



Brief Descriptions of State Climate Actions: Transportation and Land Use

(Note: This is a listing of Transportation and Land Use (TLU) policy options considered by numerous states as part of their climate change planning process with the Center for Climate Strategies (CCS). In a CCS-facilitated planning process, Technical Work Group (TWG) members provide input to modify these policies and add new ideas to craft a unique program for their state. CCS works with states to incorporate their own recent actions or existing programs related these topics.)

TLU-1. PASSENGER VEHICLES

1.1 PASSENGER VEHICLE TECHNOLOGY

1.1.1 New Vehicle Standards: Tailpipe GHG and Fuel Economy

Newly purchased automobiles comply with state and federal standards. Federal fuel economy standards, federal greenhouse gas (GHG) standards, and state GHG standards all have an impact on the amount of GHG emissions from newly purchased vehicles.

1.1.2 ZEV/LEV-2 Implementation

California's low emissions vehicle (LEV) II regulations establish fleet average emissions standards to be achieved by 2010. The program extends passenger car emissions standards to sport utility vehicles and pickup trucks and tightens overall emissions standards. The program regulates smog and ozone-forming air pollutants.

LEV II requires manufacturers to produce a minimum percentage of zero emissions vehicles (ZEVs), or a commensurate amount of near-zero emissions vehicles, per year. Vehicle types eligible for compliance include electric, hybrid-electric, and alternative fuel vehicles, which have lower GHG emissions than traditional vehicle types. Under the Clean Air Act, states have the option of adopting and implementing California's LEV II standards, which are stricter than current federal emissions standards.

1.1.3 Research and Development and Bringing to Market Lower-GHG Vehicle Technologies

A state could support research and development (R&D) of low-GHG vehicle technologies to encourage technological innovation and accelerate the time period for bringing these technologies to market. Market expansion can also reduce unit costs for these newer technologies.

1.1.4 Vehicle Add-on Technologies (e.g., Low-Friction Oil and Fuel Efficient Tires)

Both existing and newly purchased passenger vehicle fuel efficiency may be improved with incremental add-on technologies such as low-friction oil or low-rolling-resistance tires (fuel-efficient tires).

Fuel economy can be improved on light-duty vehicles by setting minimum energy efficiency standards for replacement tires. Typically, energy efficient tires are used on new models; however, low-rolling-resistance replacement tires may not be readily available to consumers, and there is little information regarding the fuel economy of replacement tires.

1.1.5 Hybrid Buses

Urban public transportation buses may be powered by a hybrid diesel-electric engine, which may be able to provide a fuel economy improvement of up to 50% compared with similar sized standard diesel engines.

1.1.6 Support Stronger Federal CAFÉ Standards

A state may encourage the federal government to adopt and implement stronger fuel economy standards such as corporate average fuel economy (CAFÉ) standards for newly purchased vehicles.

1.1.7 Programs for Consumer Information About GHG Emissions for Newly Purchased Cars

To increase consumer awareness about GHG emissions, states may allow, encourage, or require auto manufacturers to affix a “global warming index” sticker to new cars and passenger trucks detailing carbon dioxide and other GHG emissions. These stickers can provide a comparison of the GHG emissions of one vehicle with the average projected emissions from other comparable vehicles of the same model year.

1.1.8 Develop Infrastructure for Plug-In Vehicles

The state could develop infrastructure facilities for plug-in hybrids to recharge at rest areas and fueling stations on limited access highways. These plug-in recharging facilities would provide consumers with more locations for recharging and would allow plug-in vehicles to extend their range to longer distance trips.

1.2 PASSENGER VEHICLE OPERATIONS

1.2.1 Enforce Speed Limits

Reduced vehicle speeds can improve fuel economy, reduce GHG emissions, and improve safety. One potential implementation method for this enforcement includes speed-detection cameras, for both intercity highways and urban roads, which have been shown to be an effective and cost-effective means of achieving compliance with posted speed limits. Enforcement measures could be combined with measures to lower the speed limit on interstates, freeways, and major arterial roads. Significant enforcement resources may be needed for this measure to achieve the expected GHG reductions.

1.2.2 Vehicle Maintenance and Driver Training

Improved consumer information and education can lead to an increase in fuel efficiency. Consumer education could include the use of “best in class” vehicle guides (e.g., American Council for an Energy-Efficient Economy [ACEEE]) that provide comparative fuel efficiency information about different vehicles and also provide associated vehicle GHG emissions. Public education and training can make drivers more aware of maintenance issues that impact pollution and vehicle operating cost, including tire inflation and engine lubricants. Such public education may also encourage energy-efficient driving habits (notably, slower acceleration, shifting at lower revolutions per minute [RPMs], and use of cruise control) and encourage the use of lower-GHG modes of transportation.

1.2.3 Improved Transportation System Management (e.g., Traffic Signal Synchronization and Intelligent Transportation Systems)

Improved transportation system management can improve vehicle flow on the roadway system, which reduces fuel use and GHG emissions. Coordinated operation of the regional transportation network can improve system efficiency, reliability, and safety. Tools for reducing traffic congestion include high-occupancy vehicle (HOV) lanes, roundabouts at appropriate intersections, synchronized signals, incident clearing and management, variable message signs, 511 and other real-time driver information, ramp metering, and other forms of intelligent transportation systems (ITS).

1.2.4 Driver Information Technologies, Including Pay-As-You-Drive Insurance

Driver information technologies can provide real-time information on driving habits that affect GHG emissions. Two important potential elements of driver information are use of on-board computers and displays that provide instantaneous fuel economy information and guidance on more fuel-efficient shifting for manual transmissions. With the introduction of global positioning system (GPS)-based pay-as-you-drive insurance, information can also be provided to drivers to increase awareness of their minute-by-minute cost of driving.

1.2.5 Tune-Up Services, Including Tire Pressure Checks

States may allow, encourage, or require tune-up and on-demand oil change and engine check facilities to check tire pressure and inflate to the recommended pressure.

