

Transportation and Land Use Roadmap to 2020

Report to the Oregon Global Warming Commission

The following report, *Transportation and Land Use (T&LU) Roadmap to 2020*, was developed by the T&LU Technical Committee of the Oregon Global Warming Commission (OGWC). Technical Committee members are listed in Appendix A of this report.

I. PURPOSE AND CONCLUSIONS

The purpose of the Committee was to develop and prioritize a set of strategies and actions for reducing greenhouse gas emissions from transportation and land use choices to meet Oregon's 2020 greenhouse gas (GHG) goal. The recommendations will be considered by the Oregon Global Warming Commission for inclusion in the Interim Roadmap to 2020/Report to the new Governor and Legislature, to state agencies, and to Oregon's Congressional delegation. Recommendations may also guide private sector investments and university research agendas.

After several months of deliberations the Committee narrowed the Key Actions from a possible 120 actions down to 12. Appendix B contains the consolidated Inventory of Actions developed by T&LU Technical Committee. The Committee's "Clean Dozen" are more fully described in Section III – Key Actions For 2020 of this report. In summary they are:

1. Change the Way We Fund Transportation
2. Develop New Funding Sources
3. Expand Urban Transit
4. Create Complete Neighborhoods
5. Keep Urban Footprints Compact
6. Move Freight the Low-Carbon Way
7. Plan to Mitigate GHGs and Adapt to Climate Change
8. Expand Intercity Transportation Options/Choice
9. Reduce Demand by Increasing Options
10. Manage and Price Parking
11. Support Electric Vehicles
12. Adopt Low Carbon Fuel Standard

The Committee noted that the greater part of its recommendations are focused on transportation and land use choices in Oregon's urban areas, although many are applicable statewide (more efficient freight and intercity transit, along with access to electric vehicle technologies, offer opportunities to urban and rural Oregonians alike). The focus was neither accidental nor reflecting an urban bias; rather it was recognizing that the majority of efficiency gains and greenhouse gas savings must be contributed by residents of Oregon's cities, where densities make options like

transit more cost-effective and feasible. By contrast, access to shopping and services in many of Oregon's smaller communities is already relatively clustered and efficient.

II. FUTURE STATEMENTS

The following *Future Statements* are intended to describe what the year 2050 might look like with carbon reduction in alignment with Oregon State goals, based on the implementation of the Actions for 2020 noted above and throughout this document (i.e. back-casting exercise from 2050). It is critical to align these actions with our 2050 visions recognizing that these actions can be either enabling (funding shifts) or constraining (land use and other actions reducing VMT/demand) over the long-term. The Committee used these statements to guide our development of present day key actions that need to occur by 2020. The statements are categorized into four topic areas:

- How We Move Goods
- How We Move People
- How We Use Land
- How We Make Transportation Choices, and Fund Them

How We Move Goods in Oregon in 2050

Oregon's economy remains trade-dependent and export-led, and the transportation system serves the engines driving the economy, supporting the growth of family-wage jobs. The system is viewed as moving people and goods rather than vehicles; and the design, planning, development, and usage of transportation reflects that shift. Market forces in the form of customer demand, cost reductions, and improved efficiencies and technology drive reduction in GHG emissions from freight movement. Awareness of emissions and opportunities to reduce costs are second nature to front-line staff operating machinery and vehicles in the movement of freight. Policy decisions take a systems approach and consider safety, economics, and GHGs.

Policy

Land has been preserved and (re-)zoned for industrial use on, adjacent to, and near highway interchanges and freight transportation corridors, where this would improve efficiency of freight movement, multiply intermodal opportunities and efficiencies, and reduce total vehicle miles traveled by trucks in Oregon. This also has enabled distribution and logistics complexes to be established at or near the ports of Morrow and Umatilla with product being shuttled between Portland and the mid-Columbia by barge.

Federal regulations implemented in 2007 and beyond regarding heavy-duty diesel engines have had a substantial impact as the trucks and engines built immediately prior to new regulations have been completely retired or replaced. Public policy requires manufacturers to improve the efficiency and reduce the emissions of truck engines through the use of market-based approaches.

As rail is usually more fuel-and-carbon-efficient for overland freight, and where rail is an option, land use planning has anticipated a need to better integrate freight rail. Long-range land use plans facilitate freight rail movement by supporting the development of industrial parks and "freight villages" adjacent to rail ramps where loads can be consolidated for shipment by rail or broken up

for distribution. Markets for increased use of short line services have been identified and developed, and investments in infrastructure improvements have been funded.

Operations

All cities, counties, and MPOs working with the trucking industry have identified viable, important freight connectors, arterials, and routes. All signals are timed on these routes to allow large trucks to pass through without stopping while driving the speed limit. This reduces idling and consequently fuel consumption and GHG emissions. Freight vehicles of all kinds operate with limited or no idling.

Both US and international air space is opened up to allow flights (both cargo and passenger) to fly the most direct route possible between airports. Operations will be highly organized so that take-offs and landings can be managed in a way that allows planes to use very little fuel on descent and final approach. The airplanes themselves are fueled by lower-carbon fuels.

Design

All undivided roads have adequate passing and climbing lanes to reduce queuing of trucks and cars, thereby reducing emissions. Where possible on divided highways and where efficiency gains are possible, existing capacity exists and does not constrain other vehicle movement, truck-only lanes allow trucks consistent, efficient movement reducing starting, stopping, and slowing.

Process Improvement

Improvements in packaging have continued, enabling more freight to be shipped in fewer trips reducing both fuel consumption and GHG emissions.

Better technology and information about the transportation system has improved the modeling and operation of pick-up/delivery activities. This includes the ability to incorporate the operations of other fleets and private vehicles and their response to unpredicted problems on the network.

Capacity

Oregon ports and airports, where scale allows, have the facilities and service they need to capture 95% inbound and outbound freight within their market service areas. Oregon shippers no longer need to rely on transporting goods to/from ports and airports in California, Washington, British Columbia, and elsewhere.

Class I freight railroads (e.g. Burlington Northern Santa Fe and Union Pacific) have invested in new track capacity in Oregon and beyond enabling them to capture more long-haul freight volume moving into and out of Oregon. They are also cooperating to make more efficient two-way use of parallel tracking where it exists. Short-line railroads have also expanded to handle shorter distance freight movement.

Vehicle Manufacturing

Transportation vehicle manufacturers have modified designs (trucks, trains, airplanes, ships, etc.) to become more fuel-efficient and to reduce GHG emissions. Innovations in engine design, propulsion technology, aerodynamics, and fuel type and consumption allow for more freight to be hauled longer distances with fewer emissions.

How We Move People in Oregon in 2050

We've come a long way. In the forty years since 2010, Oregonians have thoughtfully, deliberately and persistently shifted the way we access work, school, play and shopping, especially in Oregon's urban areas where population densities support greater efficiencies.

Much like 1973's Senate Bill 100 laid the foundation for decades of wise land use in Oregon, the legislature adopted the "Options Now" bill, launching a mix of immediate and long-term actions setting Oregon on the path to a fossil-fuel free transportation system. Legislators recognized that wise transportation is the other side of the coin of wise land use. The cornerstone of the Options Now bill was the requirement that all Oregon cities larger than 10,000 people develop "Complete Community" Plans. These plans were a first step toward meeting local aspirations to create and maintain livable, vibrant communities that can accommodate a majority of non-work trips via walking, biking, shared rides, and, where available, public transportation

Oregon legislators recognized that every dollar invested in providing transportation options keeps more dollars in the Oregon economy by reducing money exported to pay for petroleum. Oregon wisely shifted investments from those that worsened our petroleum addiction to those that boosted state and local economies.

Over the past four decades Oregon has retained most of the billions of dollars that would have otherwise been exported to pay for petroleum. The "Options Now" program became one of the most powerful economic development strategies in state history.

For four decades, vehicle miles traveled (VMT) within Oregon's metropolitan areas and major cities have been steadily dropping as people lived, worked, studied and played in greater proximity. This was accomplished by the state steadily increasing the share of transportation capacity funds and incentives going to rail, transit, bicycling and walking.

For most Oregonians, it's easy to walk, bike or take transit to work, school, parks, shop, worship and to visit with friends. For longer trips, Oregon's major cities are connected by quick, clean, frequent and convenient rail service. Rural areas have travel and vehicle choices that are both lower-carbon and lower-cost.

As the state, regional and local governments invested in building more and better transportation options, use of those options increased. Now, options for walking, bicycling, transit and driving make up a truly balanced system capable of meeting State GHG emission reduction targets set nearly 40 years earlier.

The legislature created an innovative system to reward ODOT, cities and counties for policies and projects that reduced petroleum use and GHG emissions. From Astoria to Ashland and Burns to Brookings, policies were adopted to determine and pay the true cost (including environmental consequences) of parking and driving, along with comparable costs of other modes of travel.

