testing individual policy bundles, such as pricing and marketing and incentives show that no single strategy on its own meets the target. Rather, multiple strategies must be pursued, in combinations, to meet the target.

Finding #8 – Changes to pricing *or* ambitious changes to vehicles and fuels are critical

Although no single strategy on its own meets the target, sensitivity testing identifies two areas where more aggressive policies will be particularly effective: pricing and further improvements to vehicles and fuels (i.e. beyond those outlined in the Statewide Transportation Strategy). More specifically, either more ambitious pricing policies need to be pursued, *or* cleaner fuels and fleets are necessary in order to meet the target. No other policies demonstrated the same level of impact on the reduction of greenhouse gas emissions as pricing and vehicles and fuels.

[15] Oregon Health Authority, *Climate Smart Communities Scenarios Health Impact Assessment*, April 2013.

Pricing is particularly important due to its connection to funding the transportation system. Funding for transportation investments comes from many sources. The state gas taxes and user fees are critical sources of funding for transportation infrastructure and services. The revenue generated by federal and state gas taxes is declining as individuals drive less and fuel efficiency increases. As construction costs increase and the gas tax revenue is not indexed on inflation, funding Oregon's – and the nation's – transportation system grows more difficult. Until the Oregon Legislature raised the state gas tax by six cents in 2011, this revenue source had not increased since 1993. Similarly, the federal gas tax has not increased since 1993. Currently, the state is exploring a road user charge to address funding shortfalls.

Implementation of pricing policies that support the Statewide Transportation Strategy vision of covering the true cost of pricing can take many forms. Pricing policies can include shifting to a road user fee to cover the cost of maintaining and operating a multimodal transportation system, and considering a carbon tax to cover the unintended costs to public health and the environment. Another key shift is moving to mileage-based policies, such as pay-as-you-drive insurance, which allows users to more readily see the cost of each mile. These are state-led initiatives that require support from local communities to move forward.

Finding #9 – The region has multiple options to consider

In terms of local actions, there are multiple strategies that the region can consider. For example, the region can consider more ambitious community design strategies and/or marketing and incentive based strategies. A key finding in the analysis is the value of compact, mixed-use development in centralized areas, which can reduce the need for driving and greatly enhance the shift to active modes. Alternatively, the region can focus on collaborating with the state to explore pricing changes and cleaner vehicle and fuel standards. Sensitivity testing shows that there are several ways that the region could meet the greenhouse gas reduction target. This range of choices gives the region the opportunity to consider how different strategies affect achieving other regional goals and objectives. This information can be used to identify the outcomes most important to the region and the most cost effective and feasible way to get there.

NEXT STEPS FOR THE REGION

The strategic assessment identifies likely outcomes from the implementation of adopted land use and transportation plans. The assessment also shows how a new modeling tool, RSPM, can help evaluate alternative policies or actions as the region updates its land use and transportation plans. As a first step, the information provided in this strategic assessment, including the more detailed information on inputs, assumptions, and sensitivity testing in the appendices, will:

1. Support further implementation of adopted plans and policies,
2. Help to inform plan updates and investment decisions, and
3. Provide support for coordinated regional efforts.

The results of the adopted plans analysis and the sensitivity testing show how well the region fairs on a number of output measures. Using this information, planners, local officials, and others can consider policies that may help the region improve on certain measures, whether it be reducing emissions or increasing mixed-use areas.

In addition, the region is currently considering moving forward with metropolitan scenario planning. As noted earlier, the state, through ODOT and DLCD, supports and encourages metropolitan areas to engage in scenario planning. Specifically, ODOT provides financial support, and both ODOT and DLCD provide technical assistance in the form of data collection, modeling, and analysis.

Currently, there are many ongoing planning efforts underway in the Corvallis metropolitan planning area. Corvallis and Philomath are working on transportation system plan updates, the Corvallis Transit System is working on a transit master plan, and Oregon State University is updating its campus master plan, to name a few. Due to the many ongoing initiatives, the region is exploring ways to tailor the scenario planning process to ensure the timing aligns with existing efforts and complements other plan update processes.

Through formal scenario planning, the region could more fully evaluate a range of land use and transportation policies and actions to reduce greenhouse gas emissions and address other issues of importance to the region. As a collaborative process that requires the engagement of various stakeholders, including local jurisdictions, transit services, and others, scenario planning would seek to develop a preferred scenario that would be endorsed or adopted by CAMPO member governments as a guide to subsequent land use and transportation planning efforts.

The strategic assessment is the first step in and the basis for the scenario planning process. Scenario planning would involve more detailed analysis of three to five alternative land use and transportation futures for the region, each representing a different approach to accommodating growth and transportation needs.

CONCLUSION

The Corvallis metropolitan planning area has a long history of planning for healthy and livable communities where residents have a variety of transportation options. This strategic assessment shows that implementing plans will likely result in many positive outcomes for the region, and will make progress in reducing greenhouse gas emissions. In addition, the assessment indicates that there are a number of strategies and actions that can further reduce emissions and make the region and its citizens better off.

This strategic assessment provides the region with substantial new information about the likely outcomes of existing plans, and a new tool – RSPM, that can help decision-makers evaluate choices for the future. Armed with this information, the Corvallis metropolitan planning area can continue to advance its planning practices to achieve a community desired by its citizens, and explore approaches to reducing greenhouse gas emissions.

As a regional coordinating agency with close relationships with member jurisdictions, transit districts, federal and state agencies, and others, CAMPO is well positioned to work collaboratively with regional stakeholders to decide how the findings and issues identified in the strategic assessment should be addressed in the region's planning work.

Value of the Strategic Assessment

The strategic assessment will help to inform other planning work now underway, including, but not limited to the following efforts:

- *Corvallis and Philomath **transportation system plan** updates,*
- *Oregon State University **campus master plan** update,*
- *CAMPO's ongoing work and collaborative efforts, such as:*
  - ***Multimodal Safety Plan**, which includes input from public-safety stakeholders and others in the region.*
  - *Corvallis **Safe Routes to School** program, which includes creating walking/biking maps for students and families to further increase the use of alternative modes.*
  - ***Transit hub feasibility study** for the Corvallis Transit System, which focuses on the Oregon State University campus, where parking is a persistent and growing concern.*
  - ***Transit planning** with the Albany Area MPO to address future expansions and a governance structure for the Linn Benton Loop transit route, which serves the communities of Albany and Corvallis.*

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APPENDICES

APPENDIX 1. OREGON'S STRATEGY FOR REDUCING GREENHOUSE GAS EMISSIONS

Metropolitan scenario planning and this strategic assessment are part of a comprehensive effort that the state is undertaking to significantly reduce greenhouse gas emissions. The state efforts listed below provide a framework and support efforts at the regional and local level.

State Greenhouse Gas Emission Reduction Goals

In 2007, the Oregon Legislature adopted House Bill 3507 establishing a statewide goal to reduce greenhouse gas emissions. The goal applies to all emission sectors, including energy production, buildings, solid waste and transportation, and call for:

- Stopping increases in emissions by 2010
- Reducing emissions to 10 percent below 1990 levels by 2020
- Reducing emissions to 75 percent below 1990 levels by 2050.

The 2007 Oregon Legislature also established the Oregon Global Warming Commission (OGWC)[16] – a 25-member commission charged with helping coordinate statewide efforts to reduce greenhouse gas emissions and guide the state toward its climate goals. The commission is also charged with helping the state, local governments, businesses and residents prepare for the effects of climate change.

Roadmap to 2020

The Oregon Global Warming Commission's *Roadmap to 2020* outlines a series of recommendations for state, regional and local actions to achieve the state's goal of reducing emissions to 10 percent below 1990 levels. In addition, the OGWC has prepared a series of reports to the Oregon Legislature that outline progress in implementing its recommendations.

The *Roadmap to 2020* and other OGWC reports are available at:
http://www.keeporegoncool.org/view/ogwc-reports

Governor's 10-Year Energy Action Plan

In 2012, Governor Kitzhaber put forth a 10-year energy action plan to help Oregonians reduce energy use in a way that makes Oregon more competitive and resilient economically and environmentally. The comprehensive action plan outlines strategies for energy efficiency, renewable energy, greenhouse gas reduction, and transportation, with strategies that help create investment opportunities to keep more capital circulating in Oregon.

The 10-Year Energy Action Plan is available at:
http://www.oregon.gov/energy/Pages/Ten_Year/Ten_Year_Energy_Plan.aspx

[16] More information about the Global Warming Commission is available at www.keeporegoncool.org.

Metropolitan Greenhouse Gas Emissions Targets

In 2011, the Land Conservation and Development Commission (LCDC) adopted greenhouse gas emission reduction targets for six metropolitan areas. The targets are intended to guide scenario planning by metropolitan areas and identify the per capita percentage reduction in emissions that each area would need to achieve to enable the state to meet its overall emission reduction goals. Scenario planning to meet the targets is voluntary, except for the Portland metropolitan area, which is required to adopt a preferred land use and transportation scenario meeting its adopted target by the end of 2014.

More information about Metro's scenario planning work, known as Climate Smart Communities is available at: http://www.oregonmetro.gov/index.cfm/go/by.web/id/36945

More information about the greenhouse gas emissions reduction targets is available at: http://www.oregon.gov/LCD/CLIMATECHANGE/pages/metropolitan_greenhouse_gas_reduction_targets.aspx

The STS identifies the following 18 strategies effective in reducing greenhouse gas emissions:

Strategy 1 – More Efficient, Lower-Emission Vehicles and Engines

Strategy 2 – Cleaner Fuels

Strategy 3 – Operations and Technology

Strategy 4 – Airport Terminal Access

Strategy 5 – Parking Management

Strategy 6 – Road System Growth

Strategy 7 – Transportation Demand Management

Strategy 8 – Intercity Passenger Growth and Improvements

Strategy 9 – Intercity Transit Growth and Improvements

Strategy 10 – Bicycle and Pedestrian Network Growth

Strategy 11 – Carsharing

Strategy 12 – More Efficient Freight Modes

Strategy 13 – Compact, Mixed-Use Development

Strategy 14 – Urban Growth Boundaries

Strategy 15 – More Efficient Industrial Land Uses

Strategy 16 – Funding Sources

Strategy 17 – Pay-As-You-Drive Insurance

Strategy 18 – Encourage a Continued Diversification of Oregon's Economy

Statewide Transportation Strategy

In 2010, the Oregon Legislature directed ODOT to prepare a statewide strategy for achieving emission reductions in the transportation sector. In 2012, the Oregon Transportation Commission accepted the Statewide Transportation Strategy. The STS Vision sets out a series of strategies that outline how the state can best accomplish emission reductions in the transportation sector, including freight or goods movement, air and marine travel, in addition to passenger travel by light vehicles. The Statewide Transportation Strategy will guide future ODOT planning, and outlines state level actions that metropolitan areas can consider as they conduct scenario planning.