1.2.6 Passenger Vehicle Idling Restrictions

State or local governments could enact stricter idling restrictions that prohibit idling for extended durations. States could also implement public awareness campaigns to encourage reduced idling.

1.2.7 School Education Programs

States could implement school instruction for grades 3 through 12 to educate students on the benefits of idling reduction and the consequences of not doing so. Such a curriculum can also address how students may broach this topic with parents or other drivers.

A “lower GHG” curriculum could be developed for teachers at the elementary and secondary school levels. Such a curriculum would distribute information through children to their parents and would educate future drivers.

1.2.8 Public Education

States may implement public education programs to better inform the public of the measures individuals can take to reduce their transportation-related GHG emissions.

1.3 PASSENGER VEHICLE INCENTIVES AND DISINCENTIVES

1.3.1 Procurement of Efficient Fleet Vehicles

State and local governments can provide incentives for public and private vehicle fleets to include low-GHG vehicles.

1.3.2 Feebates (State-Specific or Regional)

States may adopt a variety of programs to encourage purchase of lower-GHG vehicles. State incentives could include differential registration fees, feebates, and/or tax credits. Feebate programs are usually structured to provide incentives for reduced GHG emissions by creating (1) fees on relatively high-emission/lower-fuel economy vehicles and (2) rebates or tax credits on low-emission/higher-fuel economy vehicles.

1.3.3 CO₂-Based Registration Fees and Vehicle Licensing Fees

Higher vehicle registration fees can be charged for vehicles that have higher emissions, and vehicles that emit less could be charged a lower fee. Vehicle licensing fees could also be based on vehicle weight and could use a dollar-per-vehicle-ton multiplier instead of the present broad categories of vehicle weight.

1.3.4 Tax Credits for Efficient Vehicles

Tax credits can be offered for the first-time purchase of a hybrid, alternative-fuel vehicle, or other type of vehicle that has relatively lower GHG emissions.

1.3.5 Vehicle Scrappage

State and local governments may adopt incentives program to accelerate the replacement and/or retirement of passenger vehicles with higher GHG emission rates. Because of the energy input required for manufacture of new vehicles, keeping low-GHG emitters in the fleet longer will also provide benefits for vehicles that are well maintained.

1.3.6 Emission-Based Tolling (Discounts for Clean Vehicles)

More fuel efficient vehicles could pay lower tolls than less fuel efficient vehicles. This measure has been implemented for trucks in Germany.

1.3.7 Establish a Carbon Emission Tax Modeled After the Clean Air Discount Bill

The Clean Car Discount Bill provides rebates to those who purchase vehicles with low levels of GHG emissions while placing an additional surcharge on vehicles with higher emissions.

1.3.8 Establish a Fleet Replacement Grant Program

State or local governments could incentivize earlier retirement of older fleet vehicles by creating a grant program that helps vehicle owners purchase more fuel efficient, lower GHG emitting vehicles.

1.3.9 Provide a Tax Incentive for Adult Bicycles

Governments could provide incentives for adults to purchase, use, and commute by bicycle. In England, a program such as this allows employees of participating employers to choose a bicycle for commuting, along with safety and security equipment.

1.3.10 Support Alternative Travel in the Advertising Mainstream

States may promote the use of alternative travel such as walking, cycling, and the use of trains, buses, and trolleys through mainstream advertising media such as TV, billboards, radio, and magazines.

1.4 FUEL-RELATED MEASURES

1.4.1 Low-GHG Fuel Standard (e.g., Renewable)

Adopt a low-GHG fuel standard. This option would reduce GHG emissions by decreasing the carbon intensity of all passenger vehicle fuels sold in the state. The low-carbon fuel standard (LCFS) would require all fuel providers in the state to ensure that the mix of fuel they sell into the state market meet, on average, a declining standard for GHG emissions measured in CO₂ equivalent grams per unit of fuel energy sold. The state should regulate quality standards for low-carbon fuels. Low-carbon fuels include biodiesel, cellulosic ethanol, hydrogen, compressed natural gas (CNG), liquefied petroleum gas (LPG), electricity, and low-carbon blends such as E10 or E85.

The standard would be measured on a life cycle basis in order to include all emissions from fuel production to consumption. Options for compliance could include blending or selling increasing amounts of lower carbon fuels, using previously banked credits, and purchasing credits from fuel providers who earned credits by exceeding the standard.

This option could also promote R&D related to biofuels production, such as the use of enzymes for breaking down cellulose to produce ethanol (as opposed to corn-based ethanol, which has a lower life cycle benefit).

1.4.2 Low-GHG for State Fleets (e.g., CNG, Biodiesel)

Mandate that public vehicle fleets include alternative fuel vehicles, typically targeting a certain percentage of penetration within a certain period of time. These mandates could be used to require pure electric vehicles and/or plug-in electric vehicles for fleets.

1.4.3 Biofuel Expansion (Biodiesel, CNG, LPG, Cellulosic Ethanol)

Adopt standards that require a certain amount or percentage of fuel sold within the state to be a renewable fuel (e.g., ethanol or biodiesel). This percentage can gradually increase over time. The State can help facilitate transition to renewable fuels by regulating quality standards for fuel blends.

This option could also promote R&D related to biofuels production, such as the use of enzymes for breaking down cellulose to produce ethanol (as opposed to corn-based ethanol, which has a lower life cycle benefit).

1.4.4 Alternative Fuel Infrastructure Development

Provide incentives to private providers of alternative fuel infrastructure. The development of an alternative fuel infrastructure can help promote alternative fuel use. The expense of equipment and installation costs can be offset by creating an infrastructure. Having conveniently located stations that offer competitive prices can increase the use of alternative fuels.

1.4.5 Fund Research and Development for a Full Range of Renewable Transportation Fuels

Provide funding to assist in the development of low-carbon fuels that are not yet commercially viable, such as cellulosic ethanol. Provide an accurate analysis of and recommendations on which renewable fuels will be the best options for the state, region, or city.