In 2050, nearly 90% of the miles traveled by vehicles in Oregon are from electric and other low-or non-carbon vehicles. And most of the electricity consumed by those vehicles is Oregon-based

renewable resources. Many of the parts of those electric vehicles are made by Oregon workers, as is the technology that contributes to a more efficient operation of our transportation system.

There was concern early on that electric vehicles, with their lower operating costs, could create new pressures for urban sprawl. But Oregon's commitment to preserving the values embedded in its land use laws, together with a public transportation system that continuously improved its offerings created offsetting incentives to live and work within urban growth boundaries.

Oregonians now live longer than any other Americans. We get more exercise because we walk and bike more, and therefore have lower rates of many chronic diseases. After decades of reducing vehicle emissions; we have lower rates of asthma and other respiratory diseases.

The critical path to 2050 was established by two key policies offered in the "Options Now" legislation:

1. Establish pioneering least cost transportation planning that focused investment of our limited transportation budget in providing Oregonians with options that are both lower-cost and lower-carbon.
2. Reward ODOT, cities and counties for adopting policies that reduce fossil fuel consumption, vehicle miles traveled, and GHG emissions.

How We Use Land in Oregon in 2050

Oregon's shift to a low-carbon economy has given us, in 2050, the opportunity to live more prosperous, healthier lives by making the right long-term choices. Starting in 2010, anticipation of our impact 40 years hence became a foundational principle in the region for planning and developing our urban areas, using our natural resources and rural lands, and transporting our people, goods, and services. The highly energy-efficient homes and offices that have dominated the market over these four decades are not only much less expensive to operate and maintain, but with ever more sophisticated design have proven to be more comfortable and healthier to live in as well.

Oregon's land use patterns and practices have evolved with each decade of progress, and essentially will look to continue developing new urban constraints. By 2050, new development and redevelopment reflect compact, efficient mixed-use settlement patterns created largely through redevelopment and infill; our communities in 2050 have approximately the same footprint they did in 2012.¹ Statewide intercity and interregional networks of transit service, broadband, and coordinated freight movement have enhanced personal and business mobility and accessibility at no net increase in industrial land consumption.

Highly energy-efficient building stock, assembled in more compact mixed-use neighborhoods result in increased convenience of urban living. More Oregonians have more choices of lifestyles with a smaller footprint but greater livability. As the lower-density neighborhoods from the last half of the

¹ 2012 is recognized as a transition year as current UGB analyses will be complete in both the Eugene-Springfield and Portland Metro regions. It's recommended that UGB reviews post-2012 include no expansion options together with Complete Community Plans.

20th century were redeveloped, neighborhood centers for shopping and services were coupled with on-demand local transit to gain new efficiencies and convenience.

Greatly increased and convenient access to shared cars, walking, cycling, transit, and other services have allowed people to reduce their average driving per household, and downsize their household transportation costs. Urban households now own only one car on average. Commercial shared vehicles and expanded access to the full range of convenient transit options have allowed families and individuals to avoid many of the high costs associated with buying, operating, and maintaining cars for longer trips.

Local governments hardly need to build new roads, and are directing scarce dollars to maintaining and improving existing infrastructure.

Rural Oregon still relies greatly on personal autos and trucks, but these are efficient low-carbon and electric vehicles with an extended range. More efficient freight vehicles and IT-managed collection/delivery systems support more robust rural economies and better linkages between urban and rural places, communities, and economies statewide. Oregon's farms have efficient access to both local and global markets, and this diversification helps stabilize farm incomes.

Rural Oregon is also the source of much of the energy we use to power our vehicles, homes and businesses. Energy comes from wind, solar, biofuels, and combined-heat-and-power or cogeneration facilities at lumber-mills, dairies, wastewater treatment plants and landfills.

To prevent further urban spread, communities in the lands along and within 10 miles either side of the I-5 corridor -- the part of Oregon that will be home to most of our population in 2050, as in 2010 -- have adopted land-use strategies where living, working, learning, and experiencing nature are substantially co-located and easily accessible.

Roles for State agencies, local governments and businesses have been realigned to focus on sustainable development principles. Agencies and businesses have shifted from the traditional linear "take-make-waste" production model to a circular "borrow-use-return" production system. Shifting to this closed-loop approach has led to cost savings, increased productivity, and ultimately to a competitive advantage for business while improving our quality of life and conserving nature.

To create a low-carbon, prosperous Oregon of 2050, we built on our historic land use and transportation policies, adopting a more rigorous integrated approach to land use and transportation planning that incorporates the following elements:

1. Building and redeveloping our communities to make them more convenient places to live, with or without a car. We added more destinations within walking distance of our homes and jobs; made the public realm more people-friendly and safer for pedestrians, cyclists and transit riders; and reduced the number of trips that required an automobile.
2. Developing a statewide system for intercity public transportation, in close partnership with private sector providers, local communities, public agencies, and others. Making it possible to inhabit not just a neighborhood but an entire state as a pedestrian. This extended the reach of citizens and created new luster for Oregon's international reputation as an

environmental leader. Using the revenues from new funding sources like congestion pricing allows us to fund efficient options such as urban and intercity transit. This brings transportation choices to both urban and rural Oregonians.

3. Creating stronger, safer and more convenient links between the amenities in the public realm (parks, squares, public facilities, access to nature, beauty, etc.) and smaller, more efficient building and site designs.
4. Using transportation system pricing—tolls, transit fares, parking charges—to ensure that the people who choose to make heavy use of scarce transportation system capacity thereby creating congestion, pollution and GHGs pay the real cost of that use. Getting the prices right ensured market signals that allowed us to make smarter choices about where we live, how and when we moved around, which reduced the carbon emissions caused by driving.
5. Changing the way we raised and decided how to spend our scarce transportation dollars so we were getting the least-cost, biggest-bang for our buck system. This is defined as maximum mobility and accessibility for people, goods and services at the least cost in dollars, air quality, land consumption and GHG emissions.
6. Prioritizing the use of now-scarce gasoline and diesel fuels and associated infrastructure to support rural economies and goods movement, and backing it up with both public policy and public investment.

Technological development played a central role in Oregon’s transition to a low-carbon future. However, Oregon’s strategy of developing a diverse set of living, working and transportation choices for families and businesses avoided the overreliance on technological “silver bullets”. This strategy allowed Oregon to continue protecting its farm, forest and wild lands as they coped with the stresses of adapting to the unavoidable climate change effects of water scarcity, variable land productivity and pressures on existing ecosystems accustomed to climate stability.

How We Make Transportation Choices, and Fund Them in Oregon in 2050

Reducing greenhouse gas (GHG) emissions from Oregon’s transportation sector involves different institutional arrangements, policies, as well as direct actions (e.g., fleet conversion to low-carbon vehicles and fuels). These institutional changes were essential in enabling Oregon’s transportation and land use institutions to become catalysts of change, enabling us to connect different uses and users, to think in terms of systems, of systemic change, and of collaborative efforts across boundaries instead of isolated actions that failed to connect and reinforce each other strategically.

Allocating GHG Emissions Among Emitters

Oregon early on reached agreement on the amount and timing of needed emissions reductions from transportation and other sectors that are sources of GHGs, giving Oregon citizens and businesses carbon predictability. GHG allocations were based on technical feasibility, amount of the reduction, cost, timing, and equity impacts. Different sub-sectors within transportation (e.g., air/sea/land freight, business, transit, and private vehicles) have allocations that declined over time at different rates, and to different levels (that still, in aggregate, meet an overall transportation sector allocation). Allocations within Oregon also conform to a national GHG budget, captured in a national “cap” mechanism, so Oregon’s allocation reflects its fair share.

Planning

Transportation and land use planning in Oregon shifted to a “least cost planning” basis that internalizes the economic, environmental, social and other identifiable costs of fuel choices, land use actions, and GHG emissions. Planning and infrastructure investing for reduced GHG emissions consistent with State goals were embedded into planning protocols as a fixed limiting condition. Modeling tools for such a least cost path have been developed and applied, allowing for plans that can meet GHG reduction goals while optimizing for multiple attributes (e.g., safety; congestion-avoidance; travel time reliability; accessibility; modal share; etc.). Infrastructure investments and operational are consistent with the least cost plans.

“Locational” Costs Assessment

Urban areas, where most of the population lives in 2050, apply the lessons of least cost planning to integrating transportation with locational land use decisions. Internet-accessed models now display transportation “locational” costs (travel time/accessibility; travel costs; emissions effects; health effects) of choices of where to live and work. Businesses seeking new locations clearly can access what their shipping/distribution costs will be and their access to skilled work force. These costs can be integrated with other locational costs (e.g., energy, water, and services) to give those locating a residence, business, institutional or government office a more complete picture of the consequences of different location choices.

