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## **Brief Descriptions of Catalog Items Transportation and Land Use Technical Work Group**

*This document provides brief descriptions of the policy options contained in the corresponding Technical Work Group (TWG) Catalog of State Policy Actions. The catalog and these brief descriptions will be developed more fully during the climate planning process in Kentucky.*

### **PASSENGER AND LIGHT-DUTY VEHICLES**

#### **TLU-1. LIGHT-DUTY VEHICLES: TECHNOLOGY AND OPERATIONS**

##### **1.1 Clean Car Program (Pavley Standards)**

Under the Clean Air Act, states have the option of adopting and implementing California's vehicle emission standards, which can be stricter than federal emission standards. Earlier in 2009, President Obama announced that new federal fuel economy standards for new light-duty vehicles will be established by a joint rulemaking process between the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Transportation (DOT). In effect, this rulemaking sets federal and California fuel economy standards that are identical for model years 2012–2016. So, unless a state moves very quickly to adopt California emission standards (so that they apply to pre-2012 model years) there is little that states can do via emission standards adoption beyond accepting the improvements in fuel economy that are expected to occur under the identical federal/California standards.

##### **1.2 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.

##### **1.3 Black Carbon Control Technologies (e.g., Use of Particulate Traps, 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.

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#### **1.4 Procurement of Low-GHG Fleet Vehicles (Fuel Efficiency, Alternative Fuel)**

This policy is aimed at using public vehicle fleets as an early adopter of low-greenhouse gas (GHG)-emitting vehicle technologies. This could be accomplished by making available loans and subsidies to municipalities, local governments, waste management organizations, etc., to encourage more rapid adoption of low-GHG-emitting technologies by fleets. While these fleet vehicles may be small in number, they provide a leadership example, along with experience with fueling and maintaining new technologies that might not otherwise occur.

#### **1.5 R&D on Low-GHG Vehicle Technology (e.g., Fuel Cells)**

States with existing vehicle manufacturing capability have considered ways to fund or incentivize new research and development (R&D) efforts aimed at producing more energy-efficient vehicles generally, and improvements to battery technology specifically.

#### **1.6 Lower and/or Enforce Speed Limits**

Lower vehicle speeds can improve fuel economy, reduce GHG emissions, and improve safety. One potential implementation method for this enforcement includes speed-detection cameras on 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 reductions.

#### **1.7 Vehicle Maintenance and Driver Education**

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) 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 affect pollution and vehicle operating costs, including tire inflation and engine lubricants. Such public education may also encourage energy-efficient driving habits (notably, slower acceleration, shifting at lower RPMs [revolutions per minute], and use of cruise control), as well as encourage the use of lower GHG modes of transportation. Eco-driver training might also be required as part of driver training programs for obtaining their first driver’s license.

#### **1.8 Reduce Vehicle Miles Traveled**

States or local governments may enact stricter idling restrictions, prohibiting idling for extended durations. States may also implement public awareness campaigns to encourage reduced idling.

## **TLU-2. LIGHT-DUTY VEHICLE INCENTIVES AND DISINCENTIVES**

### **2.1 Feebates (State-Specific or Regional)**

Proposed state feebate programs seek to reduce GHG emissions by imposing a fee on new, high-GHG-emitting vehicles and then rebating these fees to buyers of low-emission vehicles. A pivot point miles-per-gallon (MPG) level is set at a fuel economy value designed to ensure that the more efficient cars can be paid for by the fees on the less efficient vehicles.

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.

### **2.2 GHG-linked Registration Fees**

Annual vehicle registration fees are typically the same for each vehicle within a class. This program would establish a GHG-based vehicle registration fee that would be higher for low-fuel-economy vehicles and lower for high-fuel-economy vehicles. This would operate under the same principle as the federal gas-guzzler tax—which is charged to vehicles that have fuel economy below a certain MPG level.

### **2.3 Tax Credits for Low-GHG Vehicles**

Hybrids purchased or placed in service after December 31, 2005, may be eligible for a federal income tax credit of up to \$3,400. Credit amounts begin to phase out for a given manufacturer once it has sold over 60,000 eligible vehicles. States can consider establishing their own state income tax programs that might mirror the federal tax credit program for hybrids, but might be based on having GHG emissions below a certain grams per mile value. These tax credits would be based on new vehicle purchases.