1.4.6 Develop Life Cycle Analyses of Transportation Fuels to Determine the Appropriate Pathways to Sustainably Protect Natural Resources

Examine the environmental impacts of transportation fuels over their full life cycle. For example, in examining corn ethanol, a study would look at the environmental impact of growing the corn, including fertilizers used, emissions from farm equipment, construction and operation of processing facilities, and emissions and safety risks from transporting the fuel, as well as the emissions released from burning the fuel versus the energy output of corn ethanol.

TLU-2. LAND USE EFFICIENCY AND MODAL OPTIONS

2.1 GENERAL LOCATION EFFICIENCY

2.1.1 Statewide Growth Management Plan

Adopt a statewide growth management plan and corresponding GHG emission goals. The plan would provide specific guidance for regional (metropolitan planning organizations [MPOs], county, or municipal) transportation and land use plans and programs to help the organizations conform to the state-determined GHG budgets and vehicle miles traveled (VMT) per capita targets set in the statewide growth management plan.

2.1.2 Include GHG Evaluations in State Policies

Require state transportation and land use legislation, regulations and policies, capital funding programs, long-range transportation plans, and the project environmental review process to evaluate their GHG implications. This will serve as a mechanism to support climate-friendly and energy efficient policies and development patterns.

2.1.3 Shape Investment to Maximize GHG Reductions

Guide public and private land use development and investment toward maximizing GHG reductions and growth management. This would be accomplished by adoption or strengthening an indirect source rule to hold development agencies accountable for GHGs, transfer of

development rights, open space protection, coastal zone management, and adequate public facilities initiatives.

2.1.4 Provide Technical and Financial Support to Local Agencies

Provide technical and financial support to MPOs, planning offices, and related local and regional agencies for land use, planning, and zoning activities that will provide technical tools, increase technical capacity, and fund Blueprint Planning Grant programs.

2.1.5 Smart Growth Planning, Modeling, Tools

Provide state funding, information dissemination, and technical assistance to facilitate the adoption of smart growth planning processes, models, and tools by local and regional jurisdictions. Smart growth planning, modeling, and tools are methods of development that reduce sprawl and maximize environmental, fiscal, and economic resources. This form of planning and modeling often incorporates other planning tools such as mixed-use, open space protection, and transit-oriented development.

2.1.6 Land Use, Zoning, Tax and Building Code Reform

Modify and fund reforms of state and local property tax, development fees, and zoning and building codes to support GHG reductions and facilitate implementation of the state's growth management plans. Measures can include

- Using property tax assessments for empty or underdeveloped urban lots to encourage infill development;
- Reducing building setback requirements;
- Shifting parking minimum requirements to maximum standards;
- Reducing restrictions on density, floor area ratios, and mixed-use development; and
- Reforming on-street parking availability and pricing.

2.1.7 State Congressional Advocates for Federal Action

Pass legislation petitioning the state's congressional delegation to work for federal highway and transportation and land-use-related legislation and programs that support timely climate change action.

2.1.8 Use of Flexible Federal Transportation Funding

The Safe, Accountable, Flexible, Efficient, Transportation Equity Act: A Legacy for Users (SAFETEA-LU) authorizes \$286 billion in spending between 2004 and 2009 for numerous surface transportation programs such as highways, transit, freight, safety, and research. Much of this funding is flexible in terms of how it is used by the state, and full funding for transit, pedestrian and bicycle facilities, intercity rail, and other climate-friendly investments should be prioritized.

2.1.9 Downtown Revitalization

Provide economic development incentives (e.g., tax-based) and liberalize zoning and permitting processes (parking requirements, density and mixed-use restrictions) to encourage investment in downtowns and central business districts. Revitalizing downtown areas can reduce automobile travel for commuters and provide sufficient density to support transit operations, thereby providing two means of reducing GHG emissions.

2.1.10 Brownfield Redevelopment

Provide economic incentives, liberalized zoning, and land use restrictions and permit streamlining to encourage development of empty or underutilized industrial facilities and derelict properties in urban areas. Redeveloping brownfields in urban areas can be a key factor in urban revitalization because it provides new centrally located areas for residential, commercial, or mixed-use development. By producing “infill” of existing urban areas, it also reduces average trip distances and can save public funds by taking advantage of existing infrastructure and public utilities.

2.1.11 Infill Development

Provide economic incentives, liberalized zoning, and land use restrictions and permit streamlining to encourage development of vacant or underutilized properties (e.g., surface parking lots) in urban areas. Infill development is the process of developing vacant or under-used parcels of land within existing urban areas that are already largely developed. Infilling existing urban areas can reduce average trip distances and can save public funds by taking advantage of existing infrastructure and public utilities.

2.1.12 Transit-Oriented Development

Provide economic incentives, liberalized zoning, and land use restrictions and permit streamlining to encourage dense mixed-use development of properties close to transit stations or facilities. Transit-oriented development (TOD) is the creation of compact, mixed-use commercial or residential communities designed to maximize access to public transit and create a community attractive to pedestrians and bicyclists. TOD is thus a tool that can be used to reduce automobile travel and the associated GHG emissions by increasing travel options and transit ridership.

2.1.13 Traffic Calming

Traffic calming measures such as roundabouts, speed bumps, and chokers result in traffic moving at slower speeds and with smoother flow (e.g., roundabouts reduce full stops at intersections). The reduced speed and smoother flow of traffic is associated with a reduction in GHG emissions and makes these areas more attractive, convenient, and safe for bicyclists and pedestrians, encouraging use of these climate-friendly modes.

2.1.14 Targeted Open Space Protection

Adopt a comprehensive state plan to preserve open space, especially on the periphery of urban areas where sprawl development may otherwise occur. Targeted open space protection typically includes programs or policies designed to protect and conserve state land and recreational and agricultural areas.