Transportation Funding and Cost Allocation

It was clear before 2010 that funding models for transportation were not working. The purchasing power of gas tax revenues were declining as the need to maintain existing and build new infrastructure was growing. More efficient mobility and accessibility were required for both freight and people. Existing funding models were also failing to capture the full range of costs created by transportation, in particular the costs of building capacity to accommodate peak transportation demand, and the costs of pollution and the increases in GHG emissions. Oregon pioneered a “utility” pricing model that levied a base (“capacity”) charge for access to the transportation infrastructure (roads, transit, etc.); a usage-based (“energy”) charge for each user’s annual share of roadway, airshed, and GHG budget consumed; and a congestion (“peaking”) charge to reflect peak period use. “Congestion pricing,” together with real time information on traffic flows and slowdowns, now helps us avoid traffic jams and rush hours which contributes to more efficient use of our transportation infrastructure. As well, because demand is managed we now can avoid building a great deal of new infrastructure. Traffic – vehicle, pedestrian, transit, and bicycle – moves efficiently and predictably, reduces stress for all, and reduces costs and delays for commercial traffic. Computers designed for privacy and electronic applications accessible to drivers facilitate movement and access.

Research and Commercialization

Oregon has become a technical and business leader in developing advanced transportation solutions; building off its base and exploiting its comparative advantage already apparent in 2010. Modeling, planning, applied technology and user behavioral studies are combined into a cycle of constant investment and improvement in moving people and goods efficiently and equitably. The vehicles may be made elsewhere, but the systems that make them work are made in Oregon.

III. KEY ACTIONS FOR 2020

The following Key Actions were developed by reviewing numerous local and regional Climate Change Action Plans, and where appropriate, new and enhanced action items were developed. The top 12 Key Actions, our “Clean Dozen,” are listed below:

1. Change the Way We Fund Transportation
2. Develop New Funding Sources
3. Expand Urban Transit
4. Create Complete Neighborhoods
5. Keep Urban Footprints Compact
6. Move Freight the Low-Carbon Way
7. Plan to Mitigate GHGs and Adapt to Climate Change
8. Expand Intercity Transportation Options/Choice
9. Reduce Demand by Increasing Options
10. Manage and Price Parking
11. Support Electric Vehicles
12. Adopt Low Carbon Fuel Standard

While this list represents the T&LU Technical Committee’s top 12 actions, many more actions were considered (see Appendix B). The process concluded that most of these actions, including but not limited to the top 12, will be needed to reach our 2020 and 2050 State goals.

1. Change the Way We Fund Transportation

Develop and deploy a “utility” funding model for State and local transportation infrastructure, transit fleets and operations, and other transportation costs. Such a model should include:

- A base (“capacity”) “access” based charge to all who use any part of the system, whether driving, biking, busing, or using goods and services delivered from the system;
- An (“energy”) “usage” based charge (i.e. VMT charge) to reflect the amount one uses the system, that includes both the cost of infrastructure and externalities (e.g., airshed pollutant contribution; carbon emissions);
- A (“peak”) “congestion” based charge to reflect peak period use of the system.

Oregon has relied for decades on a gas tax applied to light-duty vehicles to fund the State’s portion of transportation capital and operating costs (heavy duty freight vehicles pay a weight-mile tax rather than a fuel tax) as directed by the State Constitution. This reliance on the gas tax should come to an end for three reasons. First, the amount of the gas tax is fixed and has declined in purchasing power due to the combined influence of inflation, dramatic increases in transportation infrastructure costs, and the effect of more efficient vehicles. Second, proceeds from the tax are directed constitutionally solely to expensive highway-related costs, leaving other least-cost mobility

and accessibility solutions unfunded. Third, transportation charges should be levied commensurate with use of the system (as highway freight charges now are) rather than more narrowly on the amount of fuel used. *A change in Oregon's Constitution will be required to transition to a 'utility' funding model.*

"Utility" rate design evolved from electric and gas utilities as a way to allocate costs fairly and according to use of the system. In the case of transportation, a "utility" design would charge all parties a base or "access" rate because all parties benefit from the system, either by using the highways, buses and trains directly, or relying on them to bring them goods and services.

A "usage" charge would reflect miles traveled in the system and how efficiently those miles are traveled. The usage charge would reflect miles traveled by different modes (e.g., auto, bus, train, bicycle) and the efficiency of the mode (e.g., an average emissions per VMT/passenger for a bus rider; an efficiency rating that might be captured instead as a graduated registration fee within the "access" charge).

A "peak" or "congestion" charge would be triggered when vehicles create congestion, and would reward those who use available real-time traffic information to avoid congested sections of the system at times of congestion (thus avoiding the need to incur additional capital costs of new facilities to accommodate the increased congestion).

This strategy for pricing publicly-supplied transportation services (roads, buses, trains) should: (a) more fairly allocate all costs to users (including land consumption, air pollution and climate impact costs); (b) provide price signals which create incentives for the public to use existing infrastructure more efficiently in meeting their transportation needs; and, (c) lower pollution and emissions per person-mile traveled because of gains in efficiency.

The above action will only work if we can truly define the total cost of the transportation system.

2. Develop New Funding Sources

Develop new, stable sources of funding for climate-friendly transportation.

It is imperative that every transportation dollar spent move us closer to meeting the state's greenhouse gas reduction goals. However, Oregon's current method of funding transportation is inflexible and unstable, and thinly spread funds are insufficient to meet our needs. Oregon has a constitutional requirement to use gas tax dollars on road improvements instead of on a broader suite of transportation alternatives that could achieve "least cost" mobility and access. Oregon is also one of only four states with no sales tax. To make critical investments in transportation infrastructure, operations and programs that will enable us to meet our GHG reduction goals, we need new sources of funding that are diverse, stable, predictable and flexible, as well as moving towards a 'utility' based methodology described above. Included in the development of the utility method would be defined approaches for governance, administration, and allocation of revenues generated from the utility rate base. Existing authorities and commissions may not be correctly structured to administer a new rate.

The T&LU Technical Committee did not fully explore the viability or revenue-raising potential of all possible new sources of funding; however, the following have been identified as options in need of future exploration by the T&LU Technical Committee, the Global Warming Commission, the Governor and Legislature, and others:

- Maximizing the use of all discretionary funds (e.g. federal funds for multimodal transportation).
- Offering drivers the opportunity to make a voluntary contribution to an alternative transportation fund to offset the impact of their driving behavior when they renew their vehicle registration or driver's license.
- Reducing the senior medical deduction for high-income seniors and dedicating savings to Oregon's Special Transportation Fund to support special needs transit.
- Implementing taxes on the act of parking or imposing a business license tax based on the number of parking spaces a business makes available for employees and the public.
- Dedicating state lottery revenue to multimodal transportation.
- Expanding payroll tax authority and implementing and raising payroll taxes to fund transit.

3. Expand Urban Transit

Expand Urban Transit to Provide Travel Choices, Reduce Carbon Intensity of Travel, and Curb Vehicle Miles Traveled.

- Expand and improve public transportation infrastructure and operations in the state's urban areas to provide lower carbon intensity travel options that reduce the number of vehicle miles traveled, while meeting the access and mobility needs of commuters, low-income citizens, seniors, disabled persons, school kids, recreationalists, and others who because of circumstance or choice seek public transportation options.
- Extend coverage and/or increase frequency and capacity of urban transit service to urbanized areas with transit-supportive land use policies; shaping the level of service to density factors and density development goals consistent with transit agency policies.
- Provide separated lanes where possible and/or traffic signal priority for public transportation vehicles to reduce travel time, reduce idling, and improve the reliability and operating efficiency of transit service.

The benefits of public transportation are many. At the **national level**:

- Public transportation's overall effects save the United States 4.2 billion gallons of gasoline annually: more than 3 times the amount of gasoline imported from Kuwait.
- Households near public transit drive an average of 4,400 fewer miles than households with no access to public transit.
- Communities that have invested in public transit reduce the nation's carbon emissions by 37 million metric tons annually. This is equivalent to the GHG emissions from all the electricity used by New York City; Washington, DC; Atlanta; Denver; and Los Angeles – *combined!*

- One person switching to public transit can reduce daily carbon emissions by 20 pounds, or more than 4,800 pounds in a year. A single commuter switching his or her commute to public transportation can reduce a household's carbon emissions by 10%, or up to 30% if he or she eliminates a second car.²

The Federal Transit Administration has also assessed the carbon footprint of transit agencies and compared their performance to that of other modes.³ FTA's analysis found that "national averages demonstrate that public transportation produces significantly lower GHG emissions per passenger mile than private vehicles."⁴ Analysis specific to TriMet found riders emitting 53% less GHG per passenger mile than the national average for single-occupancy private vehicles.⁵

GHG emission reductions at the **community level** are attributable to the provision of transit service through three pathways:

- Mode Shift: Benefits from directly shifting trips from more carbon-intensive modes (low-occupancy private vehicles) to less carbon-intensive modes (bus and rail transit).
- Congestion Relief: Benefits through improved operating efficiency of private automobiles, and commercial vehicles, including reduced idling and stop-and-go traffic.
- Land-Use Factor: Benefits produced through transit enabling more compact land-use patterns that promote walking and cycling, shorter and less frequent trips in private automobiles, and reduced private vehicle ownership.