### **2.4 Incentives for Low-GHG Vehicles (preferential parking, Use of HOV Lanes, Lower Tolls)**

Some states and metropolitan areas allow hybrids to use high-occupancy-vehicle (HOV) lanes, regardless of the number of passengers. This preference might also be awarded via achievement of an average fuel economy above a certain MPG level. Another preference option to encourage buying and using low-GHG vehicles might be lower cost or more convenient parking at businesses and shopping centers.

### **2.5 Tax Credits or Incentives to Retire or Improve Older High-GHG Vehicles (All Types)**

The federal government recently funded a short-term cash-for-clunkers program that encouraged owners of older, less fuel-efficient cars to replace them with new more fuel-efficient cars. Other programs of this type might be enacted to encourage further turnover of the light-duty fleet.

**2.6 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.

**2.7 Establish a Fleet Replacement Grant Program**

A government may incentivize earlier retirement of older fleet vehicles by creating a grant program that helps vehicle owners purchase more fuel-efficient, lower-GHG-emitting vehicles.

**2.8 Provide a Tax Incentive for Adult Bicycles**

Governments may provide an incentive 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 they will use, along with safety and security equipment.

**2.9 Support Alternative Travel in the Advertising Mainstream**

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

**TLU-3. ALTERNATIVE FUEL-RELATED MEASURES****3.1 Low-GHG Fuel Standard (e.g., Renewables Such as Ethanol and/or Biodiesel)**

This option would reduce GHG emissions by decreasing the carbon intensity of all passenger vehicle fuels sold. The low-carbon fuel standard would require all fuel providers in the state to ensure that the mix of fuel they sell into the state market meets, on average, a declining standard for GHG emissions measured in carbon dioxide-equivalent (CO<sub>2</sub>e) grams per unit of fuel energy sold. The state could regulate quality standards for low-carbon fuels, which include (but are not limited to) biodiesel, cellulosic ethanol, hydrogen, compressed natural gas (CNG), liquefied petroleum gas, electricity, and low-carbon blends, such as E10 or E85.<sup>1</sup>

The standard would be measured on a life-cycle basis in order to include all emissions from fuel production to consumption. Options for compliance may 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).

<sup>1</sup> E10 and E85 are fuel blends of 10% ethanol and 90% gasoline and 85% ethanol and 15% gasoline, respectively.

### **3.2 Fuel Quality Standards**

With new vehicle fuels being introduced into the motor vehicle fleet, associated fuel quality standards may need to be established to ensure that vehicle warranties are not voided if the fuels are deployed at fueling stations. The organization that normally sets fuel quality standards is the American National Standards Institute.

### **3.3 Low-GHG Fuel Mandates for State/Local Fleets**

Mandate that public vehicle fleets include alternative-fuel vehicles (e.g., CNG or biodiesel), 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.

### **3.4 Alternative Fuel Production Incentives**

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).

### **3.5 Targeted State Fuel Procurement to Encourage Alternative Fuel Production**

This might require minimum volumes of cellulosic ethanol and biodiesel to be blended into gasoline and diesel fuel commensurate with specified in-state production of these biofuels. This would be designed to ensure that biofuel produced will be blended and sold in the state—ensuring a market for biofuel producers.

### **3.6 Alternative-Fuel Infrastructure Development**

Directly provide and/or provide incentives to private providers of alternative-fuel infrastructure. The development of an alternative-fuel infrastructure can aid in the promotion of alternative-fuel use and offset the expense of equipment and installation costs. The convenient locations of stations offering alternative fuels at competitive prices can increase the use of the fuels.

### **3.7 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 and recommendations of which renewable fuels will be the best options for the city, state, or region.

## LAND USE EFFICIENCY AND MODAL OPTIONS

### TLU 4. LAND USE AND LOCATION EFFICIENCY

#### 4.1 Infill, 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, providing new centrally located areas for residential, commercial, or mixed-use development. Redeveloping brownfields also reduces average trip distances and can save public funds by taking advantage of existing infrastructure and public utilities.

#### 4.2 Transit-Oriented Development

Provide economic incentives, liberalized zoning, land-use restrictions, and permit streamlining to encourage dense mixed-use development of properties in proximity 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.

#### 4.3 Smart Growth Planning, Modeling, and 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 TOD.

#### 4.4 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 lands and recreational and agricultural areas.

#### 4.5 “Fix-It First” and Location-Efficient Funding Strategies

Encourage a prioritization of repairing existing infrastructure *in situ*, and revitalizing efficiently located areas, instead of expanding development to new areas, leaving blighted and deteriorated buildings and infrastructure in place. Funding mechanisms could include tax incentives, loan guarantees, grants, special-rate mortgages, and low-interest loans.