2.1.15 Balance Economic Development With Agriculture, Protection of Natural Resources, and Preserving Rural Character

Adopt a comprehensive state plan to preserve agricultural land uses, protect natural resources, and preserve rural character, especially on the periphery of urban areas where sprawl development may otherwise occur. This involves taking into consideration multiple land uses and policy objectives—such as economic development, agriculture, preservation of natural resources, and preservation of a given area’s rural character—when examining future development patterns and the economic needs of an area.

2.2 INCREASE LOW-GHG TRAVEL OPTIONS

2.2.1 Make Full Use of CMAQ Funds With Application Reviews That Consider GHG Reductions

Fully allocate all funding from the federal Congestion Mitigation and Air Quality (CMAQ) program and prioritize its use for GHG-reducing investments.

2.2.2 Improve Transit Service (Frequency, Convenience, and Quality)

Improve existing transit service (e.g., expanded hours or coverage of bus service, higher frequency bus routes, and investments in rail transit) to generate greater use of public transit and a consequential reduction in automobile travel. This option could also include expansion of intercity bus service. Data on travel origins and destinations can be useful in prioritizing intercity regional routes.

2.2.3 Transit Marketing and Promotion (Including Individualized Transit Marketing)

Fund promotion and marketing of transit to achieve greater use of public transit and a consequential reduction in automobile travel. A state subsidy that encourages the adoption of transit passes and allows for a reduction in transit fares could be part of this program. Targeted transit marketing has proved to be highly effective in reducing auto trips by increased transit use.

2.2.4 Expand Transit Infrastructure (Rail, Bus, Bus Rapid Transit)

Increase funding for new public transit infrastructure (e.g., rail lines and bus rapid transit [BRT] routes). Greater use of public transit and reduction in automobile travel can be achieved by expanding public transit infrastructure. This option could include expansion of intercity bus service (e.g., by providing centrally located urban bus terminals or pick-up areas). New transit lines increase the population base served by a transit system, extend system coverage for existing system riders, and expand the overall commercial, residential, and retail market served. Infrastructure improvements, such as physical track upgrades or the conversion of mixed traffic lanes to dedicated bus or light rail lanes, can significantly aid level-of-service measures.

2.2.5 Transit Prioritization (Signal Prioritization, HOV Lanes)

Improve transit level of service (travel time, reliability, and frequency) for urban buses and light rail through prioritization measures such as signal prioritization (where a transponder on the transit vehicle accelerates or extends the green cycle on traffic lights allowing the vehicle to avoid many red lights), or lane-specific prioritization (preemptively turning a red light green in a lane occupied by a bus or in an appropriate turn lane (thus allowing the bus to merge or turn

several seconds in advance of other traffic). Prioritization can also be achieved for buses through HOV lanes, which offer higher travel speeds.

2.2.6 Guaranteed Ride Home

Provide state funding to transit agencies and local jurisdictions to establish or expand guaranteed ride home (GRH) programs. This program encourages carpooling and transit usage by providing a back-up means to return home. Generally, this is aimed at persons concerned that without their own private vehicle at work, they will not have transportation in case of unexpected overtime, early departures for family sickness, or other similar situations. Participants are eligible a limited number of times annually for alternative transportation—including taxi fare where appropriate—as a back-up.

2.2.7 Create Regional Intermodal Transportation Centers

Provide funding for intermodal terminals in centralized location(s) where various forms of passenger transportation connect to one another, such as rail, bus, and bikeways. The intermodal centers can significantly improve the level of service for users by facilitating easier transfers, which can be established with coordinated schedules minimizing transfer wait times. Transfer timing and coordination improvements can be made by improving and publicizing better connections between bus and rail services. The high value that travelers place on reduced waiting time makes these improvements especially effective.

2.2.8 Bike and Pedestrian Infrastructure

Improve, construct, and promote sidewalks and bikeways to increase pedestrian and bicycle travel and reduce automobile use. Adding new sidewalks and improvements to existing sidewalks can facilitate many shorter trips by non-motorized means. Bicycle lanes can be on both shared streets and on segregated facilities physically separated from roadways except at crossings. Physical improvements could also include bicycle parking and shower or locker amenities at places of employment. Require local governments to have “complete streets” policies that provide for systematic adoption of sidewalks and a network of bicycle lanes to help achieve these improvements.

2.2.9 HOV Lanes

Increase funding and identify appropriate locations for additional HOV lanes. HOV lanes can be added through new road capacity designated for HOVs or by converting existing lanes and can also employ reversible lane strategies. HOV lanes are usually in effect only in the peak direction during rush hour; however, HOV lanes can also be in effect 24 hours. HOV programs are most successful as part of an integrated regional transportation strategy that includes other improvements (e.g., park-and-ride facilities) and incentives for transit and rideshare use.

2.2.10 Vanpooling and Carpooling

Provide financial incentives or preferential treatment for vanpools and carpools and fund supporting regional ride-matching programs. These options reduce VMT associated with workplace commuting as well as reduced rush-hour traffic congestion and the GHG emissions associated with traffic. Regional ride-matching programs provide a centralized database for matching drivers with others with similar commute schedules, origins, and destinations. Because

of registration information requirements, participant identities are known which helps address safety concerns.

2.2.11 Park-and-Ride Lots

Provide additional state funding for park-and-ride lots. This strategy will expand the construction of well-lighted and police-patrolled parking locations for carpoolers and others who would interface with buses, light- and heavy-rail and commuter trains. It is most effective when implemented jointly with HOV lanes and transit service. While participants must drive to the lot location, each facility still decreases VMT—especially the portion of the commute that occurs on the more congested radial routes—by a significant amount.