Modeling commissioned by the New York Metropolitan Transportation Authority (MTA), indicates that the MTA helps avoid the emission of 8.24 metric tons of GHG emissions for every 1 metric ton that its own operations emit. This number can and does vary from region to region. Even within the MTA service region (the largest transit-served area in the country), the "avoidance factor" at the sub-regional level varied from about 2 to 20, with 8.24 being a weighted average for the entire region.⁶

While the same modeling has not yet been fully run for TriMet or other Oregon transit districts, initial TriMet analyses using a similar approach suggest an avoidance factor of approximately 1.84 due to mode shift and congestion relief alone. However, this likely substantially underestimates the overall avoidance factor since it excludes the emissions avoided due to more compact development patterns enabled by transit (the most significant factor in the MTA analysis). The "land use factor" is likely to be a significant factor in the Portland region, where much of the documented GHG

² Source: <http://www.apta.com/mediacenter/ptbenefits/Pages/default.aspx>

³ Source: <http://www.fta.dot.gov/documents/PublicTransportationsRoleInRespondingToClimateChange2010.pdf>

⁴ Ibid., p. 2

⁵ Ibid., pp11-12, with modal emission factors weighted by the modal split of ridership

⁶ Sources:

http://apta.com/resources/hottopics/Documents/Executive_Summary_Recommended_Practice_for_Quantifying_Greenhouse_Gas_Emissions_from_Transit.pdf

and

<http://www.mta.info/sustainability/pdf/MTA%20Carbon%20Model%20Report%20&%20Presentation.pdf>

savings from the transportation and land use sector comes from lowering over time VMT in the Portland region as a result of more compact development within the urban growth boundary. Even without this land use factor being considered, TriMet services reduces nearly two tons of GHGs for every single ton it emits, making the expansion of high-quality, productive transit service a key reduction strategy for GHGs from transportation and land use for urban areas in Oregon.

4. Create Complete Communities

Require the development and implementation of “Complete Community Plans” for all urban areas that are subject to Comprehensive Planning in the State of Oregon (cities over 10,000).

“Complete Community Plans” (e.g. 20 minute neighborhoods) are intended to meet local aspirations for creating and maintaining livable, vibrant communities that can accommodate a majority of non-work trips via walking, biking, shared rides, and, where available, public transportation. Complete community plans should include, but not be limited to:

- Higher density, mixed-use zoning and development incentives aligned with public transit and a connected system of “complete” streets that include pedestrian amenities and bicycle facilities (bike boulevards, lanes, parking).
- Parking management plans that limit parking in order to allow more efficient use of land and to balance parking supply with actual demand.
- Land use plans that identify a development and implementation strategy of key community amenities to fit local aspirations for shopping, parks, schools, libraries, public plazas, farmers markets, and other places for people to congregate and meet everyday needs.
- Housing plans that balance housing needs for all income levels and housing types and leverage access to public transit, walking, and bicycles.

Oregon Department of Land Conservation and Development (DLCD) would be responsible for statewide rule-making and review of local comp plans to ensure compliance for complete community plans.

Collective research conducted by Metro during the 2010 Update to the Regional Transportation Plan on trip generation rates shows complete neighborhoods and communities with compact urban form, access to transit and a greater mix of uses generates shorter vehicle trips with a 20-50% reduction in vehicular trips when compared to rates in lower-density, suburban style development. The finding confirms that ITE trip generation rates tend to overestimate automobile trips for compact, mixed-use development patterns. Recent data collection in areas with these development characteristics within the Portland region showed an average reduction of 40 percent between the ITE vehicle trip rates and observed trips.

5. Keep Urban Footprints Compact

Keep employment and population growth within existing UGBs.

Land within Oregon is considered a finite resource and must serve future generations. In addition to urban needs, the State’s lands must serve agricultural, forest, and natural habitat purposes.

Therefore, with limited exceptions (i.e. allowing flexibility within UGBs without modifying total urban land supply), we must accommodate residential and employment growth within existing urban growth boundaries by focusing new development on vacant developable land or through infill and redevelopment. This requirement would take effect after December 2012 and exceptions should only be approved for specific uses that cannot be accommodated within an existing UGB or for growth that accommodates integrated transportation and land use planning for complete communities.

Objectives would focus on land conservation and include:

- Strategies to better balance housing and employment within UGBs in order to minimize expansion of urban “travel sheds.”
- Brownfield redevelopment. While difficult, efforts to minimize urban footprints by cleaning up and reusing large parcels of mostly vacant land should be accelerated, partnerships fostered, and incentives developed.
- Transit Oriented Developments to better leverage mixed-use high-density development with transit investments.

Comparisons between urban areas that expand land areas and those that restrict urban growth to inside existing growth boundaries show that vehicle miles of travel and GHG emissions can be reduced up to 20 percent over 20 years at growth rates between one to two percent per year.

6. Move Freight the Low-Carbon Way

Reduce carbon emissions from freight movement in Oregon and help improve the efficiency and cost-effectiveness of freight movement.

The freight community has a number of opportunities to contribute to reductions in greenhouse gas emissions. Because freight movement competes on a regional, national and global scale, policies and programs must be harmonized with other states and countries to avoid unintended consequences. Those low-carbon strategies that offer the greatest potential are those that will both reduce carbon emissions from freight movement in Oregon while helping improve the efficiency and cost-effectiveness of freight movement.

- Improve tools and transparency to accurately show how freight moves through the system in order to improve efficiency of freight movement and infrastructure investment. This includes the development and deployment of Intelligent Transportation System (ITS) elements to inform drivers of existing conditions and route alternatives as well as the collection and sharing of truck trip routing data to identify where operational or infrastructural inefficiencies exist.
- Make strategic investments in multi-modal freight transportation, including intermodal freight transshipment facilities as well as infrastructure capacity to enable cost-effective mode shifting over time from less carbon-efficient modes (e.g., truck, air) to more carbon-efficient modes (e.g., rail) for medium and long-haul freight movement. Ensure such

investments are commensurate with and result in an identifiable public benefit (consistent with Least Cost Planning principles) and leverage private investments where possible.

- Site industrial land/facilities along key freight corridors and interchanges, and support and conserve regional significant industrial areas that may provide for future intermodal facilities and efficient local deliveries.
- Implement market-based incentive programs to incent truck and rail fleets to switch to more efficient engines and fuel types and to adopt alternative sources of power (rather than their own engines) to power while idled. Regulation may also be necessary.
- Implement incentive programs needed to increase capture of inbound and outbound freight within Oregon ports' and airports market service areas, thereby maximizing the use of the most efficient modes of freight movement.
- Engage the private sector to determine what shippers are already doing or are looking into resulting in positive emission results and identify those innovations that Oregon could help with implementation support (e.g. shipping practices, vehicle design/aerodynamics, etc.).

Reducing emissions from freight transportation is one area which can benefit from both public and private sector innovation. This combination can also result in benefits in other areas such as safety, reduced infrastructure and operational costs, and reduced conflict between land uses. In Columbus, OH, for example industry, government, and higher education as part of a larger strategy to attract the logistics industry are working to develop green logistics solutions and practices. The primary attraction for these private-sector developments is cost savings, yet they reduce the impact of freight movement. The following examples illustrate the potential:

- In 2009 Wal-Mart implemented a low-packaging strategy to reduce the packaging around many of the products they sell. By doing so they were able to ship more freight on the same truck or rail car than they did before. By the end of 2009, they had increased the number of cases of products shipped by 161 million, yet reduced VMT 87 million miles and gas consumption 15 million gallons.
- Boeing's most recent improvement to its 747 freighter has resulted in a reduction in fuel consumption of 17% per metric ton of cargo and about a 20% reduction in carbon emissions all while carrying 16% more cargo. Alaska Airline is testing bio-jet fuel that significantly reduces emissions.

Knowing and understanding where research and development in logistics practices, equipment manufacturing, and other areas is making advances can shape future policy and programs. Oregon, through policy, its research universities, and partnerships with the freight community can advance the state of the practice and encourage competition and innovation.

7. Embed Climate Change in Transportation Planning

The specific language for this action may be for consistency with SB 1059.

Embed greenhouse gas mitigation and climate change adaptation goals into least cost transportation and land use planning conducted by state, regional and local governments.

From the overarching Oregon Transportation Plan developed by ODOT to the local comprehensive plans and transportation system plans developed by cities and counties, all levels of government must plan to reduce greenhouse gas emissions, adapt to climate change, and prepare for the inevitable escalation in the cost of petroleum fuels.