**4.6 Land Use, Zoning, Tax, and Building Code Reform**

Modify and fund reforms of state and local property taxes, development fees, zoning/building codes and policies, and statewide annexation policies to support GHG reductions and the implementation of state growth management plans. Measures can include property tax assessment policies regarding 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.

**4.7 State Congressional Advocates for Federal Action**

Pass legislation petitioning that the state's congressional delegation works for federal highway, transportation, and land-use-related legislation/programs supporting timely climate change action.

**4.8 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 its utilization by the state, and full funding for transit, pedestrian and bicycle facilities, intercity rail, and other climate-friendly investments should be prioritized.

**4.9 Downtown Revitalization**

Provide economic development (e.g., tax-based) incentives, and liberalize zoning and permitting processes (parking requirements, density and mixed-use restrictions, etc.) 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.

**4.10 Balance Economic Development With Agriculture, Protection of Natural Resources, and Preservation of 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 option involves taking multiple land uses and policy objectives into consideration—including economic development, agriculture, the preservation of natural resources, and the preservation of the rural character of a given area—when examining future development patterns and the economic needs of an area.

**TLU-5. TRANSPORTATION EFFICIENCIES in PLANNING, INFRASTRUCTURE, AND USE****5.1 Transportation System Management**

Improve existing transportation system management by analyzing current conditions, improving traffic flow, synchronizing traffic lights, installing roundabouts, building HOV lanes, designing intelligent systems, addressing interconnectivity of transportation options, etc. Improve overall system functionality through broad planning initiatives.

**5.2 Improve Transit Service (Frequency, Convenience, and Quality)**

Improve existing transit service (e.g., expanded hours or coverage of bus service, higher-frequency bus routes, 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. Use of state Department of Transportation data on travel origins and destinations could help determine whether there are intercity regional routes that need prioritization.

**5.3 Transit Marketing, Promotion, and Pricing Incentives**

Fund enhanced promotion and marketing of transit to achieve greater use of public transit and a consequential reduction in automobile travel. A state subsidy to encourage the adoption of transit passes and/or allow 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 through increased transit use.

**5.4 Expand Transit Infrastructure (Rail, Bus, Bus Rapid Transit)**

Increase funding for new public transit infrastructure (e.g., rail lines, bus rapid transit routes). Greater use of public transit and reduction in automobile travel can be achieved by expanding public transit infrastructure. This option also could include expansion of intercity bus service (e.g., by providing centrally located urban bus terminals or pickup areas). New transit lines increase the population base served by a transit system, extend system coverage for existing riders, and expand the overall commercial, residential, and retail markets 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.

**5.5 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.

### **5.6 Create Regional Multimodal Transportation Centers**

Provide funding for multimodal terminals in centralized location(s) where various forms of passenger transportation connect to one another, such as rail, bus, and bikeways. The multimodal 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/coordination improvements can be made through both improving and publicizing better connections between bus and/or rail services. The high value that travelers place on waiting time makes these improvements especially effective. These transportation centers would have anti-idling policies.

### **5.7 Bike and Pedestrian Infrastructure**

Improve, construct, and promote sidewalks and bikeways to increase pedestrian and bicycle travel and reduce automobile use. Providing new sidewalks and improving existing sidewalks can shorten pedestrian and bicycle trips. Bicycle lanes can be provided both on 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 government “complete streets” policies, providing for systematic adoption of sidewalks and a network of bicycle lanes, to help achieve these improvements.

### **5.8 High-Occupancy Vehicle Lanes**

Increase funding and identify appropriate locations for additional HOV lanes. HOV lanes can be added by converting existing lanes, employing reversible-lane strategies, and creating new road capacity designated for HOVs. HOV lanes are usually in effect only in the peak direction during rush hour; however, they 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 ride-share use.

### **5.10 Van Pooling and Car Pooling**

Provide financial incentives or preferential treatment for van pools and car pools, and fund supporting regional ride-matching programs. These options reduce vehicle miles traveled (VMT) associated with workplace commuting, as well as 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 requirements, participant identities are known, addressing safety concerns.

### **5.11 Park-and-Ride Lots**

Provide additional state funding for park-and-ride lots. This strategy will expand the construction of well-lit, police-patrolled parking locations for car poolers and others to interface with buses, light and heavy rail, and commuter trains in the state. It is most effective when implemented jointly with HOV lanes as well as transit service. While participants still must drive to the lot location, each

facility still decreases VMT—especially the portion on the more congested radial commute routes—by a significant amount.

