



Date: March 24, 2011
To: Climate Leadership Summit Participants
From: Kim Ellis, Principal Transportation Planner; Ray Valone, Principal Regional Planner
Re: Guide to Strategies For Reducing Carbon Emissions From Light Vehicles

Purpose

The purpose of this memo is to convey to Climate Leadership Summit participants the actions, programs and incentives that local governments and Metro could implement to reduce carbon emissions from cars, small trucks and SUVs. The tables below provide descriptions of these various strategies and should be used in conjunction with the Discussion Worksheet included with the Summit packet.

The overview of actions, programs and incentives came mostly from a literature review conducted by Cambridge Systematics, Inc. as part of the Oregon Sustainable Transportation Initiative (OSTI) effort and Metro's Climate Smart Communities Scenarios effort. The literature review considered existing national, state and regional/local research completed in the past 10 years.

Strategy Organization

The strategies have been organized into five categories, with associated tables, grouping together those with common themes (see below). From the tables, it is clear that there are several strategies that can be used in reducing carbon emissions. For the purpose of simplicity and due to limited time at the Summit, we will discuss only a handful of these strategies. The shaded strategies at the beginning of each table indicate those that will be the focus of the Summit, and they can be found on the Discussion Worksheet included in this packet.

- **Community design and the built environment**
 - Land use (*Table 1*)
 - Public transit (*Table 2*)
 - Active transportation (*Table 3*)
- **System management and operations/Intelligent Transportation Systems (*Table 4*)**
- **Technology and fleet (*Table 5*)**
- **Marketing and travel demand management (*Table 6*)**
- **Pricing (*Table 7*)**

Community design and the built environment

The strategies outlined in Tables 1-3 aim to change community design and the built environment in ways that will reduce the number of vehicle miles traveled in the region and their corresponding emissions, and increase walking, biking and use of transit.

Table 1. Land Use Actions, Programs and Incentives

Action/Program/Incentive	Description
More mixed-use, infill and reinvestment in centers and transit corridors	Change in the mix and location of certain land use types and densities to result in: <ul style="list-style-type: none"> • Increased density and mix of uses in strategic locations • Increased percentage of new development in attached or small-lot detached units, with good bike/pedestrian/transit and mix of uses • Mixing of residential and commercial so jobs and residences are in closer proximity.
Transit-oriented development (TOD)	Moderate to higher density development within walking distance to high frequency transit service, generally with a mix of residential, employment and shopping opportunities.
Infill development funding and incentives	Strategic public investment in projects such as streetscaping, walking, cycling, and transit infrastructure. Can include tools such as land assembly, system development charges, enterprise zones, urban renewal and tax increment financing to produce investments in centers and corridors. Also includes waiving/reducing fees, tax abatement and developer subsidies for infill development or other desired development.
Parking management	Manage the supply of parking provided at a particular site or area. Examples include shared parking credits; timed on-street parking; parking restrictions/minimums/maximums; structured parking and parking permit zones to prevent business customers and transit riders from using residential spaces; and programs that allows businesses certain number of free permits/mo then charge for additional ones.
Parking restrictions/remove parking minimums/implement parking maximums	Limit parking allowed at a particular site or area (e.g., downtown major commercial center). Portland set a cap of approx. 40,000 parking spaces downtown in 1975. The number increased in the 1980s and 1990s, but is still said to have helped increase transit use. <i>(Source: Victoria Policy Transport Institute)</i>
Shared parking credits	System in which parking spaces are shared by multiple users to promote efficient use of parking spaces. Arrangements vary, but in some cases, allow developers to pay in lieu fees instead of private off-street parking.
Urban growth boundary	This regional boundary is a locational land supply tool to manage urban expansion to protect farms and forests from urban sprawl and to promote the efficient use of land, public facilities and services inside the boundary.