More information about the Statewide Transportation Strategy is available at: http://www.oregon.gov/ODOT/TD/OSTI/pages/sts.aspx.

Oregon Sustainable Transportation Initiative

In 2010, ODOT and DLCD created the Oregon Sustainable Transportation Initiative (OSTI) to coordinate state agency efforts to achieve emission reductions for the transportation sector. A major element of OSTI work is assistance to metropolitan areas and local governments to conduct scenario planning and related efforts to reduce emissions. Through OSTI, ODOT developed the Regional Strategic Planning Model and the Statewide Transportation Strategy, and provides funding and technical support for metropolitan scenario planning, including scenario planning guidelines and a "toolbox" of effective emissions reduction actions and programs that can be implemented at the local level.

More information about OSTI programs is available at:
http://www.oregon.gov/ODOT/TD/OSTI/Pages/index.aspx

ODOT Climate Change Adaptation Planning

In 2012, ODOT completed an Adaptation Strategy Report, a preliminary assessment of risks to our transportation infrastructure and system operations in the face of increased climate variability and change. This is necessary because, even if emissions are reduced or stop today, a certain level of climate impacts will be experienced into the future. Climate impacts are projected to include higher average temperatures, higher sea levels, extreme precipitation events, and an increase in the frequency and magnitude of coastal flooding. These changes can all have a direct effect on transportation infrastructure. The 2012 report identifies current areas of adaptive capacity and potential actions to be taken by ODOT, and underlines the need for a statewide vulnerability assessment.

ODOT is currently conducting a Climate Change Vulnerability Assessment and Adaptation Options Study on the north coast of Oregon. This pilot project will assess the vulnerability of the region's highway infrastructure to extreme weather events and higher sea levels, inventory and prioritize hazard areas, and develop a range of options to address potential hazard sites. The adaptation study will be completed in fall 2014. Lessons learned from the pilot will be used to inform ODOT's future adaptation efforts and plans for a statewide vulnerability assessment.

More information on climate change adaptation planning is available at:
http://www.oregon.gov/ODOT/TD/CLIMATECHANGE/pages/cc_adaptation.aspx

APPENDIX 2. EXPLANATION OF KEY RSPM INPUTS AND ASSUMPTIONS

Inputs and assumptions for the RSPM are drawn from a number of sources, including Census data, CAMPO's travel demand model, and state programs and rules, including the greenhouse gas target rule, the Statewide Transportation Strategy, future vehicle and fuel assumptions from a collaborative analysis of Oregon with the Oregon Departments of Energy and Environmental Quality, and federal standards. In addition, some of the assumptions used in the RSPM analysis are based on the adopted plans in the region, including:

- CAMPO Regional Transportation Plan;
- Comprehensive Plans and zoning from Adair Village, Corvallis, Philomath and Benton County; and
- Oregon State University Campus Master Plan.

Absent specific, adopted policies for some inputs, CAMPO worked in partnership with the Corvallis Transit System and local jurisdictions to develop realistic and financially reasonable assumptions. This appendix provides details on the summary of inputs provided in Table 1 of this report.

Table 2A: Key Inputs, Regional Context

Category	Measure	2010	2035
Regional Context	MPO population, including group quarters	65,041	78,953
	Average household size	2.27	2.27
	Average annual per capita income	$23,185	$28,414

Note: All costs are reported in 2005 dollars, accounting for inflation.

Regional context inputs, such as population, household size, and income have an impact on greenhouse gas emissions. As a household-based model, these inputs act as the foundation of the RSPM. The RSPM creates households and applies a household size, income, and age mix to each household using a variety of other factors, such as density and access to transit. Although the future value of these variables is uncertain, the greenhouse gas target rule and the Statewide Transportation Strategy specify many of the inputs.

Key factors and assumptions:

- Based on county long-range population forecast data from the State Office of Economic Analysis (OEA), population is expected to grow by 20 percent between 2010 and 2035. The share of population over 65 years increases from 10 percent to 16 percent in Benton County. Household size was held constant between 2010 and 2035. This data is consistent with the region's latest urban travel demand model.
- 2010-2035 state income is assumed to increase by 21 percent (0.8 percent compounded), consistent with the Statewide Transportation Strategy, a reflection of the health of the local economy. The RSPM calculates CAMPO's average income as slightly above state income, consistent with the Bureau of Economic Analysis.

Figure 2A. Projection of Oregon Real Average Per Capita Income (1929-1950)

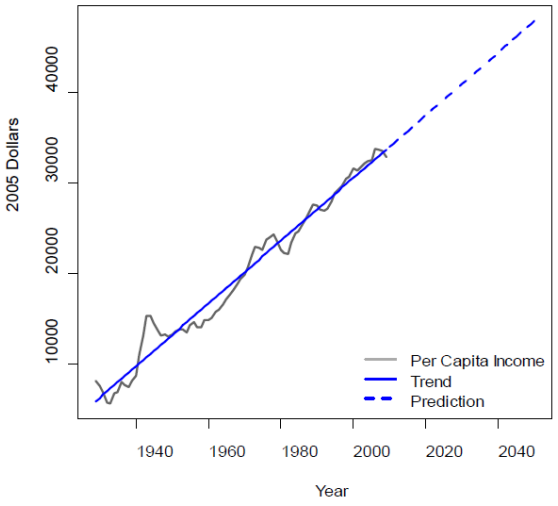


Table 2B: Key Inputs, Vehicles & Fuels

Category	Measure	2010	2035
Vehicles & Fuels	Light truck share of household vehicles	37%	30%
	Vehicle turnover (years)	10	8
	Plug-in hybrid/all electric vehicles (by year built)	2%	8%
	Full stock share of plug-in hybrid/all electric vehicles	0%	0.8%
	Fuel economy for autos (miles per gallon)	24	54
	Bus fuels, share of bio-diesel in transit fuel usage	5%	20%

The vehicles on the region's roadways, including vehicle fuel type and efficiency, has a significant impact on the amount of greenhouse gas emitted per mile of vehicle travel and is expected to change significantly in the next 20 years. Assumptions about fleet, vehicle type and fuel economy were developed by three state agencies (ODOT, ODEQ and ODOE), and assumptions about these factors were used by LCDC when setting the region's per capita emissions reduction target in 2011. The assumptions were developed based on the best available information and current estimates about improvements in technologies and fuels. Similar assumptions are reflected in the Statewide Transportation Strategy, and were incorporated into the analysis performed for the future year for CAMPO.

Key factors and assumptions:

- The share of light trucks in the vehicle fleet is expected to decline in the future, with more people choosing to purchase smaller more fuel-efficient cars, rather than full-sized trucks, vans, and SUVs.
- The fleet turnover rate (i.e. the average age of the vehicle fleet) is expected to decline slightly, from 10 years to 8 years. Fleet turnover affects how quickly new emission standards reduce total fleet emissions.
- Fuel economy is expected to more than double as a result of new federal standards for cars and light trucks through 2035.
- Based on conversations with the Corvallis Transit System, the share of bio-diesel in the bus fleet is expected to increase to 20 percent by 2035.
- Oregon is a leader in adopting and implementing low-carbon fuel standards that reduce the use of gasoline in favor of biofuels and other low-carbon fuels. It is assumed that these standards will continue to be in place.
- The purchase of plug-in hybrid and electric vehicles is also expected to increase.

Table 2C: Key Inputs, Pricing

Category	Measure	2010	2035[17]
Pricing	Fuel price (dollars per gallon)	$2.43	$5.53
	Pay-as-you-drive insurance (participating households at $0.05 per mile)	0%	0% / 99%*
	Gas tax (dollar per gallon)	$0.424	$0.484
	Road user fee (dollar per mile)	$0	$0 / $0.03*
	Social costs recovered (at $50 per C02e ton)	0%	0% / 69.4%*
	Electricity costs (dollar per kilowatt-hour)	$0.08	$0.204/ $0.303*

Note: All costs are reported in 2005 dollars, accounting for inflation.

Fuel prices and other direct costs of driving affect how much individuals drive and choices regarding vehicle type. In addition to the price of gas, gas taxes and Oregon's proposed first in the nation road usage fee are also a pricing factor. By 2035, analysis found that new sources of funding such as a vehicle miles traveled based road user fee may be in place, or the gas tax may be increased.

[17] Two different sets of assumptions are provided for state-level policies and actions that may be in place in the year 2035. The first column/figure represents a continuation of existing policies and trends, the second column/figure represents implementation of policies or actions identified in the Statewide Transportation Strategy. The target rules allow metropolitan areas to count actions identified in the Statewide Transportation Strategy (e.g. pay-as-you-drive insurance) when evaluating whether or not the metropolitan area is likely to meet the adopted target. **Denotes inputs allowed per the greenhouse gas target rules adopted by the LCDC (Oregon Administrative Rules 660-044).* Local inputs for the strategic assessment came from adopted policies and staff estimates of reasonable implementation of adopted plans.