State, regional and local governments must align spending programs to support transportation investments that result in reduced GHGs and/or help communities adapt to climate change with the least cost plans. We recommend that:

- ODOT develop and deploy a Least Cost Planning (LCP) model for state and local government transportation decision-making pursuant to House Bill 2001. A robust LCP model, adapted from electric utility LCP, takes a comprehensive approach to solving transportation problems along the sustainability triple-bottom-line of the economy, the environment, and social equity. It considers how to affect transportation demand as well as transportation supply. It considers all direct and indirect costs on a lifecycle basis. “Cost” includes not only the up-front price of an option, but also costs that can be quantified (like congestion and GHG emissions) and costs that are qualitative in nature (like equity). It compares the benefits and costs of a variety of solutions and ranks them according to cost-effectiveness or benefit/cost ratios. It ensures that solving one transportation problem doesn’t exacerbate another transportation problem. Oregon’s LCP model should incorporate GHGs as a hard constraint; in other words, when applying LCP, GHGs must not exceed a specific emissions level related to metropolitan area or statewide GHG reduction targets.
- LCDC incorporate GHG reduction goals and climate change adaptation goals into the Statewide Planning Goals and align GHG reduction goals with VMT reduction goals.
- ODOT incorporate GHG reduction goals and strategies to meet those goals into all modal plans (Oregon Highway Plan, Oregon Rail Plan, etc.) as they are updated, utilizing the statewide strategy for reducing GHG emissions from transportation sector being developed pursuant to Senate Bill 1059.
- Ensure that local governments, MPOs, and the State work cooperatively, as financing is available, to develop, adopt and implement scenarios to achieve their transportation-related GHG targets, using strategies that best fit their communities. This would occur once ODOT and DLCD have completed their Senate Bill 1059 requirements to develop a statewide strategy to reduce GHG emissions from the transportation sector, set targets for reduction of GHG emissions from light vehicle travel for the state’s six major metropolitan areas, develop guidelines for scenario planning, develop a toolkit to assist local governments in reducing GHGs from transportation, develop rules for Complete Community Planning, and educate the public about the costs and benefits of reducing transportation-related GHG emissions.
- Utilize newly developed GHG accounting and reporting methods, which include lifecycle carbon emissions (i.e. construction energy), operations (vehicle miles traveled and flow) and maintenance, in all planning efforts.

8. Expand Intercity Transportation Options/Choice

Provide efficient and reliable intercity transit, with higher-speed rail as a central component.

Passenger rail and other fast, reliable intercity options are essential components of a low-carbon transportation future. We recommend that the state:

- Pursue its near-term plan (by 2017) to increase train speeds between Eugene and Vancouver, BC to 110 mph, improve on-time performance to 95 percent, pave the way for additional daily roundtrips to be added in the future, and consider switching to electric power for the route, potentially using solar panels on the state-owned right-of-way to help provide the electricity. These improvements could triple ridership on the Eugene to Portland segment reducing the state's CO₂ emissions by nearly 70,000 pounds a year⁷ and laying the groundwork for eventual high-speed service.
- Explore other opportunities for commuter rail and long-distance passenger rail.
- Link Oregon communities not served by passenger rail via intercity bus service.
- Build stations in the right places, where passengers have access to a variety of transportation options for completing their trip and where passenger rail can provide a catalyst for transit-oriented development.

Passenger rail travel currently emits 60 percent less CO₂ per passenger mile than cars and 66 percent less than planes.⁸ Newer locomotives are becoming even more efficient, and switching rail lines from diesel to electric power could reduce GHG emissions even further. We need to think big—imagine all major U.S. cities within 100 to 500 miles of each other linked by true high-speed rail by mid-century. Here in the Pacific Northwest, the Amtrak Cascades line between Eugene, Portland, Seattle and Vancouver, B.C.—which is less than 500 miles from end to end and where ridership has increased eight-fold over the past 15 years—is particularly ripe for substantial investment. While this corridor should be the initial focus of our high-speed rail efforts, other corridors can be served by lower-speed passenger and commuter rail; and all communities not served by rail must be linked with frequent and reliable intercity bus service.

9. Reduce Demand by Increasing Options

Implement cost-effective Transportation Demand Management (TDM) programs that increase use of travel options. TDM is a quick, inexpensive approach to reducing the number and length of drive-alone trips.

Nationwide, agencies have been successful at reducing drive-alone trips by adopting demand reduction targets, then implementing community-appropriate strategies to achieve the target. But Oregon currently lacks statewide and regional TDM strategies with clear goals, roles and funding. An effective TDM program would:

⁷ Oregon Department of Transportation, Rail Division, *High-Speed Rail/Intercity Passenger Rail Service Development Plan*, 2 October 2009.

⁸ Center for Clean Air Policy and Center for Neighborhood Technology, *High Speed Rail and Greenhouse Gas Emissions in the U.S.*, January 2006.

- Reward ODOT, MPOs, cities, counties and transit agencies that establish 2020 Demand Reduction targets and implement strategies to achieve the targets.
- Develop and market a new Statewide Rideshare Online program, a tri-state advanced ridesharing program for personal and commercial car sharing. Involve private sector and marketing experts in the development. Offer incentives for participation.
- Develop and implement “Corridor TDM” programs in large new transportation construction projects. ODOT, local agencies and employers collaboratively provide corridor users information and incentives to carpool, vanpool, use transit, walk, bicycle and telecommute. Similar programs have proven effective, reducing drive alone trips 8 – 13%.
- Provide baseline funding for TDM programs in jurisdictions with major employers and ongoing congestion programs, similar to WSDOT’s successful Commute Trip Reduction (CTR) program.
- Provide incentive funds for a competitive, performance-based TDM program, open to local agencies and private sector employers and entrepreneurs who prove measurable trip reduction, similar to WSDOT’s successful Trip Reduction Performance Program.
- Reduce or eliminate government-supported parking subsidies.
- Reward local agencies that implement Transportation Management Plan (TMP) standards for large and mid-sized new development projects. Developers and/or project owners provide employees and residents information and incentives to use travel options.
- Expand the use of local transportation management associations and parking management districts to coordinate TDM and parking programs.
- Support companies in setting up and marketing Peer-to-Peer (P2P) car sharing. P2P car sharing enables owners of underutilized vehicles to add their cars into a P2P network during certain hours for other members to use for an hourly rate. Example companies include relayrides.com and spride.com.

10. Manage and Price Parking

Encourage less single-occupancy vehicle travel and less travel during peak periods by implementing one or more parking management strategies.

We recommend the following:

- Charging for parking.
- Modifying existing parking charges by eliminating discounts for daily or monthly parking, structuring parking fees to reflect peak period use, and/or setting hourly rates higher once a certain number of hours have passed.
- Requiring employers to offer employees a “parking cash-out” option where the employee can choose the parking benefit or the cash equivalent of the benefit.
- Impose a business license tax based on the number of parking spaces a business makes available for employees and the public to encourage more efficient use of land.

- Develop Shared Parking policies and practices.

99% of automobile trips end in a free parking spot. But neither land nor pavement are free, and the availability of free or heavily subsidized parking encourages driving. When designed in conjunction with other land use and pricing measures, parking pricing policies and parking management policies can ensure the appropriate supply of parking for a given area while encouraging carpooling and trips by other modes. Studies conducted by the USEPA of various employee parking programs found a 12-39% reduction in vehicle miles traveled and a 66-81% reduction in single occupancy vehicle trips to worksites. Similarly, the studies found community-wide pricing programs resulted in a 19-31% reduction in vehicle trips.⁹

11. Support Electric Vehicles

Deploy an Oregon Electric Vehicle (EV) Strategy designed to double the 2020 National level (estimated at 5% of total fleet) of light duty vehicles registered in Oregon qualifying as electric or plug-in electric vehicles.¹⁰

Accomplish this through:

- Creation of a new Transportation Electrification Tax Credit (TETC) for electric vehicles and infrastructure, as recommended by the 2010 Working Group (Governor's Alternative Fuels Advisory Committee).
- Incentives such as tax credits and feebates for EV purchases including freight vehicles.
- Tax credits and other incentives to fund EV charging stations and infrastructure in residences, work places, and public places.
- Incentives for and investments in electric vehicle fleet purchases and set EV purchase standards for government fleets.
- Redesign urban streets to accommodate and encourage deployment of low-speed electric vehicles (including two and three-wheeled EVs).
- Deployment of smart grid technology for EV charging by 2020 to significantly reduce the need for utility infrastructure upgrades.

Use of electricity for powering vehicles will reduce harmful emissions and promote sustainable mobility. In Oregon, our electricity partly comes from renewable sources but also coal and natural gas. Nonetheless, powering vehicles with electricity produced from any of our energy sources is more efficient than using gasoline powered engines. According to the US Department of Energy, electric motors convert 75 percent of the chemical energy from the batteries to power the wheels, while internal combustion engines (ICEs) only convert 15 to 20 percent. Even with energy losses at the power plants and through transmission, electric vehicles are producing considerably less GHG emissions than internal combustion engines. As the percentage of renewable energy sources increases, the benefits of electric vehicles will also increase.