#### **5.12 Car-Sharing Programs**

Provide funding or subsidies, and reserved parking locations, for the introduction/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 eliminated fixed vehicle costs (purchase/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.

#### **5.13 Telecommute, Live Near Your Work, and Compressed Work Week**

Provide incentives to employers to provide such options 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.

The live-near-your-work option, also known as “proximate commute,” encourages organizations with multiple locations (e.g., banks, fast-food restaurants) to transfer employees, such that the maximum number work at the branch location closest to their home. A compressed work week (for example, four 10-hour days of work) can reduce the number of commute trips at organizations that are able to accommodate this.

#### **5.14 Require Government Agencies to Use Telecommuting**

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

#### **5.15 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 to telecommute. Employees can avoid having to create a work space in their home and the distractions that sometimes correspond, employers can know their employees are in an office setting, and the facilities significantly decrease vehicle commute mileage.

#### **5.16 Make Full Use of Federal Congestion Management Air Quality Funds**

Fully allocate all funding from the federal Congestion Mitigation and Air Quality program, and prioritize its use for GHG-reducing investments. Consider all GHG reductions in application reviews.

**5.17 Thorough Analysis of Future Infrastructure Capacity**

Expand planning efforts to focus future infrastructure capacity assuming a low-carbon future. Adjust existing out year plans to reflect a greater sensitivity to promoting low-GHG travel and reducing overall VMT through intelligent system planning.

**5.18 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 are associated with a reduction in GHG emissions and make these areas more attractive, convenient, and safe for bicyclists and pedestrians, encouraging these climate-friendly modes.

**INCENTIVES and disincentives****6.1 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 program, parking cash-out, and guaranteed ride home 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 van pools, and provide preferential parking and other amenities to car poolers 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.

**6.2 Adopt Best Work Places for Commuters Policies**

The state would adopt for state employees and provide incentives to other organizations to adopt the policies and programs as set forth by EPA's Best Work Places Program to reduce VMT associated with daily work commutes. For more information, please visit: <http://www.bestworkplaces.org>.

**6.3 Issue Free Bus Passes to Downtown Workers, Students, and Retirees**

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 number of rides. This measure serves to increase ridership by price-sensitive customers (e.g., college/university 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.

**6.4 Transit Pricing Incentives**

Provide a subsidy to transit agencies and universities 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] or for specific times [such as off-peak travel]) or offer discounts. Reducing fares is one important means to increase transit ridership; however, it is neither the only nor necessarily the most cost-effective means.

**6.5 Free Downtown Parking for Car Poolers**

Provide free downtown parking for car poolers at municipal lots or through vouchers issued to car poolers or a subsidy to private parking operators. This option provides an incentive for car poolers while it discourages single-occupancy vehicles.

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

Set standards for local jurisdictions to reserve parking spaces for HOVs and car-share programs. This program provides incentives for people who car pool or use car-sharing programs.

**6.7 Guaranteed Ride Home**

Provide state funding to transit agencies and local jurisdictions to establish or expand guaranteed ride home programs, which encourage car pooling and transit use by providing a backup means to return home. Generally, this is aimed at people concerned that without their own private vehicle at work, they will not have transportation in case of unexpected overtime work, early departures for family sickness or emergencies, and similar situations. A limited number of times annually participants are eligible for alternative transportation—including taxi fare where appropriate—to provide this backup transportation.

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

Provide incentives to drivers of vehicles with low-GHG emission rates. This would be both vehicles using 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.

**6.9 Vehicle-Miles-Traveled Charges**

The state would charge a tax or fee reflective of miles traveled by passenger vehicles. It would be collected through odometer audits at annual vehicle inspection visits or through global positioning system 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 is on a trajectory to otherwise 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 alternatives within a corridor or region.

**6.10 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.

**6.11 Pay-As-You-Drive Auto Insurance**

The state would pass necessary legislation to allow, encourage, and support the provision of pay-as-you-drive auto insurance, possibly including state 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 annual miles), 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.

**6.12 E-Commerce Incentives**

Provide a sales tax exemption for all e-commerce. Light-duty-vehicle trip reductions can be achieved through the use of e-commerce instead of traditional means of shopping involving passenger vehicle travel.