Key factors and assumptions:

- In 2010, the average price Oregonians paid for a gallon of gas was $2.43. The 2035 price is estimated at $5.53 per gallon. The 2035 price is based on the U.S. Energy Information Agency's (EIA) 2010 Annual Energy Outlook (December 2009). The Statewide Transportation Strategy developed a composite fuel price trend that rises faster than the EIA reference price in the short-term and approached the EIA high price in the long-term.
- The state gas tax is expected to increase from 42 cents per gallon in 2010 to 48 cents per gallon in 2035. The state gas tax is assumed to keep up with inflation.
- In addition, the state is encouraging "pay-as-you-drive" insurance, which is based on the number of miles driven rather than a flat annual rate. Since this program is recently being offered by insurance agencies, it is not assumed in the adopted plans scenario.
- The state is considering shifting from the current gas tax to a road user fee that charges by the miles driven. The Statewide Transportation Strategy suggests replacing the current gas tax with a 3 cents per mile user fee by the year 2035. Analysis shows this would result in sufficient revenue to build and maintain the statewide transportation system. Because this is not currently adopted, it is not assumed in the adopted plans scenario.
- Social costs refer to the unintended consequences of transportation, such as carbon emissions that contribute to climate change, air pollution that causes health and environmental problems, and other such costs. The Statewide Transportation Strategy makes an assumption that by 2035 69 percent of these social costs will be recovered. This is not included in the adopted plans scenario.
- The price of electricity becomes more important with a greater shift from gasoline to electric-fueled vehicles. The cost per mile of an electric vehicle is pennies on the dollar relative to gasoline vehicles, even hybrids. Further study will ensure the ability of the energy sector to absorb this increased demand. ODOE estimated the cost of electricity would rise from 8 cents to 20 cents per kilowatt hour, reflecting an increase in more expensive renewable power.

Table 2D: Key Inputs, Community Design

Category	Measure	2010	2035
Community Design	Persons per acre	6.18	6.44
	Single-family to multi-family ratio (SF:MF)	63:37	59:41
	Single-family attached and multi-family (2-4 units) – 40% of new units	3,726	6,527
	Population living in mixed-use areas	14.3%	14.9%
	Core districts share of total dwelling units	39%	37%
	Share of workers subject to parking fee	1.5%	16%
	Share of non-work trips subject to parking fee	6.5%	13.7%
	Average per day parking fee (where changed)[18]	$3.30	$3.35
	Share of workers subject to parking cash-out-buy-back programs	0%	0.8%
	Single occupant vehicle trips diverted to light vehicles (e.g. bicycles)	9%	12%
	Transit service miles per capita	6.24	6.24

Note: All costs are reported in 2005 dollars, accounting for inflation.

Unlike pricing, vehicles, and technology considerations, metropolitan areas exert a strong influence over the design of communities, including the amount of mixed-use development and the provision of transportation options. Due to the synergistic effects of these inputs, housing type, parking pricing, and transit service are bundled into the community design category. In combination, increasing densities, encouraging transit ridership, expanding the incentives for the use of alternatives modes, and managing parking are especially effective in emissions reduction.

CAMPO and its member jurisdictions have been successful in implementing many of the community design factors that decrease emissions. Specifically, the Corvallis Transit System provides fareless transit service throughout the city. Furthermore, providing for walking and bicycling is an integral component of transportation planning practices in Corvallis. According to the U.S. Census Bureau's 2009 American Community Survey, 9.3 percent of Corvallis residents bike to work, the largest percentage in the nation. Corvallis also has been recognized as a city with the second highest percentage of people walking to work (followed by Eugene).

The assumptions used in the RSPM analysis are based on the adopted comprehensive plans and zoning implemented by the local jurisdictions in the region, existing and projected parking management strategies, existing and projected transit service levels, and goals and policies in CAMPO's adopted Regional Transportation Plan. Some of the inputs required by the RSPM are not specifically addressed in these plans and policies. For those inputs, the RSPM assumptions were developed in partnership with CAMPO, Corvallis Transit System, and local jurisdiction staff to ensure realistic and financially reasonable assumptions.

[18] For more information on the parking assumptions, please refer to *Appendix 5. Parking*.

Key factors and assumptions:

- Local comprehensive plans and zoning provided the basis for the inputs related to housing type, consistent with the region's latest urban travel demand model. This future assumes a higher share of multi-family units, but only 27 percent of new dwelling units in Corvallis metropolitan planning area will be developed in the core districts with the highest potential for mixed-use. Thus, although the MPO densities increase, the share of households in mixed-use remains less than 15 percent under the existing plans analysis.
- CAMPO's 2012 Regional Transportation Plan provided the information necessary for inputs related to parking. Existing parking structures near campus and in downtown Corvallis are extended with a slight increase in parking fees. Additionally, the Good Samaritan Regional Medical Center and the Hewlett-Packard campus are assumed to adopt pricing policies for both workers and visitors by 2035.
- In the absence of specific policies related to mode shift and lack of household survey data, the percentage of auto trips diverted to bicycles and other light vehicles (less than 20 miles roundtrip) was assumed to be 9 percent in 2010 and 12 percent in 2035. This is slightly higher than peer city Eugene in the base year, but with less aggressive future year forecasts.
- Based on conversations with the Corvallis Transit System, the 6.24 transit service miles per capita in 2010 is assumed to grow with population from 374,000 total annual transit service miles in 2010 to 454,000 total annual transit service miles in 2035. This is reflective of the innovative transit utility fee that is indexed to fuel price and sustains the fareless transit system started in 2011.

Table 2E: Key Inputs, Marketing & Incentives

Category	Measure	2010	2035[19]
Marketing & incentives	Workers covered by transportation demand management programs	2.1%	2.2%
	Intelligent Transportation Systems, arterial signals and access management (relative to peer cities)	40% / 50%	40% / 50%
	Households covered by individualized marketing programs	1%	5%
	Car sharing vehicles	2	50
	Households eco-driving	0%	0% / 83.3%*
	Low rolling resistance tires	0%	0% / 82.2%*
	Household miles per gallon optimization	0%	0% / 82.2%*

Public education and marketing programs include teaching motorists to drive as efficiently as possible and maintain vehicles appropriately, as well as building awareness of travel choices. These measures are part of transportation demand management programs that can be implemented by businesses, employers, institutions such as universities and hospitals, or local or regional governments. These strategies can be tailored to a particular audience and can raise public awareness of the benefits of driving less beyond emissions reduction.

Several programs have been successfully implemented in the region, all of which helped to inform the inputs and assumptions related to marketing and incentives. Cascades West Rideshare, a program of the Oregon Cascades West Council of Governments (OCWCOG), conducts transportation options marketing in Corvallis. This includes promoting Drive Less Connect, ODOT's statewide online ride matching program, at workplaces; providing safety information and giveaways at community events; and networking with businesses, civic organizations, community groups, and others to promote awareness related to travel choices. Marketing focuses on a variety of messages, including the promotion of sustainability and emissions reductions. CAMPO and Cascades West Rideshare are both staffed by OCWCOG staff members.

The City of Corvallis also has an active travel options program which conducts similar outreach and partners with OCWCOG on various initiatives, including a new individualized marketing program to launch July 2014 in South Corvallis promoting transit, biking and walking to individual households in the neighborhood through direct-mailings and outreach at community events.

Active partners from the business community include Samaritan Health Services and Oregon State University, which are the two major employers in the Corvallis metropolitan planning area, as well as over a dozen smaller employers active in the City of Corvallis' Employee Transportation

[19] Two different sets of assumptions are provided for state-level policies and actions that may be in place in the year 2035. The first column/figure represents a continuation of existing policies and trends, the second column/figure represents implementation of policies or actions identified in the Statewide Transportation Strategy. The target rules allow metropolitan areas to count actions identified in the Statewide Transportation Strategy (e.g. pay-as-you-drive insurance) when evaluating whether or not the metropolitan area is likely to meet the adopted target. **Denotes inputs allowed per the greenhouse gas target rules adopted by the LCDC (Oregon Administrative Rules 660-044).* Local inputs for the strategic assessment came from adopted policies and staff estimates of reasonable implementation of adopted plans.

Coordinator group, including Hewlett Packard, CH2M Hill, and government agencies such as the Environmental Protection Agency and U.S. Forest Service. Several bicycle advocacy groups are active, including the Mid Valley Bike Club and the Corvallis Bicycle Collective. The nonprofit Corvallis Sustainability Coalition has an active Transportation Action Team that conducts a Car Free Day festival every year. The Oregon State University Sustainability Office and Alternative Transportation Advisory Committee participate in diverse events on campus, from Off-Student Housing Fairs to Earth Day festivals. Enterprise CarShare has offered carsharing options for Oregon State University students, faculty and staff since 2010 and expanded availability to the Corvallis community at large in September 2013.

Key factors and assumptions:

- For workplace transportation demand management programs, data collected from Drive Less Connect and specific employers (e.g. Samaritan Health Services) show that 2.1 percent of workers in the Corvallis metropolitan planning area participated in 2010, which is assumed to rise slightly to 2.2 percent by 2035. This increase is modest and reflects potential program outcomes from a continued status quo. The benefits of increased investments in transportation demand management can be explored in scenario planning.
- For home-based individualized marketing programs, ODOT, OCWCOG and the City of Corvallis are launching a pilot program in July 2014. MPO households in the program are assumed to be 1 percent in 2010 and 5 percent in 2035, projecting that other programs in more areas of Corvallis will follow the pilot program.
- Based on car sharing data from Enterprise, in 2010 two vehicles were available only to Oregon State University faculty, staff, and students. Enterprise estimates 50 cars will be available publicly in 2035 serving the urbanized area.
- Intelligent transportation systems include programs that serve to improve safety and roadway operations. One effect is speed smoothing that leads to increased vehicle fuel efficiency and associated greenhouse gas emissions reduction. For Corvallis, these include signal coordination and access management on arterial roadways.

APPENDIX 3. SENSITIVITY TESTS[20]

Hundreds of model runs were performed as part of sensitivity testing to assess the effect of more ambitious policy actions in the Corvallis region. More specifically, of 455 scenarios run nearly half meet the greenhouse gas reduction goal of 21 percent beyond existing vehicle and fuel changes. Of the 24 policy combinations presented in this report 11 meet this goal. The scenarios presented in Table 3A include those 11 scenarios, as well as Key Path 1 which came close.