Action/Program/Incentive	Description
School siting/placement	School siting policies aimed at retaining existing schools, or constructing new schools within established communities. Schools with pedestrian and bicycle access can result in greater accessibility for students and parents without the need for a motor vehicle

Public Transit

Table 2 identifies public transit actions and programs. These strategies increase service levels, provide incentives for using transit (and thus reduce the number of single-occupancy vehicle (SOV) trips) and/or enhance operational efficiency of transit vehicles. Together, these investments improve accessibility and can increase ridership levels, facilitating a reduction in the number of cars on the road, congestion levels and VMT. Additional improvements in comfort levels and reductions in fares also help to make transit a more attractive option.

Table 2. Public Transit Actions, Programs and Incentives

Action/Program/Incentive	Description
Increase frequency of transit service	Expand service frequency to increase ridership.
Expand public transportation options (LRT/BRT/Express bus/circulators)	Introduce new types of transit and add more service, routes, etc.
Discount transit passes/decrease fares	Reduce the cost of using transit.
Limited-stop service	Particularly useful for commuting, common routes into downtowns and major employment centers.
Park & ride facilities	These can include parking facilities at rail and bus stations, as well as near highway on-ramps to encourage ridesharing.

Active Transportation

Table 3 summarizes the proposed active transportation actions and strategies. These strategies help reduce carbon emissions by expanding transportation options for people to walk and bike to meet some or all of their daily needs, particularly for short trips. The strategies also help make walking and biking more convenient and promote safety and access to local services and destinations.

Table 3. Active Transportation Actions and Programs

Action/Program	Description
Construct new or connect existing bicycle and pedestrian facilities	Construct both on- and off-street facilities such as bicycle boulevards, bicycle lanes, trails, and bicycle parkways to promote walking, biking, and access to transit.
"Complete Streets" policy	Policy that takes into account all users of streets rather than just autos with a goal of completing the streets with adequate facilities for all users.
Pedestrian-oriented design/Buffered sidewalks	Protect sidewalks by creating a landscaped buffer between motorized traffic and pedestrians.
Bicycle parking at destinations including transit stations	To encourage use – could be all types of parking – short term, long term, secure.
Promote bicycle and pedestrian use	Through marketing programs, safety lessons, etc.
Traffic calming	Tools employed to reduce vehicle speeds, improve safety, and enhance one's quality of life.
Increase number of crossings, curb cuts and signalized crossings and reduce crossing distances and intersections and mid-block crossings	These actions help people of all mobility levels to cross the street and access destinations. Add signals at pedestrian crossings, especially on busy streets, to increase pedestrian safety and improve traffic flow. Could include innovative signal types, such as hybrid beacons that are dark when not in use to allow traffic flow, but are triggered to flash when pedestrians activate them.
Urban nonmotorized zones	Designated areas for nonmotorized transportation modes only.

System Management and Operations/Intelligent Transportation Systems (ITS)

Table 4 identifies actions and programs related to operations and ITS. These strategies improve system operations using technology to provide information about roadway conditions or other data and other management strategies.

Table 4. System Management and Operations/ITS Actions and Programs

Action/Program	Description
Incident management	Restore “normal service operation” after roadway incidents (accidents or other actions that interrupt standard operation of roadways) as soon as possible after an incident.
Traffic signal timing coordination	When a group of two or more traffic signals work together so that vehicles moving through the group will make the least number of stops.
Traffic Signal Coordination/Arterial System Management	When a group of two or more traffic signals work together so that vehicles moving through the group will make the least number of stops.
Electric vehicle infrastructure	Build electric vehicle charging stations/infrastructure.
Ramp-metering	Control entry of traffic onto freeways to improve traffic flow and decrease accidents. Vehicles are stopped and allowed to enter via ramp at intervals determined by current congestion levels.
Electronic message signs	Signs located along roadways providing drivers with traveler information, such as accidents, detours, etc.
Transportation Management Center (TMC)	A facility into which real-time traffic data from roadways flows that provides coordinated transportation management on transportation facilities (e.g., state highways, other parts of system). Data is processed and decisions are made (such as rerouting, etc.) in order to maintain best possible system operations. In an emergency, TMC is command center that directs relief efforts.
Freeway management system	Provides highway conditions data, including freeway traffic camera, and information on related programs and services.
Active Traffic Management (ATM)	Use of automatic systems and human intervention to manage traffic flow, aka “managed lanes” or “smart lanes.”
Integrated corridor management	Using all possible capacity in a transportation system to get out most of entire network. For example, using formerly underused parallel routes to help mitigate heavy traffic on freeways or using the nonpeak direction during peak hours.
Road weather management	Includes 3 types of strategies applied during inclement weather: advisory (fog warnings, etc.); control strategies (speed limit reductions using signs, etc.); and treatment strategies (sand, salt, ice).
Arterial management	Program designed to improve traffic signal systems operation, improve flow of traffic, and reduce arterial congestion.
Access management	Coordination between land use and design of roadways to improve transportation.