**6.13 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 can significantly improve vehicle fuel economy and reduce 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.

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

Introduce emission-based tolls based on new car ratings and other vehicles' inspection results, 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.

**6.15 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 due to new private or public-private partnership toll highways, or the conversion of existing public highways to this 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.

**6.16 Cordon Pricing and/or Allocations**

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 the implementation of a toll to drive within central urban areas, using electronic, camera, or similar toll collection to avoid the need for toll booths. Restrictions on entry to high-congestion areas, such as used in Rome, allows entry based on even or odd license plate numbers with tight enforcement. Controlled entry can limit the number of vehicles admitted into congested areas.

**6.17 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 an area's level of transit service. Smart parking identification systems can help inform drivers of parking availability and reduce excessive circling and searching.

**6.18 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. In all levels of environmental review, require an inventory of the changes in 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, for example, 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.

**6.19 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, will lower operating costs, and may increase VMT.

**6.20 Research Alternative Transportation Funding That Creates 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 similar measures.

**6.21 CO<sub>2</sub> Conformity Requirements**

Allocate transportation CO<sub>2</sub> 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 in the measurement and monitoring of emissions, as well as the modeling of future emissions to ensure transportation plans conform to the budget. An emissions trading system could be permitted between jurisdictions, at a defined market rate for emission permits, as unlike for other air pollutants the location of GHG emissions does not matter.

**6.22 Encourage Coordination and/or Consolidation of Transit Agencies**

Encourage coordination and/or consolidation of transit agencies to reduce costs and increase service options and increase coordination in intermodal transportation.

**HEAVY-DUTY VEHICLES****TLU-7. HEAVY-DUTY VEHICLE TECHNOLOGY****7.1 Freight 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 tractors and trailers, speed governors, wide-base tires, fuel-efficient lubricants, low-rolling-resistance radial tires, automatic tire-inflation devices, auxiliary power units).

EPA's SmartWay transport program offers a number of alternatives that could be used to improve the fuel efficiency of existing freight trucks. These technology options might include installation of aluminum wheels for single-wide tires to reduce vehicle weight and rolling resistance. Another option might be to install fairings to improve vehicle dynamics. There is evidence that implementation of SmartWay truck transport initiatives has been more successful via loan programs than by grants.

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

**7.2 R&D on Low-GHG Vehicle Technology**

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

### **7.3 Black Carbon Control Technologies**

There have been many recent initiatives to retrofit existing heavy diesel-powered vehicles with particulate controls. Such programs could be expanded in order to achieve added benefits for the purposes of reducing black carbon emissions.

### **7.4 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 vessel diesel engines. Steps or incentives might be taken to introduce these technologies to the marketplace earlier than the federal requirements.

### **7.5 Tire Technologies**

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 trucking 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.

## **TLU-8. HEAVY-DUTY VEHICLE OPERATIONS**

### **8.1 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 and other tools, can help with load matching and route and schedule optimization.

### **8.2 Lower and/or Enforce Speed Limits**

Reducing the number of trucks traveling over the speed limit can improve the fuel economy of these trucks, which reduces GHG emissions and can also improve safety. Speed cameras, both for intercity highways and for urban roads, have proven to be an effective and cost-effective means for enforcing speed limits.

### 8.3 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, such as through the use of freeway ramp metering, can improve system efficiency, reliability, and safety.

### 8.4 Allow Increased Size and Weight of Trucks

States typically limit the size and weight of trucks that travel on their highways. Allowing larger trucks to travel in a state could lead to more efficient freight movement on a CO<sub>2</sub>e-per -on-mile basis. Larger trucks may take advantage of economies of scale to haul more freight with a proportionally smaller increase in fuel consumption. Therefore, the state could consider changing state truck size and weight regulations. However, several issues would have to be considered before changing regulations. First, this action might 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 raises safety concerns, and may increase road maintenance needs, among other issues.

### 8.5 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.

There are advanced automated vehicle information technologies available that enable qualified motor carriers to electronically comply with state safety, weight, and credential requirements while traveling down the road at highway speeds, thereby enabling them to bypass weigh stations. An example can be found at <http://www.prepass.com>.

### 8.6 Truck Stop Electrification

Truck emissions can be reduced by providing electrification at truck stops to reduce idling and associated fuel consumption during extended stays at truck stops. These electrical hookups can provide power for heating, cooling, and other needs while trucks are stopped, which could be particularly beneficial at overnight rest stops. While electricity produces some GHG emissions, they are typically much less than the emissions that occur from trucks leaving their engines running.