Table 3A. Sensitivity Testing Scenarios that Achieve the Region's Greenhouse Gas Reduction Target

	Policy Assumption - Level of Ambition				Results
Key Path Family	**Community Design**	**Marketing & Incentives**	**Vehicles & Fuels**	**Pricing**	**Greenhouse Gas Reduction***
Key Path 1	2	2	1	1	-19.1%**
Key Path 2	1	1	2	2	-21.2%
Key Path 2+	1	2	2	2	-25.0%
Key Path 2+	2	1	2	2	-25.6%
Key Path 2+	2	2	2	2	-29.4%
Key Path 3	3	1	2	1	-21.2%
Key Path 3+	3	2	2	1	-25.7%
Key Path 4	3	1	1	2	-24.9%
Key Path 4+	3	2	1	2	-28.7%
Key Path 4+	3	1	2	2	-30.4%
Key Path 4+	3	2	2	2	-33.9%
Key Path 5	2	2	1	2	-23.9%

* Greenhouse gas of adopted plans beyond vehicle and fuel technology.

** Nearly reaches the GHG reduction goal

A more detailed discussion of the assumptions made in the many sensitivity test runs completed are included in Table 3B, with more detail on Community Design inputs in Appendix 4. Community Design. Level 2 essentially matches the strategies outlined in Oregon's Statewide Transportation Strategy (STS), while Level 3 is more ambitious. Table 3C identifies the effects of these policies implemented in isolation in addition to adopted plans. Some scenarios evaluate the risk if ambitious policies (even those in adopted plans and state law) cannot be achieved or maintained, such as the impact of not expanding parking costs to the Hewlett-Packard campus and Good Samaritan Hospital areas (Parking Level 0), and the repeal of the state's low carbon fuel standards. Table 3C presents not only the greenhouse gas reduction impact, but also other performance measures important to the region.

[20] RSPM is a strategic model initially built to estimate greenhouse gas emissions. The model was supplemented with additional output indicators that are less robust, but sufficient to gauge relative impacts between scenarios. More detailed models should be used in implementation.

Table 3B. CAMPO Sensitivity Test Input Assumptions

					Year 2035 Level of Ambition*			
	Policy Bundle	General Description	Input Description	2010	1 (Adopted Plans)	2	3	Assumptions / Justification
State-Level Actions	1. Vehicles/Fuels	More aggressive turn-over of vehicle fleet to EV and PHEV, as well as reduced share of fleet that is light truck. (Note: requires appropriate land use given battery range limitation).	Household Vehicle Mix	Rule (auto/LtTk) 99%/99%ICE, 0%/0% EV	Rule (auto/LtTrk) 9%/31%ICE, 6%/1% EV)	Rule (auto/LtTrk) 7%/25% ICE, 14%/14% EV		2- STS Vision, beyond GHG Target Rule values
			Light Truck share of household vehicles	37%	30%	20%		2 - Decreased 10 percentage points (Benton Co drop by 9% in STS Vision)
			Commercial Vehicle CNG fuel mix / EV share	0%/0%	0%/0%	50%/50%		3 - 50% CNG starting in 2035 & doubled EV adoption starting in year 2020
	2. Pricing	More aggressive pricing policies implemented at a state level, including VMT fee, Carbon fee, fee to cover social costs, pay-as-you-drive insurance.	Road user fee ($/mile)	0	0	$0.03		2 - STS Vision (\rate set to cover assumed STS Vision road costs)
			Social costs recovered (at $50/CO2e ton)	0	0	69.40%		2 - STS Vision
			Gas tax (dollars per gallon)	$0.424	$0.480	$0.480		
			Electricity costs (dollars per kwh)	$0.080	$0.204	$0.303		2 - STS Vision
			Pay-as-you-drive insurance (% HH)	0	0	99%		2 - STS Vision (at $0.05/mile)
Community Design	3. Alternate Land Use	Changes in future development patterns, including different growth patterns within existing/expanded UGB, different dwelling unit type mix, increases in urban mixed use areas.	Share of MPO DUs in 7 Core Districts	39%	37%	43%		2 - 2010 Urbanized fooprint, and 25% of new units in Corvallis shifted from outer 6 to inner 7 core districts; 3 - Mixed use increased in inner 7 districts (reflects 2015 WalkScore >70).
			Single-family to multi-family ratio (SF:MF)	63:37	59:41	59:41	59:41	
			Population living in mixed use areas	14.4%	14.7%	24%	40%	
	4. Transit Investment	Changes in future transit service levels and cleaner bus fuels and/or electric vehicles.	Transit service miles per capita	6.24 LnMi/Cap	1x	2.4x	4x	2 - STS Vision 3 - Increased to comparable with similar size U.S. cities
			Bus fuel mix Fleet share of electric buses	5% biodiesel 0% electric	20% biodiesel 0% electric	N/A biodiesel 100% electric		2 - CTS estimates 100% electric by 2050, pushed to 2035. Impacts Heavy Duty Vehicle GHG.
	5. Light Vehicle Promo	Changes in bicycle trip diversion, including consideration of future e-bikes and light vehicles	Single occupant vehicle trips diverted to light vehicles (e.g., bicycles, electric bikes)	9%	12%	20%	24%	2 - STS Vision (trips less than 20 miles round trip) 3 - Doubled Adopted Plans diversion
	6. Parking Policies	Changes in parking policies, including expanded parking fee locations (work-focused) or rates, or increase in cash-out/buy-back parking programs.	Parking Coverage (workers/non-work trips)	1.5%/6.5%	17.5%/15%	17.5%/15%	32.5%/15%	3 - Increased work to cover new areas with Cash Out Buy Back programs.
			MPO average parking fee	$3.30 / day	$3.35 / day	$5.00 / day	$5.00 / day	2&3 - roughly 1.5 times adopted plans
			Workers covered by cash out buy back parking	0%	0.8%	0.8%	15%	3 - Significant increase in non-fee employers shifting to Cash Out Buy Back.
Marketing & Incentives	7. Driving Efficiency	Promotion of programs that improve driving efficiency, including increased investment in ITS programs, and programs to promote eco-driving, use of low-roll tires, and household vehicle mpg optimization.	ITS programs (signals/access)	40%/50%	40%/50%	95%/80%		2 - STS Vision
			Household eco-driving	0%	0%	83.30%		2 - STS Vision
			Low-rolling resistance tires	0%	0%	82.20%		2 - STS Vision
			Household Vehicle Fuel Efficiency Optimization	0%	0%	82.20%		2 - STS Vision
	8. Demand Management	Promotion of programs that improve driving efficiency, including increased deployment of TDM (work and home-based programs), increased car-sharing program.	Demand mgmt marketing program participants (share of workers/share of households)	2.1%/1%	2.2%/5%	15%/12%		2 - Use 2010-2035 change in STS Vision (applied to CAMPOs 2010 values)
			Car sharing vehicles	2	50	75		2 - 1.5 times current Enterprise plans for 2035
				Reduced	Adopted Plans	Increased		
Context Setting	**9. Income**	Resiliance of Policy effects under alternative assumptions of economic growth (reflected in state income growth).		0% CAGR	0.7% CAGR	1.1% CAGR		Reduced - No increase over 2010 state income (same purchasing power) Adopted Plans - STS 80-year historic compound average growth rate Increased - 1.5 times Adopted Plans
	10. Fuel Price	Resiliance of Policy effects under alternative future fuel price assumptions.		$2.43	$5.53	$10.00		Reduced - Keep 2010 fuel price (still grows with inflation) Adopted Plans - STS based on 2005 IEA high forecast Increased - Approximately doubling / Central Lane

Note: All monetary values are in 2005 dollars, accounting for inflation

*Levels: 1 = Original 2035 inputs / adopted plans
2 = More ambitious
3 = Most ambitious

Table 3C. CAMPO Sensitivity Test Results for Policy Actions in Isolation

			2035 Output Measures											
			Environment				Land Use	Mobility			Economy			
Bundle	Sensitivity Test	Description	2005-2035 GHG Rule Reduction	Annual GHG Per Capita (metric tons)	Daily Air Quality Pollutants (million kg)	Annual Fuel Gallons (millions)	% Pop in Mixed Use	Daily VMT Per Capita	Annual Bike Miles Per Capita	Annual Walk Trips Per Capita	Annual Auto Delay Per Capita (hrs)	Annual Total Truck Delay (hrs)	Annual Travel Costs Per Household
Adopted Plans			-2.1%	0.85	7.08	13.62	14.7%	22.7	194	134	23.0	169.5	$ 11,081
State-Level Actions	1. Vehicles/Fuels	No Low Carbon Fuel Stds	+18.4%	1.03	7.09	13.61	14.7%	22.7	194	134	22.9	169.5	$ 11,076
		Vehicle Fleet	-7.6%	**0.80**	**6.83**	**12.51**	14.7%	22.8	194	134	23.1	170.3	**$ 10,882**
		Light Truck	-5.3%	**0.82**	7.12	13.15	14.7%	22.8	194	134	23.2	170.5	$ 10,963
		Commercial Vehicle Fleet/Fuels	-3.4%	0.84	7.11	13.63	14.7%	20.8	194	134	23.0	169.9	$ 11,071
	2. Aggressive Pricing	VMT Fee, Social Cost Fee	-2.1%	0.85	7.09	13.64	14.7%	22.7	194	134	22.9	169.5	$ 11,039
		PAYD Ins, Renewable Electric	-1.9%	0.85	7.10	13.66	14.7%	22.7	194	134	23.0	169.5	**$ 9,839**
Community Design	3. Land Use	Channel Growth	-4.1%	0.83	6.97	13.36	**19.2%**	22.2	192	**143**	**22.3**	**166.9**	$ 10,932
		+ Increased Mixed Use	-5.1%	**0.82**	**6.87**	13.20	**29.6%**	**22.0**	188	**147**	**21.9**	**165.3**	$ 10,908
	4. Transit Investment	Transit - 0.8x pop growth	-2.0%	0.85	7.11	13.65	14.7%	22.7	194	134	23.0	169.9	$ 11,068
		Transit - 2.4x	-3.4%	0.84	6.99	13.44	14.7%	22.4	193	134	**22.4**	167.4	$ 10,952
		Transit - 4x	-5.9%	**0.82**	**6.81**	13.09	14.7%	**21.8**	191	**135**	**21.6**	**163.8**	**$ 10,757**
	5. Light Vehicle Promo	Bike diverts 12%	-3.9%	0.83	6.97	13.38	14.7%	22.3	**323**	134	22.4	167.2	$ 10,988
		Bike diverts 20%	-4.7%	**0.83**	6.93	**13.26**	14.7%	22.1	**388**	134	**22.2**	**166.3**	$ 10,971
	6. Parking Policies	2010 Fee areas	-1.2%	0.86	7.17	13.75	14.7%	22.9	193	134	23.4	171.3	**$ 10,446**
		Increase Parking Rate 1.5x	-3.3%	0.84	6.99	13.47	14.7%	22.3	194	134	22.5	167.5	$ 11,374
		+Add CashOut areas	-4.6%	**0.83**	**6.87**	**13.28**	14.7%	**22.0**	195	133	**21.9**	**165.3**	$ 12,032
Marketing & Incentives	7. Driving Efficiency	ITS	-2.1%	0.85	7.10	13.63	14.7%	22.7	194	134	22.5	**164.1**	$ 11,080
		EcoDr ,LowRoll,HH Optim	-4.0%	**0.83**	7.10	**13.36**	14.7%	22.7	194	134	23.0	169.6	$ 10,983
	8. Demand Management	Car-sharing	-2.7%	0.84	7.05	13.54	14.7%	22.5	192	134	22.8	168.7	$ 11,000
		TDM (home and work)	-2.6%	0.85	7.06	13.56	14.7%	22.6	194	134	22.8	169.0	$ 11,065
Context Setting	9. Income Growth	Inc growth - 1/2	-11.0%	0.77	6.34	**12.39**	14.3%	20.7	185	132	19.8	**119.2**	$ 10,160
		In Growth - 1.5x	+2.1%	0.89	7.39	14.21	14.3%	23.6	198	135	24.5	201.0	$ 11,398
	10. Fuel Price	Fuel Cost = 2010 ($2.50)	+1.3%	0.88	7.31	14.10	14.7%	23.4	194	134	24.1	174.1	**$ 9,961**
		Fuel Cost doubles ($10)	-11.0%	0.77	6.47	**12.38**	14.7%	20.7	194	134	20.1	**158.0**	$ 12,252