2.2.12 Car Sharing

Provide funding or subsidies and reserved parking locations for the introduction and expansion of public or private car-sharing operators. This measure represents the introduction of hourly rental schemes, with vehicles available at numerous locations throughout the metropolitan area. These schemes have reduced VMT largely through providing an alternative to car ownership, thus eliminating fixed vehicle costs (purchase and depreciation, insurance, and parking) and converting them to marginal costs. As vehicle owners determine that they can lower their overall transportation costs by disposing of one or more owned vehicles and participating in car sharing, annual VMT for these households can fall significantly.

2.2.13 Telecommute, Live-Near-Your-Work, and Compressed Work Week

Provide incentives to employers to provide options such as telecommuting, live-near-your-work, and compressed work weeks to reduce automobile commutes. The telecommuting option includes the development and utilization of neighborhood telecommuting centers that offer office-type services in locations close to commuters' residences. Live-near-your-work, also known as "proximate commute," encourages organizations with multiple locations (e.g., banks and fast food restaurants) to transfer employees such that the maximum number of employees work at the branch location closest to their home. A compressed work week (for example, four 10-hour days of work) can reduce the numbers of commute trips at organizations that are able to accommodate this schedule.

2.2.14 Require Government Agencies To Use Telecommuting

Require the state government to offer telecommuting for appropriate employees, which would reduce work trips and would provide a lead-by-example situation for public and private industries.

2.2.15 Telecommuting Centers, Support, and Incentives

Provide funding for regional telecommute centers and incentives for their use. These facilities vary in their details but provide an office-type environment where employees can receive various levels of logistical support for their telecommuting efforts. Employees can avoid having to create their own home work space and the distractions that sometimes correspond, employers can know their employees are in an office setting, and the facilities significantly decrease vehicle commute mileage.

2.2.16 E-Commerce

Provide a sales tax exemption for all e-commerce. A reduction in the number of light-duty vehicle trips can be achieved by using e-commerce instead of the traditional means of shopping, which involves passenger vehicle travel.

2.3 INCENTIVE AND DISINCENTIVES

2.3.1 Commuter Choice Programs / Parking Cash-Out

Provide incentives for employers to offer Commuter Choice Programs. These programs encourage employers to provide options such as telecommuting, transit subsidies, pre-tax transit fare programs, parking cash-out, and GRH service to reduce automobile commutes. Parking cash-out is a federal tax programs that allows employees to receive a cash payment as an alternative to receiving employer-paid parking. Transit benefits are a parking cash-out variant that allows employees to receive a tax-exempt payment valid on local transit systems. Commuter choice programs can also provide a ride-matching service solely within the employer's workforce, arrange and/or subsidize vanpools, and provide preferential parking and other amenities to carpoolers or others who do not drive alone to work. As an incentive to develop and provide such services, a tax credit can be offered to companies. Government spending to encourage commuter choice can stimulate a large private-sector match.

2.3.2 Adopt Best Workplaces for Commuters Policies

Create incentives for state employees and organizations to adopt the policies and programs set forth by the U.S. Environmental Protection Agency's (EPA's) Best Work Places Program to reduce VMT associated with daily work commutes. For more information, see: www.bestworkplaces.org.

2.3.3 Issue Free Bus Passes to Downtown Workers, Students, and Retired People

Provide funding to transit agencies for free bus passes for those who work in congested downtown areas, students, and retired persons. Transit pass programs allow discounted or unlimited rides within a given time period or for a specific number of rides. This measure serves to increase ridership by price-sensitive customers (e.g., college students). It also significantly helps replace personal vehicle trips with transit trips because these trips have become sunk costs—thus, they are free from a customer perspective, but because they are replacing a personal vehicle trip, they represent a no-cost mode shift to transit.

2.3.4 Transit Pricing Incentives

Provide a subsidy to transit agencies to reduce their fares. This option would include various incentives that give discretionary travelers reasons to choose transit. This could include reduced fares for populations such as seniors, it could be time-based (off-peak), or it could offer discounts. Reducing fares is one important means of increasing transit ridership; however, it is neither the only nor necessarily the most cost-effective means of doing so.

2.3.5 Free Downtown Parking to Carpoolers

Provide free downtown parking for carpoolers at municipal lots or through vouchers issued to carpoolers or through a subsidy to private parking operators. This provides an incentive for carpoolers while discouraging the use of single-occupancy vehicles.

2.3.6 Reserve Parking Spaces for High-Occupancy Vehicles and Car-Share Programs

Set standards that local jurisdictions can use to reserve parking spaces for high-occupancy vehicles and car-share programs. This kind of program would provide incentives for those who carpool or use car-sharing programs.

2.3.7 Benefits for Low-GHG Vehicles (Preferential Parking, Use of HOV Lanes)

Provide incentives to drivers of low-GHG emission vehicles. This would benefit vehicles that use alternative fuels and those with high fuel economy. Depending on effectiveness, these incentives could include preferential vehicle access to metered parking spaces or HOV lanes.

2.3.8 Location-Efficient Mortgages

Pass legislation permitting location-efficient mortgages and encourage and support their implementation. In this program, mortgage providers establish a lending program that adjusts mortgage rates to reflect transportation cost savings of living in or near transportation-oriented developments and not owning or using a car.

2.3.9 VMT Charges

The state would charge a tax or fee that reflects miles traveled by passenger vehicles. It would be collected through odometer audits at annual vehicle inspection visits or through GPS or similar systems as they become increasingly commonplace. In many cases, it has been proposed that the fee be revenue-neutral, offsetting fuel tax revenue that will likely decline with improving fuel economy and increased use of untaxed alternative fuels. As an alternative, revenues could be increased somewhat and used to fund transit and other transportation options within a corridor or region.

2.3.10 Increased Fuel Tax (With Targeted Use of Revenue Toward Travel Alternatives)

Increase the state tax on conventional fuels. Revenues can be dedicated to fund transit and other transportation alternatives within a corridor or region.