⁹ US EPA (1997) "Opportunities to Improve Air Quality through Transportation Pricing Programs

¹⁰ The EC-Vehicle Electrification Roadmap, published in 2010, projected a 5% by 2020 national target.

While EVs are a substantial improvement over internal combustion engines, driving EVs in the next decade is not a “cure-all” and will still contribute to GHG emissions; therefore, promotion of EVs needs to be integrated with other strategies to most efficiently meet GHG targets.

12. Adopt Low-Carbon Fuel Standard

Ensure an Oregon low-carbon fuels market through adoption of a low-carbon fuel standard and local production of sustainable biofuels.

The Oregon Department of Environmental Quality is currently undertaking rulemaking to adopt a low carbon fuel standard. The low-carbon fuel standard will require providers of transportation fuels to reduce the carbon intensity of the fuel mix they deliver to Oregon by at least 10% by 2020. This will grow Oregon’s clean energy industry, from electric vehicle manufacturing to cellulosic biofuels; discourage unclean energy investments, such as fuel from coal-to-liquids and oil produced from tar sands and oil shale; reduce Oregon’s dependence on imported oil, keeping more money in the state; and reduce the sensitivity of Oregon’s economy to oil price uncertainty and shocks resulting from refinery outages, cartel actions or disruptions in world oil supplies. The rules will apply only to major transportation fuels, allow for a phased-in schedule, provide quality assurance, and allow deferrals and exemptions as necessary to ensure adequate fuel supplies.

- The DEQ rulemaking needs to be completed with accurate GHG intensity methodologies that reduce life-cycle carbon impacts of Oregon’s fuels.
- Current statutory authority expires in 2015; this “sunset” needs to be removed so that long-term market stability encourages investments in fueling, vehicles, and local fuel production.
- Companion actions are needed to increase state and local support for building in-state fuel production and processing infrastructure, which studies indicate will have major benefits for rural Oregon economies.

Oregon’s overwhelming dependence on petroleum as a single feedstock for its transportation fuels leads to volatility in prices and high GHG intensities throughout the transportation sector. One essential component for Oregon to reduce its GHG emissions in the transportation sector is to reduce the GHG intensity of transportation fuels. Providing diversity in sources of transportation fuels will reduce the volatility in prices, increase new economic opportunities for the development of in-state production of liquid fuels, and do this while reducing GHG emissions statewide.

A low-carbon fuel standard requires all providers of transportation fuels to meet a declining standard for GHG-intensity of its fuels. HB 2186, passed by the 2009 Legislature, established these requirements in Oregon through 2015. The Department of Environmental Quality is developing the rules to implement the market mechanisms that will allow complying entities to most cost-effectively meet the GHG intensity reductions of the fuels they sell. Innovations in biofuels, and emerging replacement fuels, such as electricity to power electric vehicles, will likely play a major role in the state’s effort to meet these important standards.

APPENDIX A

T&LU Technical Committee Members

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APPENDIX B

T&LU Inventory of Actions

ACTIONS/RECOMMENDATIONS	DESCRIPTION		METRIC			COMMENTS		
<p><u>CATEGORIES</u></p> <p>I. Improve Light Duty, Transit and Government Fleet Technology</p> <ul style="list-style-type: none"> A. Fleets B. Passenger Cars <p>II. Reduce Carbon Content of Fuels</p> <p>III. Facilitate Fewer Miles Traveled by Passenger Cars</p> <ul style="list-style-type: none"> A. Land Use & Smart Growth B. Non-motorized Transportation C. Public Transportation D. Transportation Demand Management E. Pricing & Unbundling Fixed Costs <p>IV. Move Goods Efficiently</p> <ul style="list-style-type: none"> A. Freight Movement B. Vehicle Technology C. Vehicle Operations <p>V. Optimize Vehicular Flow & Operations (i.e., improve efficiency of transportation network to optimize traffic speed & flow and ensure vehicles are maintained/operated to maximize fuel efficiency)</p> <ul style="list-style-type: none"> A. Transportation System Management/Operations B. Vehicle Maintenance & Operations <p>VI. Enhance Decision-Making (i.e., incorporate climate change metrics into decision-making, conduct research, involve public, enable best solutions implementation by modifying and expanding funding)</p> <ul style="list-style-type: none"> A. Decision-Making Frameworks B. Public Involvement & Education C. Funding 	<p>Lead Gov. (G) Agency (A) , Private (P), etc.</p>	<p>Type of Action Incentive (Int), Tax/Fee,(T/F) Regulation (Reg), Standard (Std), Information (Info) , Technical Research (TR), etc.</p>	<p>Timing of Impact (Short = 1-5 yrs) Medium = 5-10 yrs. Long = > 10 yrs</p>	<p>GHG Savings (Y/N, Quantity)</p>	<p>Fossil Fuel Savings (Y/N, Quantity)</p>	<p>Cost (High, Medium, Low)</p>	<p>C/E (Y/N)</p>	<p>Co-benefits Risks/Tradeoffs Unintended Consequences Politics Adaptation Value <i>(use concise narrative)</i></p>
<p><i>The information above will continue to be collected and analyzed as it becomes available.</i></p>								

I. Improve Light Duty, Transit and Government Fleet Technology								
A. Fleets								
1	Convert Tri-Met, other bus transit fleets to hybrid or equivalent or better Low Emissions technology							
2	Develop, adopt and implement model “Green Fleet” policies for public and private sector fleets, including operational improvements, retrofits, and aggregated volume purchases for vehicles (light-duty, heavy-duty, and bus) fuels, tires to maximize purchasing power. Require adoption and compliance by public agencies.				0.1 CA			
3	Maximize state and local government purchase of clean diesel or non-diesel school buses and other heavy-duty vehicles.				0.1			
B. Passenger Cars								
4	<p>Deploy an <i>Oregon Electric Vehicle (EV) Strategy</i> designed to double the 2020 National level (estimated at 5% of total fleet) of light duty vehicles registered in Oregon qualifying as electric or plug-in electric vehicles.</p> <p>Creation of a new Transportation Electrification Tax Credit (TETC) for electric vehicles and infrastructure, as recommended by the 2010 Working Group (Governor’s Alternative Fuels Advisory Committee).</p> <p>Incentives such as tax credits and feebates for EV purchases including freight vehicles.</p> <p>Tax credits and other incentives to fund EV charging stations and infrastructure in residences, work</p>							

	<p>places, and public places.</p> <p>Incentives for and investments in electric vehicle fleet purchases and set EV purchase standards for government fleets.</p> <p>Redesign urban streets to accommodate and encourage deployment of low-speed electric vehicles (including two and three-wheeled EVs).</p> <p>Deployment of smart grid technology for EV charging by 2020 to significantly reduce the need for utility infrastructure upgrades.</p>								
5	Provide training for fleet managers on how to educate employees about fuel-efficient driving techniques.				0.12 OR 0.26* - 0.30 CA				
6	Prevent tampering with emission control systems on motor vehicles designed to reduce emissions of greenhouse gases and other pollutants.								
7	If and when mileage fee replaces gas tax, ensure that fuel efficiency is an overlay.								
8	Review and enhance state tax credits and local incentives for purchasing high efficiency vehicles.								
9	Adopt state and local incentives for high efficiency vehicles. (Vehicle registration fees, incentive/recognition).								
II. Reduce Carbon Content of Fuels									
10	<i>Ensure an Oregon low-carbon fuels market</i> through adoption of a low-carbon fuel standard				15 CA; 0.1				

	<p>and local production of sustainable biofuels.</p> <p>The DEQ rulemaking needs to be completed with accurate GHG intensity methodologies that reduce life-cycle carbon impacts of Oregon’s fuels.</p> <p>Current statutory authority expires in 2015; this “sunset” needs to be removed so that long-term market stability encourages investments in fueling, vehicles, and local fuel production.</p> <p>Companion actions are needed to increase state and local support for building in-state fuel production and processing infrastructure, which studies indicate will have major benefits for rural Oregon economies.</p>				PDX				
11	Educate consumers about the availability of and fuel-efficiency benefits of synthetic and re-refined oil.				2.8 CA		\$5 20 M CA		
12	Mandate minimum biofuel content for all state-owned fueling stations.								
13	Evaluate renewable fuel standard to determine whether and when biodiesel and ethanol mandate should be increased.				0.1 M/ PDX				
III. Facilitate Fewer Miles Traveled by Passenger Cars									
A. Land Use and Smart Growth									
14	<i>Keep employment and population growth within existing UGBs.</i>								