2005-2035 GHG Rule Reduction	2005-2035 Reduction in GHG per capita for light duty vehicles on MPO area roads (comparable to MPO GHG Target Rule)
Annual GHG Per Capita (metric tons)	Annual per capita metric tons of CO2e emitted by MPO light duty vehicles
Daily Air Quality Pollutants (million kg)	Daily million kilograms of HC, CO, NOx emitted by MPO residents
Annual Fuel Gallons (millions)	Annual gasoline equivalent gallons of fuel consumed by MPO light duty vehicles
% Pop in Mixed Use	Proportion of MPO population living in urban mixed-use neighborhoods
Daily VMT Per Capita	Average daily per capita VMT of MPO households
Annual Bike Miles Per Capita	Average annual per capita bike miles of MPO households
Annual Walk Trips Per Capita	Average annual per capita walk trips of MPO households
Annual Auto Delay Per Capita (hrs)	Annual hours per capita of light duty vehicle delay on MPO area roads
Annual Total Truck Delay (hrs)	Annual hours of truck delay on MPO area roads
Annual Travel Costs Per Household	Average annual MPO household vehicle operating cost (including parking), ownership costs, and social costs (in 2005$)

Forecasts of various "context" variables are prescribed in the greenhouse gas target rule, which resulted in the 21 percent per capita reduction target. These variables are far from certain, such as the future of population, fuel prices, and income/economic growth. Figure 3A identifies the impact of these variables on the adopted plans, as well as the five key paths noted in the report, pointing out the resilience of various future policies to alternative assumptions in these variables. Generally, higher incomes and lower fuel price lead to more travel and greenhouse gas emissions, but the effects vary depending on the path's policy mix. The key paths (excluding adopted plans) have a greenhouse gas reduction between 19 and 23 percent, which can vary from a high of 34 to 43 percent to a low of 11 to 16 percent with other assumptions on these context variables. In fact, the combination of high fuel price and high income nearly meets the goal with only adopted plans (19 percent).

Figure 3A. Sensitivity to Context Variables

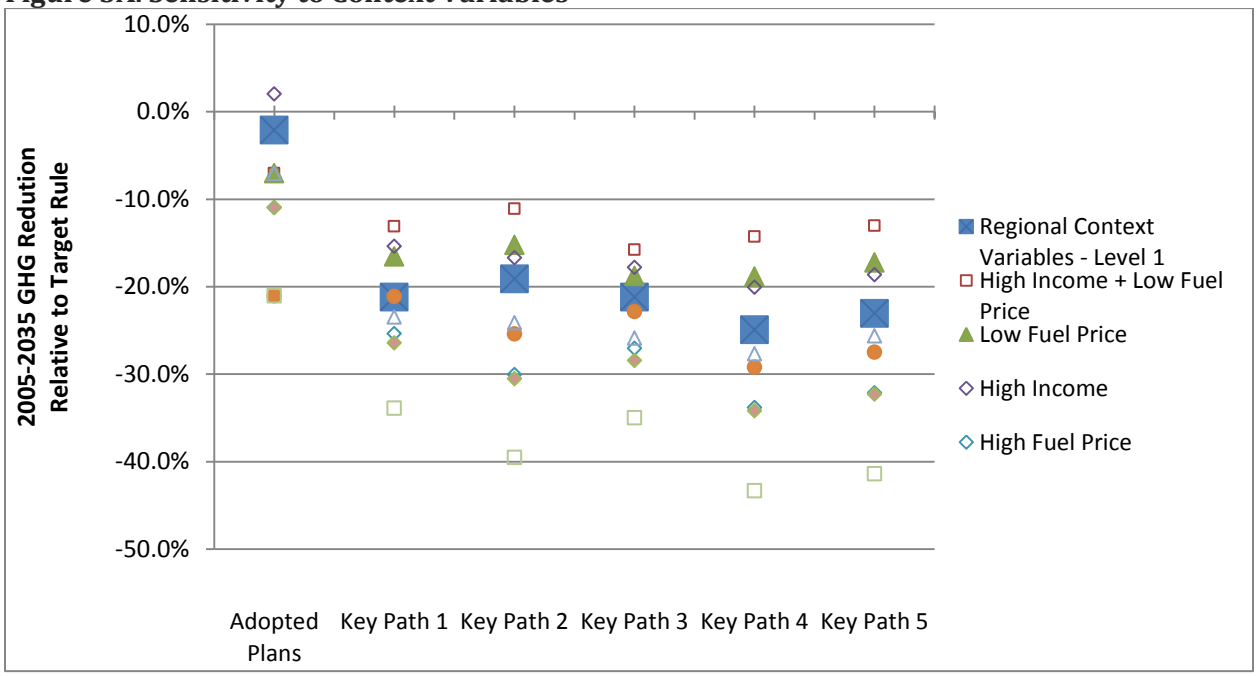
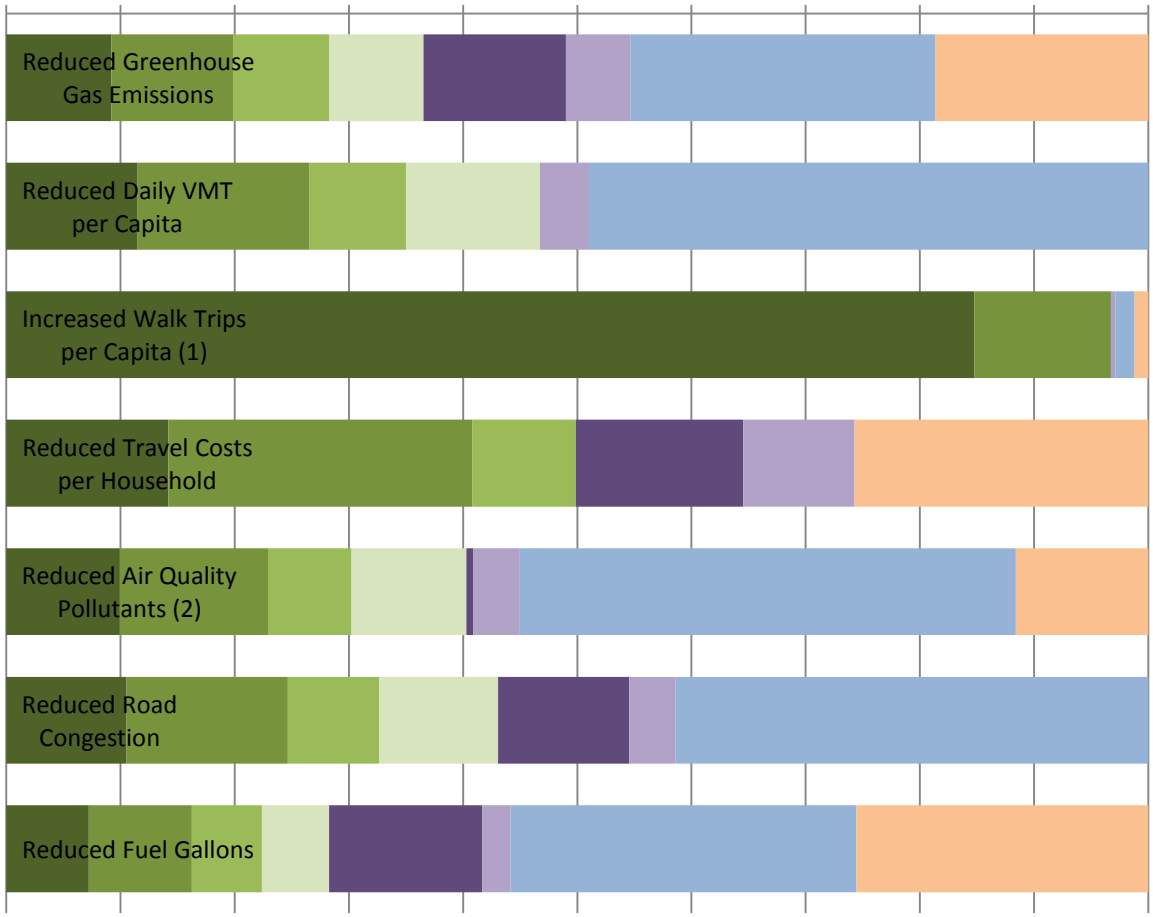


Figure 3B shows the estimated relative impact of different policies (colors on various outcomes measures), which are represented as bars. The bars have been scaled to a consistent size for easy comparison of outcomes with different units and different absolute impacts. For instance, to maximize walk trips or mixed-use communities, future plans should reflect community design strategies that go beyond existing plans. In contrast, to maximize the reduction of household transportation costs, driving efficiency programs, such as intelligent transportation system and vehicle and fuel technologies are more effective than community design. Additionally, some policies work against various outcomes, such as pricing and community design (i.e. parking) policies, which increase household transportation costs. Likewise, an emphasis on vehicles and fuel technologies and driving efficiency can lower travel costs, leading to an increase in vehicle miles traveled (known as the rebound effect) and thereby reduce associated delay benefits.