2.3.11 Pay-As-You-Drive Insurance

The state could pass necessary legislation to allow, encourage, and support the provision of pay-as-you-drive auto insurance, and could include support for additional pilot programs. This measure converts vehicle insurance from a relatively fixed annual amount (which varies little by mileage), to a mostly mileage-based rate. Thus, instead of paying \$480, \$600, or \$720 annually depending on one's actuarial bracket, one would pay \$.04, \$.05, or \$.06 per mile (based on the national average of 12,000 miles driven annually), plus perhaps a fixed amount to reflect theft or certain other largely mileage-independent risks. This measure has been shown to be a more accurate and equitable reflection of actual risks and has already been adopted as an insurance option in several states.

2.3.12 Congestion Pricing (With Targeted Use of Revenue Toward Travel Alternatives)

Increase the introduction of tolls and road pricing that varies with congestion levels (congestion pricing). This measure can be particularly effective at reducing congestion and thus significantly improving vehicle fuel economy in addition to bringing about some reduction in VMT. Roadway pricing revenues can help fund needed highway improvements and help manage system-wide

demand. In addition, pricing revenues can be used to fund transit and other transportation alternatives within a corridor or region.

2.3.13 Emission-Based Tolls (With Targeted Use of Revenue Toward Travel Alternatives)

Introduce emission-based tolls based on new car ratings and on emission inspection results for other vehicles, similar to a system now in place in Germany. Toll revenues can help fund needed highway improvements and help manage system-wide demand. In addition, pricing revenues can be used to fund transit and other transportation alternatives within a corridor or region.

2.3.14 Urban and Intercity Road Tolls (With Targeted Use of Revenue Toward Travel Alternatives)

Increase the use of and raise the rates for urban and intercity road tolls. Intercity tolls should be introduced on non-tolled intercity expressways and raised on currently tolled facilities. These measures may be expanded in part by the creation of new private or public-private partnership toll highways or by the conversion of existing public highways to toll status. Roadway pricing revenues can help fund needed highway improvements and help manage system-wide demand. In addition, pricing revenues can be used to fund transit and other transportation alternatives within a corridor or region.

2.3.15 Cordon Pricing

Implement cordon pricing (area pricing), as has been done in London, Stockholm, Singapore, and several Norwegian cities and is likely to be implemented soon in San Francisco. Cordon pricing involves implementing a toll to drive within central urban areas and uses electronic, camera, or similar toll collection methods to avoid the need for toll booths.

2.3.16 Parking Pricing, Excise Tax, and/or Supply Restrictions

Establish state standards, with incentives for local adoption, of parking management strategies. Automobile use is strongly influenced by the location, supply, and pricing of parking. Local governments can encourage reduction in automobile use by eliminating minimum parking supply requirements, establishing parking supply caps, encouraging higher parking prices, and other mechanisms. Parking ratios for the maximum number of spaces allowed can be set based on the level of transit service an area has. Smart parking ID systems can help inform drivers of parking availability and reduce excessive circling and searching.

2.3.17 VMT / GHG Offset Requirements for Large Developments

Require the identification of GHG emissions and mitigation measures as part of the environmental review process for large developments. At all levels of environmental review, require an inventory of the changes to GHG emissions that will result from the project or plan and identification of strategies that will be undertaken to offset all net new emissions or to help meet state or regional emission goals. Offsets can include preserving open spaces and converting to alternative fuel energy sources. Additionally, mitigation requirements could involve the use of a one-to-one VMT reduction measure, whereby developers would be required to invest in strategies that would reduce VMT by the amount expected to be created by the new development.

2.3.18 Research the Impact of GHG Emission Reduction Strategies on Transportation Revenue Sources

Research the impact of GHG emission reduction strategies on transportation revenue sources. Transportation revenues are largely dependent on taxes on motor fuel consumption; increases in vehicle fuel efficiency and alternative fuels will significantly reduce transportation revenue. Additionally, the increase in vehicle fuel efficiency will lower operating costs and may increase VMT.

2.3.19 Research Alternative Ways to Fund Transportation That Create Incentives to Drive Less

Examine alternative funding sources, taking into consideration federal, state, and local government programs as well as public–private partnerships and other potential revenue streams. Such sources may include mileage-based inspection fees, increased motor fuel taxes, increased vehicle registration fees, tolls and congestion pricing (including through public–private partnerships), and other similar measures.

2.2.20 CO₂ Conformity Requirements

Allocate transportation CO₂ budgets to local jurisdictions and require them to meet the budget to receive an additional amount of state funding. Technical assistance and review would be provided to help measure and monitor emissions and model future emissions to ensure that transportation plans conform to the budget. An emissions trading system could be permitted between jurisdictions at a defined market rate for emissions permits, because unlike for other air pollutants, the location of GHG emissions does not matter.

TLU-3. HEAVY-DUTY VEHICLES

3.1 HEAVY-DUTY VEHICLE TECHNOLOGIES

3.1.1 Vehicle Technology Improvements (e.g., Aerodynamics)

The fuel efficiency of freight trucks can be improved using a variety of equipment modifications (e.g., aerodynamic devices on both the tractor and trailer, speed governors, wide-base tires, fuel-efficient lubricants, low-rolling-resistance radial tires, and automatic tire inflation devices).

Government agencies can promote truck fuel efficiency improvements with financial incentives for equipment modifications and by providing outreach on the benefits of vehicle improvements to truck operators.

3.1.2 R&D on Low-GHG Vehicle Technology

The state could support R&D on low-GHG heavy-duty vehicle technology to encourage technological innovation in the field.

3.1.3 Black Carbon Control Technologies (e.g., Use of Particulate Traps and Other Complementary Technologies)

Diesel particulate matter includes black carbon aerosols, which are thought to contribute to global warming through positive radiative forcing. Diesel particulate emissions can be reduced through the use of several types of exhaust retrofit devices and particulate traps.

3.1.4 Facilitate Adoption of New Clean Technologies—Rail and Marine Engines

There are new proposed EPA criteria air pollutant emission standards for locomotive engines and commercial marine diesel engines. Steps or incentives might be taken to introduce these technologies to the marketplace before the proposed standards become federal requirements.