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"Eco-driving" training programs	Programs that train drivers to use techniques that reduce gas consumption, such as avoiding rapid acceleration and braking, driving at lower speeds, proper gear changes, and other strategies; also includes proper vehicle maintenance, including tire pressure, etc.
Transit priority treatments (includes signal prioritization)	Tools used to reduce transit vehicle delay. Could include bus lanes, queue-jumper lanes, bus-priority traffic signals, intersection reconfiguration, and grade separation so transit is not delayed by cross-streets and traffic congestion.
Traveler information system	Dissemination of traveler information through radio, traffic hotline (511) and other technologies such as the internet and smart phone applications.
Vehicle Infrastructure Integration (VII)	Research and applications dedicated to linking road vehicles to their physical surroundings to improve road safety.
Reduce speed limit	Lower speeds on city and county roads, possibly to 20 mph to increase bicycle/pedestrian safety.
Yield signs	Increase use of yield signs, as opposed to stop signs, which reduces car idling and helps bicycles move along faster. It would take driver education, but it's common in Europe. In the U.S., research has shown that completely unmarked intersections and roundabouts are safe.

Technology and Fleet Actions and Programs

Table 5 identifies fleet actions and programs. These provide incentives or disincentives to change travel behavior in a way that will reduce VMT and/or improve system operations.

Table 5. Technology and Fleet Actions/Programs

Action/Program	Description
Vehicle age programs	Policies to influence the age of vehicles on the road (may be incentive or regulatory-based).
Vehicle type programs	Policies to influence vehicle type such as CAFE standards, etc.

Marketing and Travel Demand Management

Table 6 identifies marketing and transportation demand management actions and programs including ridesharing. These actions and strategies reduce carbon emissions by reducing trips, shifting trips to other modes and thus reducing vehicle-miles traveled (VMT).

Table 6. Marketing and Travel Demand Management Actions, Programs and Incentives

Action/Program/Incentive	Description
Employer-based programs:	Commuter incentive programs take advantage of a variety of options used to reduce SOV trips for workplace travel. Employers can adopt programs that best suit the needs of their employee base, including:
Alternative work schedules	
Telecommuting	Alternative work schedules – Schedules other than 9:00 a.m.-5:00 p.m.)
Teleconferencing/videoconferencing	Telecommuting – Employees work from home rather than a central office
Ride-sharing	Teleconferencing/videoconferencing – Use of live video connections in place of physical meetings
Vanpool programs	Ride-sharing – Practice of commuting with other people (generally those that live nearby), often aided by a service or program that matches people going to the same employment area
Park & ride	Vanpool programs – Similar to ride-sharing but on a larger scale, allowing many people to ride in one vehicle
Mandatory SOV reduction programs for large employers	Park & ride – Parking facilities at transit stations, bus stops, and highway on-ramps, generally charging lower fees than in CBDs; these help facilitate transit use and ride-sharing
Parking cash-out	Mandatory SOV-reduction programs for large employers – Employers of a certain size would be required to reduce the number of SOV that commute to their offices
Guaranteed ride home	Parking cash-out – Program in which an employer offers a choice between a paid-for parking space or a cash allowance, equivalent to the market value of the parking place, giving employees an opportunity to save money if they avoid driving.
	Guaranteed ride home – Provides subsidized ride home from work to commuters who use alternative modes. For example, a commuter would receive a ride if his/her carpool driver must stay late at work or a bus rider must return home in an emergency. This addresses challenges to the use of alternative modes.