Figure 3B. Relative Impact of Policies on Various Outcomes, Beyond Adopted Plans



Notes:

(1) In its current form, the walk model is primarily based on land use changes, without adequate sensitivity to pricing and transportation demand management measures.

(2) Air Quality Pollutants is based on a simplified model reviewed by the Oregon Department of Environmental Quality and the U.S. Environmental Protection Agency, which is driven by miles driven on fueled vehicles, without direct linkage to fuel gallons.

(3) Vehicles and Fuel in the sensitivity tests represent more aggressive technology changes beyond the significant change embodied in Adopted Plans scenario.

(4) Some policies work against these outcomes, such as pricing and parking policies which increase household costs as well as Vehicles/Fuels and ITS/EcoDriving that by lowering costs lead to increased VMT and associated road congestion.

APPENDIX 4. COMMUNITY DESIGN

For the CAMPO strategic assessment sensitivity tests, more ambitious community design policy bundles were analyzed beyond that of adopted plans using the Regional Strategic Planning Model (RSPM). This section documents the assumptions in these scenarios in regards to land use, parking, bicycles, and transit. These assumptions will be particularly helpful to provide a context of what is reasonable for the region in light of other communities within and outside of Oregon, if these assumptions need to be updated as part of any future scenario planning effort.

Land Use

The adopted plans land use scenario (Level 1) was developed based on the latest forecasts used in the region's update of their urban travel model transportation analysis zones (TAZ) forecasts, which will be used in the next regional transportation plan. To simulate more ambitious land use forecasts the goal was to increase mixed-use areas in central areas. This has the effect of reducing auto ownership, which reduces costs and increases use of healthy active modes. It also increases the effectiveness of work and home-based travel demand management programs which further reduces vehicle miles traveled.

The following assumptions were made to develop the Level 2 land use scenario:

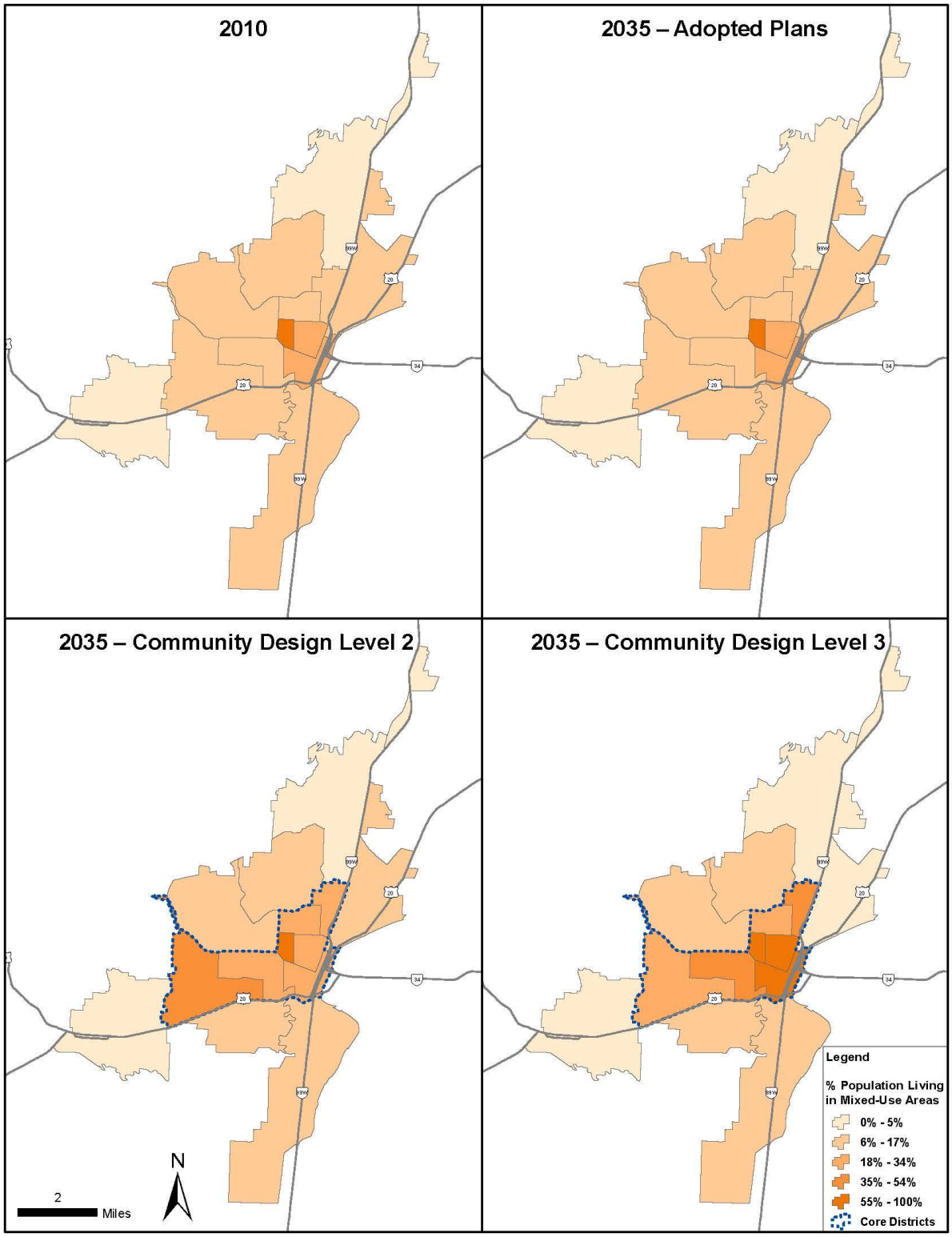
1. Assume no increase in the urbanized land area after 2010 (1,400 acres are not added to the urban footprint)
2. Assume all new units after 2010 are accommodated on urbanized land. A total of 2,017 (40% of new units) were shifted to urbanized areas in 2035.
3. Shift 50 percent of new dwelling units planned for six outer districts to seven central core districts with high mixed-use potential (equal share to each district). The seven core districts are depicted in Figure 4A. No changes were made to Adair Village or Philomath districts. This affected 1,983 new units in 2035.

The following additional assumptions were made to develop the Level 3 land use scenario:

1. Mixed-use coverage was increased in the seven core districts. To do so assumed increased land use mixing to provide more local destinations, as well as design considerations to make the area more amenable to non-auto modes. A higher mixed-use assumption was assumed in 2050 reflecting areas that currently receive a walkscore of 70 or above (www.walkscore.com) in 2010. 2035 mixed use assumptions were a linear interpolation of the 2010 and 2050 values.

The effect of these assumptions by district is shown n Figure 4A.

Figure 4A. Percent of Population Living in Mixed-Use Area



Parking

The adopted plans parking assumptions (Level 1) was developed based on analysis done for the CAMPO Regional Transportation Plan. It included a significant increase in the locations where workers and non-work trips would be subject to a parking cost.[21] Specifically, new parking fees were imposed in the Hewlett-Packard campus area and the Good Samaritan Hospital area (Figure 4B), both with active travel demand management programs today. The cost for parking was capped at $5 per day, resulting in a metro-wide average parking fee of $3.30. This effectively increased the number of 2035 workers covered from 15 to 17.5 percent and the number of non-work trips from 6.5 to 15 percent, even after assuming only 60 percent of all possible trips to these areas would face the new fee.

More ambitious parking policies provide a cost incentive to use alternate modes for the daily commute, but must balance business' competing interest to not turn away customers with another fee.

The following assumptions were made to develop the more ambitious parking policy scenarios:

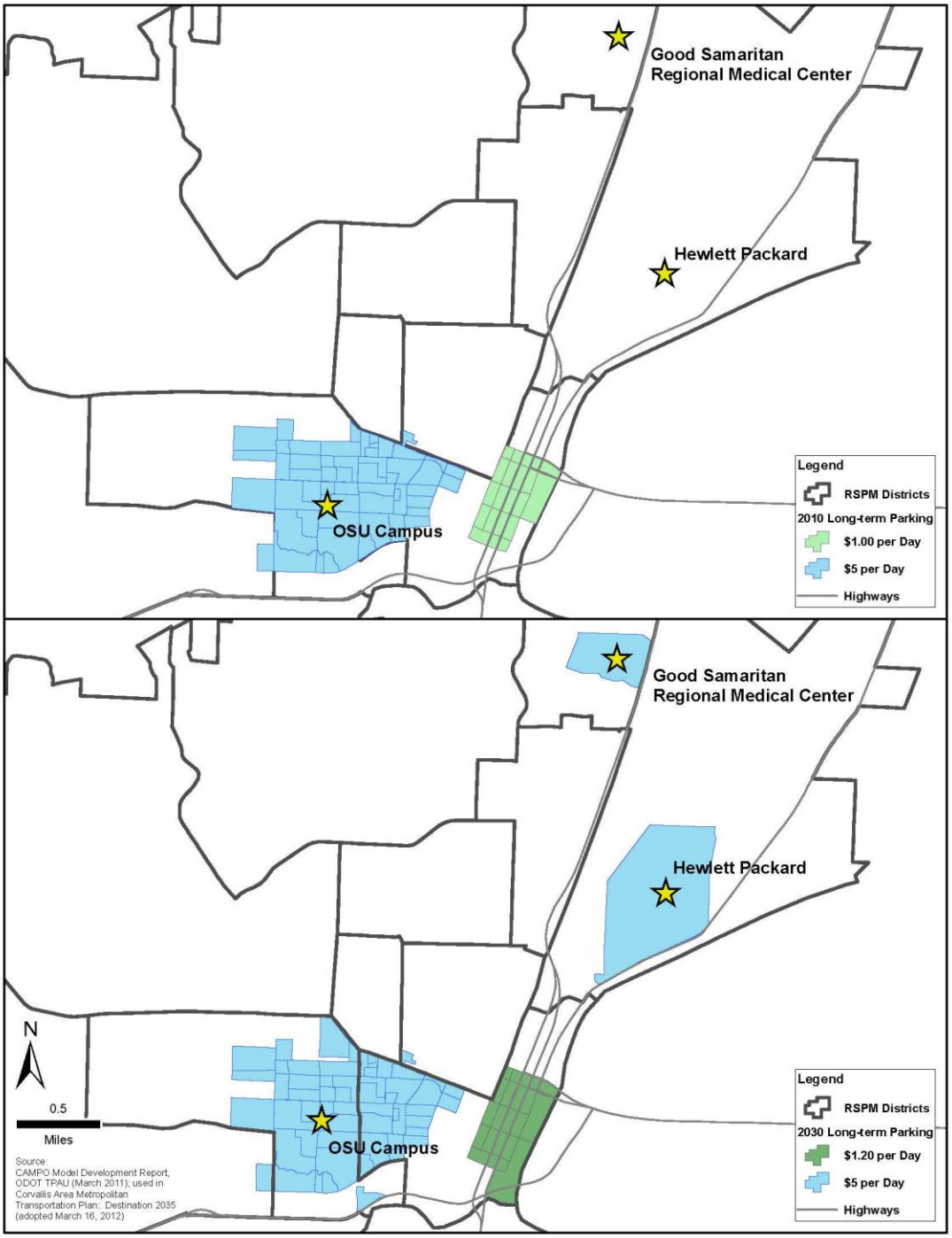
Level 2: The locations of parking fees did not change, but the average metro-wide cost for parking increased to $5 per day (in 2005 dollars). This is less than some ambitious Portland Metro scenarios which assume up to $7.50 day.