<p>Land within Oregon is considered a finite resource and must serve future generations. In addition to urban needs, the State's lands must serve agricultural, forest, and natural habitat purposes. Therefore, with limited exceptions (i.e. allowing flexibility within UGBs without modifying total urban land supply), we must accommodate residential and employment growth within existing urban growth boundaries by focusing new development on vacant developable land or through infill and redevelopment. This requirement would take effect after December 2012 and exceptions should only be approved for specific uses that cannot be accommodated within an existing UGB or for growth that accommodates integrated transportation and land use planning for complete communities.</p> <p>Objectives would focus on land conservation and include:</p> <p>Strategies to better balance housing and employment within UGBs in order to minimize expansion of urban "travel sheds."</p> <p>Brownfield redevelopment. While difficult, efforts to minimize urban footprints by cleaning up and reusing large parcels of mostly vacant land should be accelerated, partnerships fostered, and incentives developed.</p> <p>Transit Oriented Developments to better leverage mixed-use high-density development with transit investments.</p>								
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15	Better link leisure and recreation opportunities with transit, walking, and biking.								
B. Non-motorized Transportation									
16	<p><i>Bicycling –related Strategies:</i></p> <p>Create pedestrian & bicycle master plans and expand and improve pedestrian & bicycle infrastructure and connectivity. These improvements should include increasing the mileage of bicycle boulevards and shared-use paths to accommodate bicyclists of varying abilities.</p> <p>Require a minimum amount of long-term bicycle parking spaces for multi-dwelling development in areas other than the dwelling unit.</p>								
17	<p><i>Require the development and implementation of “Complete Community Plans”</i> for all urban areas that are subject to Comprehensive Planning in the State of Oregon (cities over 10,000).</p> <p>“Complete Community Plans” (e.g. 20 minute neighborhoods) are intended to meet local aspirations for creating and maintaining livable, vibrant communities that can accommodate a majority of non-work trips via walking, biking, shared rides, and, where available, public transportation. Complete community plans should include, but not be limited to:</p> <p>Higher density, mixed-use zoning and development incentives aligned with public transit and a connected system of “complete” streets that include pedestrian amenities and bicycle facilities (bike boulevards, lanes, parking).</p>						M		

	<p>Parking management plans that limit parking in order to allow more efficient use of land and to balance parking supply with actual demand.</p> <p>Land use plans that identify a development and implementation strategy of key community amenities to fit local aspirations for shopping, parks, schools, libraries, public plazas, farmers markets, and other places for people to congregate and meet everyday needs.</p> <p>Housing plans that balance housing needs for all income levels and housing types and leverage access to public transit, walking, and bicycles.</p>								
18	<p>Create pedestrian districts where only a very limited vehicle traffic is allowed in Central Business Districts and neighborhoods. These could be permanent or implemented at regular intervals.</p>								
C. Public Transportation									
19	<p><i>Provide efficient and reliable intercity transit, with higher-speed rail as a central component.</i></p> <p>Passenger rail and other fast, reliable intercity options are essential components of a low-carbon transportation future. We recommend that the state:</p> <p>Pursue its near-term plan (by 2017) to increase train speeds between Eugene and Vancouver, BC to 110 mph, improve on-time performance to 95 percent, pave the way for additional daily roundtrips to be added in the future, and consider switching to electric power for the route, potentially using solar</p>								

	<p>panels on the state-owned right-of-way to help provide the electricity. These improvements could triple ridership on the Eugene to Portland segment reducing the state's CO₂ emissions by nearly 70,000 pounds a year¹¹ and laying the groundwork for eventual high-speed service.</p> <p>Explore other opportunities for commuter rail and long-distance passenger rail.</p> <p>Link Oregon communities not served by passenger rail via intercity bus service.</p> <p>Build stations in the right places, where passengers have access to a variety of transportation options for completing their trip and where passenger rail can provide a catalyst for transit-oriented development.</p>							
20	<p><i>Provide efficient and reliable intercity transit,</i> with higher-speed rail as a central component.</p> <p>Pursue its near-term plan (by 2017) to increase train speeds between Portland and Eugene to 110 mph, improve on-time performance to 95 percent, pave the way for additional daily roundtrips to be added in the future, and consider switching to electric power for the route, potentially using solar panels on the state-owned right-of-way to help provide the electricity. These improvements could triple ridership on the Eugene to Portland segment</p>							

¹¹ Oregon Department of Transportation, Rail Division, *High-Speed Rail/Intercity Passenger Rail Service Development Plan*, 2 October 2009.

	<p>reducing the state's CO₂ emissions by nearly 70,000 pounds a year¹² and laying the groundwork for eventual high-speed service.</p> <p>Explore other opportunities for commuter rail and long-distance passenger rail.</p> <p>Link Oregon communities not served by passenger rail via intercity bus service.</p> <p>Build stations in the right places, where passengers have access to a variety of transportation options for completing their trip and where passenger rail can provide a catalyst for transit-oriented development.</p>								
21	Provide free transit passes to students.								
D. Transportation Demand Management									
22	<p><i>Implement cost-effective Transportation Demand Management (TDM) programs that increase use of travel options.</i></p> <p>Reward ODOT, MPOs, cities, counties and transit agencies that establish 2020 Demand Reduction targets and implement strategies to achieve the targets.</p> <p>Develop and market a new Statewide Rideshare Online program, a tri-state advanced ridesharing program for personal and commercial car sharing. Involve private sector and marketing experts in the</p>								

¹² Oregon Department of Transportation, Rail Division, *High-Speed Rail/Intercity Passenger Rail Service Development Plan*, 2 October 2009.

<p>development. Offer incentives for participation.</p> <p>Develop and implement “Corridor TDM” programs in large new transportation construction projects. ODOT, local agencies and employers collaboratively provide corridor users information and incentives to carpool, vanpool, use transit, walk, bicycle and telecommute. Similar programs have proven effective, reducing drive alone trips 8 – 13%.</p> <p>Provide baseline funding for TDM programs in jurisdictions with major employers and ongoing congestion programs, similar to WSDOT’s successful Commute Trip Reduction (CTR) program.</p> <p>Provide incentive funds for a competitive, performance-based TDM program, open to local agencies and private sector employers and entrepreneurs who prove measurable trip reduction, similar to WSDOT’s successful Trip Reduction Performance Program.</p> <p>Reduce or eliminate government-supported parking subsidies.</p> <p>Reward local agencies that implement Transportation Management Plan (TMP) standards for large and mid-sized new development projects. Developers and/or project owners provide employees and residents information and incentives to use travel options.</p> <p>Expand the use of local transportation management associations and parking management districts to coordinate TDM and parking programs.</p> <p>Support companies in setting up and marketing</p>									
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	Peer-to-Peer (P2P) car sharing. P2P car sharing enables owners of underutilized vehicles to add their cars into a P2P network during certain hours for other members to use for an hourly rate. Example companies include relayrides.com and spride.com .								
23	Invest in carpool vans and park and ride sites.								
24	Support investments to provide high-performance broadband connectivity to every business and residence to enable widespread e-commerce, telecommuting and improved emergency response.								
E. Pricing and Unbundling Fixed Costs									
25	<p>Encourage less single-occupancy vehicle travel and less travel during peak periods by implementing one or more parking management strategies.</p> <p>Charging for parking.</p> <p>Modifying existing parking charges by eliminating discounts for daily or monthly parking, structuring parking fees to reflect peak period use, and/or setting hourly rates higher once a certain number of hours have passed.</p> <p>Requiring employers to offer employees a “parking cash-out” option where the employee can choose the parking benefit or the cash equivalent of the benefit.</p> <p>Impose a business license tax based on the number of parking spaces a business makes available for employees and the public to encourage more efficient use of land.</p>								

	Develop Shared Parking policies and practices.								
26	Support federal tax credits for insurance companies that offer a pay-as-you-drive insurance product to supplement Oregon’s tax credit. Court MileMeter, an insurance company in Texas that is offering a pay-as-you-drive insurance product.								
27	Develop a location-efficient mortgage program to help families buy houses close to where they work.								
28	Require developers to pay impact fees to help cover the cost of infrastructure improvements.								