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Individualized Marketing (IM)	IM is a voluntary travel behavior change program that provides personalized information, motivation and support to targeted households that are interested in replacing automobile trips with other travel modes such as bicycling, walking, public transportation and carpooling. Mostly targeted to residents, some programs have targeted employees at work places.
Car-sharing Standard Personal Vehicle Car-Sharing (PVCS)	Standard – Program in which automobile rental services are used to substitute private vehicle use and ownership. Programs are designed to be accessible to residences, affordable, follow easy check-in/out processes, and reliable. PVCS – Enables private car owners to make their vehicle available on a temporary basis to a carsharing company for rental. In return, the vehicle owner gets a substantial portion of the rental revenue from the carsharing company. When not rented, the vehicle owner can continue to use their car as before. Also called “peer to peer carsharing” (abbreviated P2P carsharing).
Tire fuel efficiency programs	Public education program to encourage the purchase of fuel efficient replacement tires.
Financial support for public, private, or nonprofit car-sharing organizations	Increased financial support show commitment to this program.
Pay-as-you-drive insurance (PAYD)	A system where participants are assessed based on the number of vehicle miles traveled in combination with traditional risk based rates. PAYD goes beyond what current insurance companies are offering in premiums to low distance drivers. Shifting to this type of mileage-based auto-insurance system allows motorists to reduce their costs while encouraging them to drive less.

Pricing

Actions and programs related to pricing are included in Table 7. These actions and programs focus on raising the cost of vehicle miles traveled (VMT) and fuel consumption, which have been shown to result in people driving less – thereby reducing carbon emissions. These strategies also can help improve system operations by mitigating congestion.

Table 7. Pricing Actions, Programs and Incentives

Action/Program/Incentive	Description
Vehicle Miles Traveled (VMT) fee	Fee charged based on how many miles a car is driven; odometer readings determine the exact fee charged; a city or county could modify the structure of the fee to include a carbon fee; VMT fees can be layered to be higher or lower based on the fuel economy of one's car.
Fuel tax	A fuel tax (also known as a gasoline or gas tax) is an excise tax imposed on the sale of fuel. In most countries the fuel tax is imposed on fuels which are intended for transportation. Fuels used to power agricultural vehicles and/or home heating oil, which is similar to diesel, are taxed at a different, usually lower, rate.
Congestion pricing/road user fees	Tolls are charged to drivers using congested roadways; toll based on specific level of service goal; refers to parking, tolling, or other road user fees where prices increase during congested times in congested locations.
Parking pricing	<p>Fees charged for all parking in a certain area; could include:</p> <ul style="list-style-type: none"> • Central business districts (CBD), employment areas, and retail areas • Higher fees on previously free parking lots • All downtown workers pay for parking • Requirements for residential parking permits and for visitors • Dynamic pricing is another form of parking pricing; it involves changing pricing based on the time of day; pricing could be higher during peak traffic periods to create a disincentive to drive. <p>A flat fee-per-space on parking spaces provided by businesses would discourage automobile-dependent development, encouraging more efficient land use, and – to the extent the fees are passed on to parkers – encourage non-auto transportation choices. The revenue generated by such a fee (on parking spaces, not their use) could be used for transit and other transportation investments not eligible for highway dollars.</p>
Traffic Impact Fee	A charge on new development to cover the full cost of the additional transportation capacity, including transit, required to serve the development. Only those developments that result in an increase in vehicle trips would be charged.

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Emissions-based vehicle registration fees	Fees based on emissions.
Cordon pricing/area pricing	Requires all motorists who pass through a certain area, generally an area around a CBD or other major employment or retail area, to pay a fee.
Traditional toll roads	Payment charged for passage on roads, bridges or ferries that carry cars.
Nontraditional toll roads <ul style="list-style-type: none"> • Managed lanes • High-occupancy toll (HOT) lanes 	<ul style="list-style-type: none"> • Managed Lanes – A lane or lanes designed to increase freeway efficiency through a combination of operational and design actions. • HOT Lanes – High Occupancy Vehicle (HOV) lanes that allow a limited number of low-occupancy vehicles to use the lane if a fee is paid