3.1.5 Single-Wide Tires, Low-Rolling-Resistance Radials, Automatic Tire Inflation

Government agencies can provide incentives for the use of energy efficient truck tires or technologies to improve the fuel economy of trucks. These strategies include the use of single-wide tires, low-rolling-resistance radials, and automatic tire inflation equipment.

Single-wide (rather than double-wide) tires improve fuel economy by reducing rolling resistance for vehicles. In addition, tires specifically designed as low-rolling-resistance tires are often provided as original equipment on new vehicles. However, these are often not chosen by the consumer for replacement tires because of their increased cost, despite their long-term cost savings through fuel economy improvements. In addition, the proper inflation of tires can have a significant impact on a truck's fuel efficiency. Automatic tire inflation equipment helps maintain the optimum tire pressure.

Because each of these eventually pays for itself (by reducing fuel consumption), a loan program for small operators or truck owner-operators can be beneficial. An awareness campaign can also be conducted in conjunction with EPA's SmartWay program to encourage truck operators to consider these tires and technologies.

3.2 HEAVY-DUTY VEHICLE OPERATIONS

3.2.1 Freight Logistics Improvements / GIS

Some inefficiencies in trucking operations increase fuel consumption. For example, excessive idling, using longer or more congested routes, and hauling empty trailers increase fuel consumption. Improving freight logistics through truck travel information (geographic information systems [GISs]) and other tools can help with load matching and route and schedule optimization.

3.2.2 Enforce Speed Limits

Reducing the number of trucks traveling over the speed limit can improve the fuel economy of these trucks, reduce GHG emissions, and improve safety. Speed cameras, both for intercity highways and urban roads, have proven to be an effective and cost-effective means for enforcing speed limits. In addition, it may be possible to lower the speed limit on interstates, freeways, and major arterials to improve the fuel efficiency of vehicles. However, reducing speed limits on facilities designed to support higher speeds may require significant enforcement.

3.2.3 Improve Traffic Flow

Improving vehicle flow on the roadway system can reduce fuel use and GHG emissions for all vehicles, including trucks. Coordinated operation of the regional transportation network (e.g., through the use of freeway ramp metering) can improve system efficiency, reliability, and safety.

3.2.4 Increased Size and Weight of Trucks

Larger trucks may take advantage of economies of scale to haul more freight with a proportionally smaller increase in fuel consumption. The state could therefore consider changing regulations on truck size and weight. However, there are several issues that would have to be considered before changing truck size and weight regulations. First, it is possible that this action would induce some shipments to shift from rail to trucking, possibly increasing net GHG emissions. In addition, increasing regulations on the size and weight of trucks also raises safety concerns and may increase road maintenance needs, among other issues.

3.2.5 Pre-Clearance at Scale Houses

Truck queuing and idling time can be reduced through pre-clearance at highway truck weigh stations and expanded use of weigh-in-motion systems.

3.2.6 Truck Stop Electrification

Truck emissions can be reduced by providing electrification at truck stops to reduce idling. These electrical hookups can provide power for heating, cooling, and other needs while trucks are stopped. This could be particularly beneficial at overnight rest stop locations.

3.2.7 Enforce Anti-Idling

Vehicle idling can be reduced by enforcing anti-idling ordinances and/or encouraging the use of alternatives to idling. Many states and local governments have adopted idling regulations for trucks and buses. Alternatives to long-term truck idling include the use of technologies such as automatic engine shut-down/start-up system controls, direct-fired heaters, auxiliary power units, and truck stop electrification.

3.2.8 Clean Freight Operating Improvements

The state could require or enforce the covering of rail cars. For example, uncovered coal trains result in fugitive coal dust emissions. The state could also consider ways to improve truck operations to reduce associated particulate (black carbon) emissions. For example, ports could maximize the implementation of “paperless gates” through the use of a Web-based booking system to prevent gate congestion and idling.

3.2.9 Freight Villages / Consolidation Centers

Provide economic incentives and siting assistance for the development of freight consolidation centers. These centers can reduce the number of truck trips taken by combining the loads of multiple underutilized trucks. When paired with intermodal railyards, they can also help make rail freight transportation, which produces fewer GHGs than trucking, more attractive.

3.3 INCREASING LOW-GHG HEAVY-DUTY TRANSPORTATION OPTIONS

3.3.1 Intermodal Freight Initiatives

This option focuses on strategies to encourage more use of rail freight, for example through improvements to railroad infrastructure and rail yards. In many cases, carrying freight by rail rather than by truck can reduce emissions and fuel consumption while also reducing congestion on major roadways. Shifting freight from trucks to rail also decreases impacts on highway infrastructure and may reduce truck-related idling and GHG emissions and particulate matter.

3.3.2 Feeder Barge Container Service

Marine container shipping is often assumed to be too slow for domestic freight, but Europe has seen high growth rates in waterborne (especially river) container freight over relatively short distances. This option would support policies and infrastructure investment to shift more freight back to marine shipments.

3.3.3 Increase Rail Capacity and Address Rail Freight System Bottlenecks

Increasing rail capacity may allow some freight to shift from trucks to rail. In addition, rail infrastructure improvements could enable more use of the more fuel-efficient double-stack rail cars.

3.3.4 Shift Freight Movements from Truck to Rail

Provide economic assistance and regulatory streamlining for the improvement of intermodal rail yards and the relief of rail freight bottlenecks. It is much more fuel efficient to move freight by rail than by truck. Moving freight from highways to rail would also relieve congestion on highways, improving the fuel economy of remaining vehicles.

3.3.5 Promote Strategies to Ease the Movement of Freight in More GHG-Efficient Ways

Provide economic assistance and regulatory streamlining for the improvement of intermodal rail yards, relief of rail freight bottlenecks, and encouragement of short sea (coastal) shipping. Provide technical assistance and promote awareness to freight users of the environmental benefits of adjusting their supply chain toward more GHG-efficient modes (rail, marine, and pipeline).