Level 3: This level assumed the implementation of a significant cash-out/buy-back parking policy. In this case, 15% of the workers in the region, outside of areas that currently face a fee, would participate in the program. In these more suburban locations employers typically pay indirectly for land to provide free parking. Under the program, which could work much like California's Cash-out law[22], employers meeting certain size thresholds would be required to offer their employees a cash allowance in lieu of a parking space. If the employee opted instead to use alternative modes, they are entitled to pocket the cash equivalent of the benefit. This essentially shifts the cost burden to the employee, providing a market-based incentive to choose alternative modes.

[21] In June 2014, shortly before the completion of this strategic assessment, the City of Corvallis adopted more ambitious parking policies in the downtown area. As of the writing of this report, a citizen desiring to overturn the City Council decision filed the required paperwork for a referendum.

[22] California's Parking Cash-out Law implemented in 1992. For years, negative tax implications limited the implementation of the law. But in 1998, federal legislation fixed this problem. http://www.arb.ca.gov/planning/tsaq/cashout/cashout.htm

Figure 4B. Comparison of 2010 Parking Costs and 2030 Assumption



Bicycle Promotion

In the RSMP, bicycle promotion is represented as the level of diversion of single occupancy vehicle (SOV) trips to light vehicles, including bicycles, electric bicycles, segways, and other light vehicles. The adopted plans assumptions of diversion of trips less than 20 miles round trip were developed based on a comparison of the region's cycling goals relative to peer cities in Oregon. Portland Metro assumed an increase from 9% to 10-20% between 2010 and 2035. The City of Eugene assumed a jump from 7.7% to 15-30%, respectively. The 2010 base year data is based on 2011 Oregon Household Survey data for these two communities, which is unavailable in the Corvallis metropolitan planning area which opted out of the effort. In lieu of hard data, the scenario assumes a slightly higher base year value than Central Lane, given a higher commute bike share in the 2010 American Community Survey. But the growth over time was less than Central Lane, because the Corvallis metropolitan planning area lacks the specific mode shift policies. The adopted plans scenario assumptions for the CAMPO strategic assessment were an increase from 9% to 12% between 2010 and 2035.

The following assumptions were made to develop the more ambitious light vehicle/bicycle promotion policy scenarios:

Level 2: Light vehicle diversion was assumed to increase to the level specified in the Statewide Transportation Strategy vision. This was a 20% light vehicle diversion goal.

Level 3: Light vehicle diversion was assumed to double over the assumptions in the adopted plans scenario. This leads to a 24% light vehicle diversion goal.

For context, several tables provide data from Portland Metro background research for their scenario planning effort. Table 4A includes bicycle mode share rates and targets in other U.S. and international cities. Table 4B provides a summary of U.S. cities (population of 65,000 or more) with the highest bicycle mode share. Table 4C provides comparable data for a sample of international cities.

Table 4A: U.S. and International Bike Mode Share and Targets

City or region	Current bike mode share	Adopted or defined bike mode share target
Portland, OR	6% (2009 ACS) 7% (2010 Auditor report work trips)	30% of work trips (Draft Portland Plan)
Corvallis, OR	9.4% (2000 Census)	*None*
Davis, CA	14% (2000 census)	25% of all trips by 2012 (adopted in 2009 bike plan)
Boulder, CO	12.3% (2009 ACS) 7% (2000 census) 15.9% (2009 travel diary survey - includes all trips, not just commute)	Increasing bicycle mode share (all trips) at least 4% between 1994 (11.3%) and 2020 (1996 bicycle system plan). (Goal has been met according to travel diary survey results.) Other related targets are: 75% non-SOV mode share by 2020 (2008 Transportation plan) zero growth in VMT from 1994 levels.
Eugene, OR	10.8% (2009 ACS)	Approximately 22% (Draft bike/ped plan has defined a target of doubling bike mode share by 2020)
Seattle, WA region	0.90% (2009 ACS) Seattle-Tacoma-Bellevue MSA	*None*
San Francisco, CA region	1.5% (2009 ACS) SF-Oakland-Fremont MSA	None, but they have a goal to increase active transportation activity per day from 8 to 15 minutes by 2040
Nashville, TN region	0.10% (2009 ACS) Nashville-Davidson-Murfreesboro-Franklin MSA	None
Sacramento, CA region	1.6% (2009 ACS) Sacramento-Arden-Arcade-Roseville, MSA	Double the percentage of all trips made by bicycling and walking in the Sacramento Region from 6.6%in 2000 to 13.2% of all trips by 2020. (Modeled data)
Copenhagen, Denmark	37%	50% by 2015

Table 4B: Top U.S. Cities Commuting Bicycle Mode Share

(Only cities with 65,000 + population[5])

City	Population	Bicycle Mode Share
Boulder ,CO	100,160	12%
Eugene, OR	153,275	11%
Fort Collins, CO	138,722	10%
Berkeley CA	102,802	9%
Cambridge, MA	108,776	9%
Missoula, MT	68,875	7%
Gainesville, FL	116,615	6%
Portland, OR	566,606	6%
Somerville, MA	76,489	5%
Madison, WI	235,410	5%
Minneapolis, MN	385,384	4%
Boise, ID	205,698	4%

Source: American Community Survey; American Community Survey only includes cities with populations greater than 65,000

Table 4C: Sample of International Cities Bicycle Mode Share

City	Population	Bicycle Mode Share
Groningen	188,000	57%
Delft	96,000	43%
Houten	46,000	42%
Amsterdam	750,000	40%
Copenhagen	520,000	37%
Utrecht	300,000	33%
Bogota	7,500,000	5%
Sydney	4,500,000	2%
Brisbane	2,000,000	2%

Transit

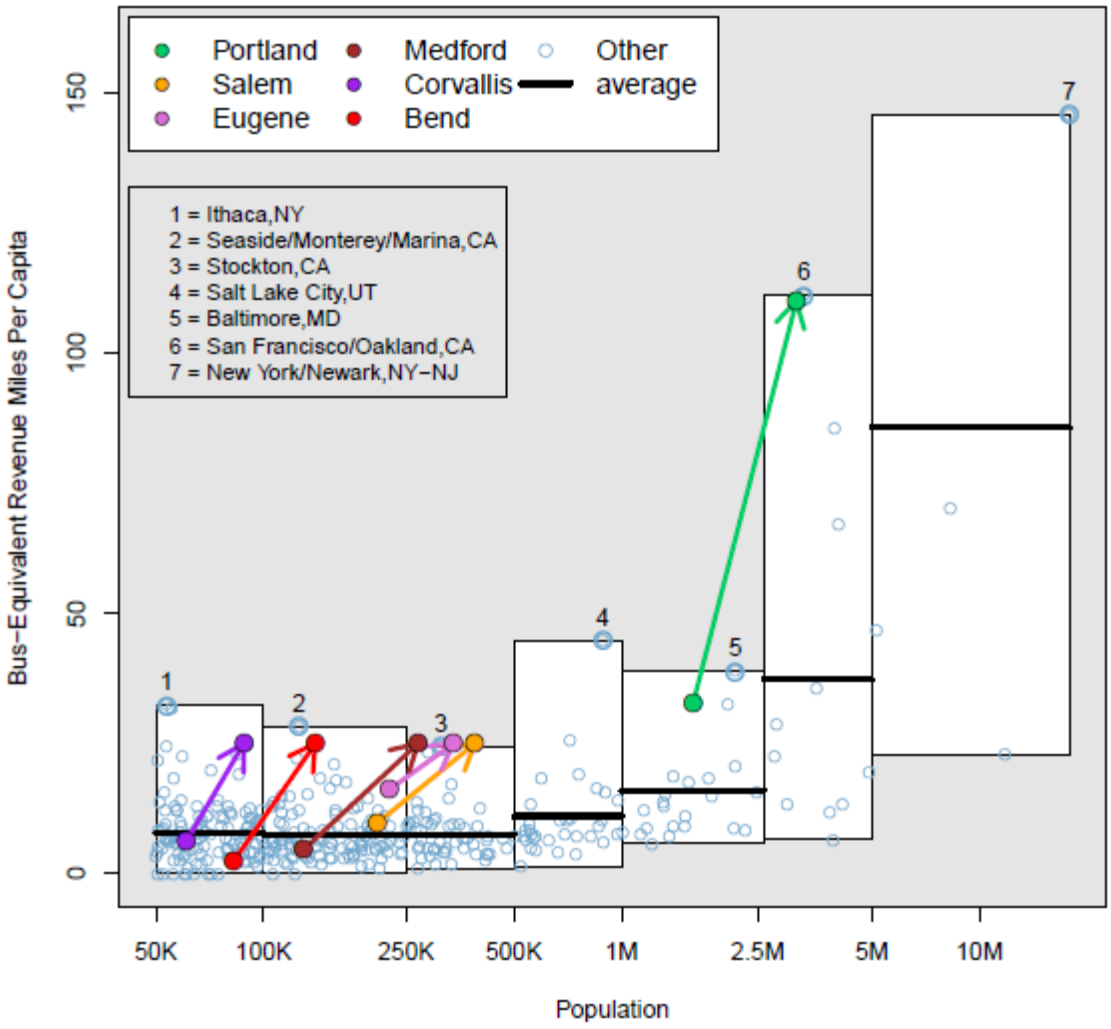
In the RSPM, transit is represented as bus service miles per capita, counting only fixed route service. The adopted plans assumptions of transit were developed based on input from the Corvallis Transit System (CTS). They estimated a growth in service of approximately 25% by 2035, which was roughly consistent with population growth. Further support for the ability of the transit service to keep up with population growth resides in the transit utility fee that provides some funding assurance.