### 8.7 Adopt and/or Enforce Anti-Idling Regulations for Buses/Trucks

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.

Many states and local areas have regulations that restrict idling from diesel vehicles with a gross vehicle weight above a certain amount (e.g., 10,000 lbs. gross vehicle weight). A typical regulation

might restrict diesel idling to 5 minutes. Some of these regulations are designed to reduce exposure to particulate matter. Idling restrictions also reduce the amount of fuel that diesel-powered commercial vehicles consume, which provides GHG emission reductions.

### **8.8 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,” such as through the use of a Web-based booking system to prevent gate congestion and idling.

### **8.9 Freight Villages/Consolidation Centers**

The state could 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 rail yards, they can also help make rail freight transportation (which produces fewer GHGs than trucking) more attractive.

## **TLU-9. INCREASING LOW-GHG HEAVY-DUTY TRANSPORTATION OPTIONS**

### **9.1 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 trucks 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.

### **9.2 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.

### **9.3 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.

### **9.4 Shift Freight Movements From Truck to Rail**

Economic assistance and regulatory streamlining could improve intermodal rail yards and relieve rail freight bottlenecks. Moving freight by rail is much more fuel efficient than by truck. Moving

freight from highways to rail would also relieve congestion on highways, improving the fuel economy of the remaining vehicles on the road.

### **9.5 Promote Strategies to Move Freight in More GHG-Efficient Ways**

Economic assistance and regulatory streamlining could improve intermodal rail yards, relieve rail freight bottlenecks, and encourage short sea (coastal) shipping. Freight users could be provided technical assistance and educated about the environmental benefits of adjusting their supply chain toward more GHG-efficient modes (rail, marine, and pipeline).

## **TLU 10. HEAVY-DUTY VEHICLE INCENTIVES AND DISINCENTIVES**

### **10.1 Procurement of Efficient Heavy-Duty Fleet Vehicles**

This option would provide incentives or 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 vehicles for freight needs.

### **10.2 Tax Credits or Incentives for New Equipment or to Retire or Improve Older, Less Efficient Vehicles**

GHG emissions can be reduced from heavy-duty diesel vehicles 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, the fuel efficiency of vehicles 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.

For heavy-duty diesels, which are usually operated for many more miles than the light-duty fleet, the incentives might be directed at installing fuel-efficient tires or other truck retrofits to achieve improved truck fuel economy on older trucks.

### **10.3 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-duty-vehicle operating costs. In addition, driver education programs can encourage energy-efficient driving habits, such as speed control and reductions in idling.

### **10.4 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-11. INTERCITY PASSENGER TRAVEL: AVIATION, HIGH-SPEED RAIL, BUS****11.1 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, reducing GHG emissions associated with aircraft activity and highway travel, while eliminating congestion for those traveling on the highway.

**11.2 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.

**11.3 Aircraft Emission Reductions**

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 of 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).

**11.4 Airport Operations and Ground Equipment**

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

**11.5 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.

**11.6 Improved Passenger Rail Service**

Improve and expand options, routes, schedules and connectivity of the passenger rail system to encourage use of and the associated GHG reductions from more efficient transport.

**TLU-12. OFF-ROAD VEHICLES: CONSTRUCTION EQUIPMENT, OUTBOARD MOTORS, ATVs****12.1 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/or tax credits. Feebates would provide incentives for reduced GHG emissions by creating fees on relatively high-emission/lower-fuel-economy vehicles, and 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, with use of a dollar-per-vehicle-ton multiplier instead of the present broad categories of vehicle weight.

**12.2 Improved Operations and 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.

**12.3 Increased Use of Alternative Fuels or Low-Sulfur Diesel**

Increase the availability, accessibility, and use of alternative fuels and low-sulfur diesel for off-road vehicles. Expand low-carbon fuel use to off-road and recreational marine vehicles. Provide incentives and support for low-carbon fuel infrastructure development.

**12.4 Adopt Green Port Strategy**

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

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

Consider shore power where applicable and feasible for shipping vessels in port.

**12.5 Marine Vessel Efficiency Improvements**

Enforce speed limits and encourage upgrades to more efficient marine engines.

**12.6 Locomotive Idling Reductions**

Reduce locomotive idling, including auxiliary engines, to help maintain power, as well as plug-in power receptacles in the proposed train storage yards.

**12.7 Idling Reduction Requirements for Construction Equipment**

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