3.4 HEAVY-DUTY VEHICLE INCENTIVES AND DISINCENTIVES

3.4.1 Procurement of Efficient Fleet Vehicles (Public, Private, or Other)

This option would provide incentives for discounts for fleet operators for the purchase of more fuel-efficient heavy vehicles. It would also provide education and encouragement for “right-sizing” fleet vehicles, purchasing the most fuel-efficient vehicle for freight needs.

3.4.2 Incentives To Retire or Improve Older, Less Efficient Vehicles

GHG emissions from heavy-duty diesel vehicles can be reduced by developing and implementing an incentives program to accelerate the replacement and/or retirement of the highest-emitting diesel vehicles. Starting with the 2007 model year, stringent new federal emission standards for new heavy-duty diesel vehicles take effect. In addition, vehicle fuel

efficiency declines over time due to wear and tear. Incentives can be offered to the owners of older vehicles to retire their vehicles early and replace them with vehicles meeting the 2007 emission standards.

3.4.3 Maintenance and Driver Training

Better driver information and education can lead to improvements in fuel efficiency. Drivers need to be aware of maintenance issues that cause an increase in pollution and heavy vehicle operating costs. In addition, driver education programs could encourage energy-efficient driving habits, such as speed control and reductions in idling.

3.4.4 Increased Emission-Based Truck Tolls or Highway User Fees

Emission-based truck tolls and/or highway user fees can help reduce congestion and thereby reduce GHG emissions. In addition, roadway tolling can be used to provide revenue for construction or operation of more energy efficient modes of transportation (e.g., rail improvements).

TLU-4. INTERCITY PASSENGER TRAVEL: AVIATION, HIGH-SPEED RAIL, BUS

4.1 High-Speed Rail

Provide financing, regulatory relief, and the use of eminent domain to develop, publicly or privately, a high-speed intercity passenger rail system serving major urban areas. Provide additional financial assistance to improve services already provided by Amtrak on other routes. This would allow for the more energy efficient movement of people and would reduce GHG emissions associated with aircraft activity and highway travel while eliminating congestion for those traveling on the highway.

4.2 Integrated Aviation, Rail, Bus Networks (Planning, Governance, and Investment)

Encourage integrated transportation infrastructure between cities to support connectivity of alternative transportation modes. Intermodal passenger terminals shared between bus, rail, transit, and possibly airports can facilitate shifts away from personal vehicles.

4.3 Aircraft Emissions

Support increased operational efficiency of aircraft to reduce GHG emissions. Incentives or subsidies can be provided to accelerate implementation of a number of air traffic control innovations that are well under development (reduced vertical separation minimums, continuous descent landings) at state airports. Other improvements can include reduced aircraft engine idle time at the gate and on the runway, R&D on emission-reducing technologies for aircraft, and the use of ground tractors to pull aircraft the full distance from the gate to the taxiway (rather than inefficiently using the aircraft's engines for this purpose, already implemented by Virgin Atlantic).

4.4 Airport Ground Equipment

Reduce airport emissions through improved runway management and ground support equipment. This may include using alternative fuels and electrification of gates.

4.5 Intercity Bus Incentives and Subsidies

Offer incentives to potential passengers and provide loans and/or subsidies to operators (public or private) to offer improved and less expensive intercity bus service.

TLU-5. OFF-ROAD VEHICLES (CONSTRUCTION EQUIPMENT, OUTBOARD MOTORS, AND ATVS)

5.1 Incentives for Purchase of Efficient Vehicles and Equipment

Adopt a variety of programs to increase purchase of fuel-efficient or low-GHG vehicles and equipment (including pure electric, hybrid, plug-in hybrid, and other alternative-fuel vehicles). State incentives could include registration fees, feebates, and tax credits. Feebates would provide incentives for reduced GHG emissions by creating (1) fees on relatively high-emission/lower-fuel economy vehicles and (2) rebates or tax credits on low-emission/higher-fuel economy vehicles. Higher vehicle registration fees can be charged for vehicles that have lower fuel economy, or vehicles that use alternative fuels could be charged a lower vehicle registration fee. Vehicle licensing fees could be based on vehicle weight using a dollar-per-vehicle-ton multiplier instead of the present broad categories of vehicle weight.

5.2 Improved Operations, Operator Training

Provide off-road operations training and educational materials to increase public awareness of maintenance issues that may cause an increase in pollution and vehicle operating costs.

5.3 Increased Use of Alternative Fuels or Low-Sulfur Diesel

This option seeks to reduce GHG emissions by increasing the availability and usage of alternative fuels and low sulfur diesel for off-road vehicles.

5.4 Adopt Green Port Strategy (Port Land-Side: Clean-up Port Dwelling and Cargo Handling Equipment Operations)

Adopt port measures to encourage more energy efficient technologies for vessel dwelling (e.g., plug-in technology, vehicle retrofits) and for land-side cargo handling equipment (e.g., “Clean Truck Fees,” low-sulfur vehicles).

5.5 Low-Carbon Fuel (Off-road and Recreational Marine)

Expand low carbon fuel use to off-road and recreational marine vehicles. Provide incentives and support for low-carbon fuel infrastructure development.

5.6 Locomotive Idling Reductions

Reduce locomotive idling (including auxiliary engines that also idle) to help maintain power and promote plug-in power receptacles in the proposed train storage yards.

5.7 Inclusion of Idling Reduction Requirements

Include clauses in construction contracts that would restrict idling time for construction equipment.

5.8 Diesel Cranes at the Port, Electrification, or Other GHG-Reducing Alternatives

Encourage clean diesel cranes and consider electrification or other methods to reduce GHG emissions.

5.9 “Shore Power” at Port Sites

Advocate the future use of shore power where applicable and feasible for shipping vessels.