IV. Move Goods Efficiently

A. Freight Movement

29	<p>Reduce carbon emissions from freight movement in Oregon and help improve the efficiency and cost-effectiveness of freight movement.</p> <p>Improve tools and transparency to accurately show how freight moves through the system in order to improve efficiency of freight movement and infrastructure investment. This includes the development and deployment of Intelligent Transportation System (ITS) elements to inform drivers of existing conditions and route alternatives as well as the collection and sharing of truck trip routing data to identify where operational or infrastructural inefficiencies exist.</p> <p>Make strategic investments in multi-modal freight transportation, including intermodal freight transshipment facilities as well as infrastructure capacity to enable cost-effective mode shifting over time from less carbon-efficient modes (e.g., truck,</p>								
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	<p>air) to more carbon-efficient modes (e.g., rail) for medium and long-haul freight movement. Ensure such investments are commensurate with and result in an identifiable public benefit (consistent with Least Cost Planning principles) and leverage private investments where possible.</p> <p>Site industrial land/facilities along key freight corridors and interchanges, and support and conserve regional significant industrial areas that may provide for future intermodal facilities and efficient local deliveries.</p> <p>Implement market-based incentive programs to incent truck and rail fleets to switch to more efficient engines and fuel types and to adopt alternative sources of power (rather than their own engines) to power while idled. Regulation may also be necessary.</p> <p>Implement incentive programs needed to increase capture of inbound and outbound freight within Oregon ports' and airports market service areas, thereby maximizing the use of the most efficient modes of freight movement.</p> <p>Engage the private sector to determine what shippers are already doing or are looking into resulting in positive emission results and identify those innovations that Oregon could help with implementation support (e.g. shipping practices, vehicle design/aerodynamics, etc.).</p>							
30	<p>Increase the number of trucks participating in "Green Light" (weigh-in-motion) program.</p>							

31	Review transponder and WIM requirements in CA and WA. Implement consistent equipment requirements along West coast.								
32	Develop new goals and strategies for efficient goods movement, including working with ports to adopt “green ports” goals.								
B. Vehicle Technology									
33	Accelerate EPA regulations on diesel emissions from ships. Set and meet goals for reduced diesel consumption by ships at port by providing shore power.								
34	Design and maintain commercial harbor crafts (i.e. tugboats) to maximum efficiency.								
35	Remove Transport Refrigeration Units Cold Storage prohibition and to increase energy efficiency								
C. Vehicle Operations									
36	Educate vessel operators about most fuel-efficient speeds to operate at.								
V. Optimize Vehicle Flow and Operations									
A. Transportation System Management and Operations									
37	Provide real-time information to drivers on optimal route and parking options utilizing Intelligent Transportation Systems. (i.e. –iPod apps, etc,] Utilize best practices including congestion pricing to optimize traffic flow for travel time, fuel efficiency, and GHG performance. Include speed limits, signal timing and other intelligent transportation system (ITS) solutions.								

38	Prioritize freight and non-single-occupancy vehicle movement at congestion choke-points.				0.08 CA				
B. Vehicle Maintenance and Operation									
39	Reduce the speed limit on interstates and highways.								
VI. Enhance Decision Making									
A. Decision Making Framework									
40	Include transportation emissions in any “cap-and-trade” or carbon tax mechanisms developed at a national, regional or state level.								
41	<p><i>The specific language for this action may be modified for consistency with SB 1059.</i></p> <p><i>Embed greenhouse gas mitigation and climate change adaptation goals into least cost transportation and land use planning conducted by state, regional and local governments.</i></p> <p>ODOT develop and deploy a Least Cost Planning (LCP) model for state and local government transportation decision-making pursuant to House Bill 2001. A robust LCP model, adapted from electric utility LCP, takes a comprehensive approach to solving transportation problems along the sustainability triple-bottom-line of the economy, the environment, and social equity. It considers how to affect transportation demand as well as transportation supply. It considers all direct and indirect costs on a lifecycle basis. “Cost” includes not only the up-front price of an option, but also costs that can be quantified (like congestion and</p>								

<p>GHG emissions) and costs that are qualitative in nature (like equity). It compares the benefits and costs of a variety of solutions and ranks them according to cost-effectiveness or benefit/cost ratios. It ensures that solving one transportation problem doesn't exacerbate another transportation problem. Oregon's LCP model should incorporate GHGs as a hard constraint; in other words, when applying LCP, GHGs must not exceed a specific emissions level related to metropolitan area or statewide GHG reduction targets.</p> <p>LCDC incorporate GHG reduction goals and climate change adaptation goals into the Statewide Planning Goals and align GHG reduction goals with VMT reduction goals.</p> <p>ODOT incorporate GHG reduction goals and strategies to meet those goals into all modal plans (Oregon Highway Plan, Oregon Rail Plan, etc.) as they are updated, utilizing the statewide strategy for reducing GHG emissions from transportation sector being developed pursuant to Senate Bill 1059.</p> <p>Ensure that local governments, MPOs, and the State work cooperatively, as financing is available, to develop, adopt and implement scenarios to achieve their transportation-related GHG targets, using strategies that best fit their communities. This would occur once ODOT and DLCD have completed their Senate Bill 1059 requirements to develop a statewide strategy to reduce GHG emissions from the transportation sector, set targets for reduction of GHG emissions from light vehicle travel for the state's six major metropolitan areas, develop</p>									
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	<p>guidelines for scenario planning, develop a toolkit to assist local governments in reducing GHGs from transportation, develop rules for Complete Community Planning, and educate the public about the costs and benefits of reducing transportation-related GHG emissions.</p> <p>Utilize newly developed GHG accounting and reporting methods, which include lifecycle carbon emissions (i.e. construction energy), operations (vehicle miles traveled and flow) and maintenance, in all planning efforts.</p>								
42	<p>Conduct the Household Survey not less often than every ten years, with tracking surveys to update critical data sets more frequently.</p> <p>Monitor statewide and local population growth rates to ensure population projections are accurate. Modify land use and transportation decisions accordingly.</p>						M		
43	<p>Incorporate “adapting to climate change impacts” and “reducing greenhouse gas emissions” as funding criteria for transportation investments in state, regional and local transportation decision-making venues.</p>								
44	<p>Require earmarks to be consistent with adopted transportation and land use plans.</p>								
45	<p>Partner with federal agencies, such as Housing & Urban Development, Environmental Protection Agency, and Department of Transportation, to apply new federal priorities (like the Interagency Partnership for Sustainable Communities) to support Oregon’s sustainable transportation and</p>								

	land use efforts.								
B. Public Involvement & Education									
46	<p>Expand Safe Routes to Schools funding for improvements to existing schools and for new schools the maximize opportunities for walking and cycling.</p> <p>Expand outreach to students, parents and schools to encourage and promote walking and cycling.</p> <p>Conduct effective education campaigns, such as SmartTrips Portland and Safe Routes to School, to promote attractive alternatives to driving alone.</p> <p>Educate children on the personal and triple-bottom line benefits of SOV-travel.</p>								
47	Require all new passenger vehicles sold in Oregon to be labeled as to their carbon output.								
48	<p>Educate drivers, truckers and fleet managers about the fuel savings associated with not idling.</p> <p>Post signage where idling often occurs (railroad crossing, bridge lifts, etc.).</p>								
49	<p>Education, Training and Outreach</p> <p>Ensure replacement tires for cars are at least as fuel efficient (in rolling resistance) as original tires that come with the initial purchase of a vehicle.</p> <p>Educate drivers about the availability of and fuel savings associate with low-rolling resistance tires.</p> <p>Conduct public education campaigns to educate drivers on fuel-efficient driving and car maintenance techniques, including maintaining</p>								

	<p>adequate tire pressure.</p> <p>Expand outreach, marketing and education regarding climate-friendly transportation alternatives and eco-driving. For example, include eco-driving tips and information on transportation alternatives on driver registration materials. Offer drivers the opportunity to offset emissions at the same time.</p>							
C. Funding								
50	<p>As discussed in action #53 below, the state should adopt a “utility” methodology for assessing and charging Oregonians according to their efficient use of the transportation system.</p> <p>The T&LU Technical Committee did not fully explore the viability or revenue-raising potential of all possible new sources of funding; however, the following have been identified as options in need of future exploration by the T&LU Technical Committee, the Global Warming Commission, the Governor and Legislature, and others:</p> <p>Maximizing the use of all discretionary funds (e.g. federal funds for multimodal transportation).</p> <p>Offering drivers the opportunity to make a voluntary contribution to an alternative transportation fund to offset the impact of their driving behavior when they renew their vehicle registration or driver’s license.</p> <p>Reducing the senior medical deduction for high-income seniors and dedicating savings to Oregon’s</p>							

	<p>Special Transportation Fund to support special needs transit.</p> <p>Implementing taxes on the act of parking or imposing a business license tax based on the number of parking spaces a business makes available for employees and the public.</p> <p>Dedicating state lottery revenue to multimodal transportation.</p> <p>Expanding payroll tax authority and implementing and raising payroll taxes to fund transit.</p>							
51	<p><i>Develop and deploy a “utility” funding model for State and local transportation infrastructure, transit fleets and operations, and other transportation costs.</i></p> <p><i>Such a model should include:</i></p> <p>A base (“capacity”) “access” based charge to all who use any part of the system, whether driving, biking, busing, or using goods and services delivered from the system;</p> <p>An (“energy”) “usage” based charge (i.e. VMT charge) to reflect the amount one uses the system, that includes both the cost of infrastructure and externalities (e.g., airshed pollutant contribution; carbon emissions);</p> <p>A (“peak”) “congestion” based charge to reflect peak period use of the system.</p>							