The following assumptions were made to develop the more ambitious transit service levels:

Level 2: The Statewide Transportation Strategy vision assumes a service near the top of the range (80%) for all U.S. metropolitan areas in the same size category. Figure 4C shows the assumed 2050 population (entire urbanized portion of each metro area) and public transit service levels for each of Oregon's metropolitan areas, relative to these U.S. peer cities. Median values are shown by horizontal black lines, and top cities in each group are noted in the legend. Rates of growth in per capita public transit service were calculated from these values.

Level 3: Assumes the 2050 Statewide Transportation Strategyvision, which assumes a four-fold increase in transit service per capita, based on population growth and 80% of service in top U.S. peer cities of that size, can be implemented in 2035 rather than 2050.

Figure 4C. U.S. Metropolitan Area Transit Service Levels in 2009 by Population Size
(Present and Assumed Future Service Levels for Oregon's Metropolitan Areas)



APPENDIX 5. GLOSSARY

Alternative fuels: Fuels that serve as a cleaner alternative to gasoline, including but not limited to: biodiesel, liquefied or compressed natural gas, electricity, hydrogen, ethanol, and methanol.

Bicycle sharing program: A membership based system of short term bicycle rental.

Biofuel: Any alternative fuel whose energy is derived from carbon fixation, which results in lower carbon emissions per unit of fuel consumed. Examples include biodiesel (a fuel derived from animal fats and vegetable oils) and ethanol.

Carbon fee: A conceptual fee that could be assessed on users of the transportation network. Rather than the gas tax (which is assessed per gallon of gas consumed) a carbon user fee would be assessed per unit of carbon emissions produced in the operation of the vehicle.

Carsharing: A membership-based system of short-term automobile rental. In Oregon, programs are in place in Portland, Eugene, and the Oregon State University campus in Corvallis.

Eco-driving: A driving technique that reduces fuel consumption, reduces emissions, and improves automobile efficiency by accelerating and decelerating smoothly, avoiding excess idling, driving at or under the posted speed limit, and keeping tires properly inflated.

Employer-based commute programs: Work-based travel demand management programs that can include transportation coordinators, employer-subsidized transit pass programs, ride-matching, carpool and vanpool programs, telecommuting, compressed or flexible work weeks and bicycle parking and showers for bicycle commuters.

Vehicle mix: The composition of vehicles on the road. Can include the percentage of vehicles classified as automobiles compared to the percentage classified as light trucks (weighing less than 10,000 lbs.), or the share of vehicles by power train (e.g. internal combustion engine, hybrid electric, plug-in/hybrid electric, or all electric vehicle types).

Vehicle turnover: The rate of vehicle replacement or the turnover of older vehicles to newer vehicles; the current turnover rate in Oregon is 10 years. The Statewide Transportation Strategy and greenhouse gas target rule assumes a more aggressive 8 year turnover.

Greenhouse gas (GHG): Emissions that trap heat in the atmosphere, contributing to global climate change. Some greenhouse gases occur naturally and some are emitted to the atmosphere through natural processes and human activities. Atmospheric gases such as carbon dioxide, methane, and nitrous oxide contribute to global climate change by absorbing infrared radiation produced by solar warming of the Earth's surface.

House Bill 2001 (Oregon Jobs and Transportation Act): Passed by the Legislature in 2009, this legislation provided specific directions to some metropolitan areas to undertake scenario planning and develop two or more land use and transportation scenarios that accommodate planned population and employment growth while achieving the GHG emissions reduction targets approved

by LCDC in May 2011. For more information go to: http://www.leg.state.or.us/09reg/measpdf/hb2000.dir/ hb2001.en.pdf.

Individualized marketing: Travel demand management programs focused on individual households. IM programs involve individualized outreach to households that identify household travel needs and ways to meet those needs with less vehicle travel. Examples include regional maps, walk/cycle activities, pedometers, and coupons for businesses within walking distance.

Intelligent transportation systems (ITS): Refers to various programs that reduce congestion while improving safety driving fuel efficiency, promoting smoother speeds, less idling, and less time spent in stop and go traffic. For this effort, ITS includes ramp metering and incident management on freeways (although Corvallis does not have any freeways), and signal optimization and access management on arterial roadways.

Light vehicles: Bicycles, electric bicycles, Segways,and similar light-weight vehicles.

Light duty vehicles: Refers to vehicles under 10,000 pounds gross vehicle weight (GVW). Generally includes cars, sport utility vehicles, and pick-up trucks, as well as smaller commercial vehicles, such as panel vans and some delivery trucks.

Low rolling resistance tires: Tires designed to reduce fuel consumption by reducing energy losses due to tire deformation as the tire rolls down the road.

Metropolitan Planning Organization (MPO): An association of local governments, per US Code Title 23, in charge of transportation planning and programming for the area. Oregon has nine MPOs, representing Portland Metro, Salem-Keizer, Corvallis Area, Bend, Central Lane, the Rogue Valley, Albany Area, Middle Rogue (Grants Pass area), and Milton-Freewater.

Mixed-use neighborhoods: Refers to portions of urban areas where commercial (e.g., retail, office, entertainment) and non-commercial uses (such as residential space), are located near one another. Different uses may be mixed vertically (e.g., housing above retail) or horizontally (e.g., housing within walking distance of retail). Mixed-use neighborhoods reduce demand for motorized transportation by locating common destinations near residences where pedestrian and bicycle access is convenient.

Parking cash-out program: Program intended to reduce vehicle trips and increase the use of alternative travel modes by offering employees monetary incentives for relinquishing their parking space. Also referred to as an employer buy-back program.

Pay-as-you-drive insurance (PAYD): A method of insuring vehicles in which premiums are based in large part on the vehicle miles traveled within a given period of time. PAYD is also sometimes referred to as distance-based, usage-based, or mileage-based insurance.

Rideshare program: Programs such as carpools and vanpools, in which multiple travelers ride together in the same vehicle.

Road User Fee: An approach to funding the transportation system that charges drivers a per mile fee.

Scenario planning: A planning method that analyzes the impacts of trends, actions and policies to estimate their likely impact on future conditions. Scenario planning is often performed at the state or regional level to evaluate various future alternatives against a set of established community priorities.

Senate Bill 1059: Oregon state legislation aimed at reducing greenhouse gas emissions from transportation. This bill also includes approval of a statewide transportation strategy on greenhouse gas emission reduction goals. (2010 Oregon Legislature).

Single-occupant vehicle (SOV): A vehicle containing only one occupant.

Social costs: Social costs refer to the unintended consequences of transportation, such as carbon emissions that contribute to climate change, air pollution that causes health and environmental problems, as well as other undesirable effects such as safety, noise, water pollution, and the costs of maintaining secure energy sources globally.

Statewide Transportation Strategy (STS): The STS defines a vision for Oregon to reduce its GHG emissions from transportation systems, vehicle and fuel technologies and urban form by 2050. For more information go to: http://www.oregon.gov/ODOT/TD/OSTI/Pages/STS.aspx.

Transportation demand management (TDM): The application of techniques that affect when, how, where, and how much people travel, done in a purposeful manner by government or other organizations. TDM techniques, often exercised at places of work, include education, policies, regulations, and other combinations of incentives and disincentives, and are intended to reduce single occupant vehicle trips on the transportation network.

Travel demand (modeling/forecasts): Travel demand modeling refers to the analytical estimation of future travel volumes and patterns performed with detailed computer models that use socioeconomic data and other key indicators to predict the number of trips that will be made in a region, where people will go, and the mode and route of travel they will take to get there.

Urban growth boundary (UGB): Under Oregon law, each city or metropolitan area in the state has a UGB that separates urban land from rural land. UGBs control urban expansion/sprawl into rural lands and promote efficient use of land, public facilities and services inside the boundary.

Vehicle miles traveled (VMT): Refers to the total distance traveled by motor vehicles in a specified area for a given period of time.

APPENDIX 6. RESOURCES AND LINKS

Oregon Sustainable Transportation Initiative:
http://www.oregon.gov/ODOT/TD/OSTI/Pages/index.aspx

Statewide Transportation Strategy: http://www.oregon.gov/ODOT/TD/OSTI/pages/sts.aspx

Scenario Planning Guidelines: http://www.oregon.gov/ODOT/TD/OSTI/pages/scenarios.aspx

Metro's Climate Smart Communities: http://www.oregonmetro.gov/public-projects/climate-smart-communities-scenarios

Central Lane Scenario Planning: http://www.clscenarioplanning.org/

Cool Planning Handbook:
http://www.oregon.gov/LCD/TGM/docs/cool_planning_handbook.pdf?ga=t

Metropolitan Greenhouse Gas Reduction Targets:
http://www.oregon.gov/LCD/docs/rulemaking/trac/660_044.pdf

Oregon Global Warming Commission: http://www.keeporegoncool.org/

Governor's 10-Year Energy Action Plan:
http://www.oregon.gov/energy/pages/ten_year/ten_year_energy_plan.aspx