

Transportation Strategies with Emissions Benefits

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Transportation Demand Management Strategies

1. Shared Ride Programs/Projects

Strategy	Examples
Park-and-Ride facilities	New park-and-ride facility
	Add parking to existing facilities
High-Occupancy Vehicle (HOV) lanes	Separate roadway for exclusive HOV use
	Barrier separated lanes within freeway right-of-way
	Concurrent flow lane
	Contra-flow lane
	HOV on arterial streets
Regional rideshare outreach/matching	Bypass lanes for HOVs at metered freeway entrance ramps
	Implement regional rideshare matching programs
Regional rideshare incentives	Upgrade ridematching software (regional address recognition, corridor search)
	Carpool incentives (e.g., free gas card, drawings)
Dynamic rideshare programs	Vanpool incentives (e.g., subsidized vanpools)
	Real-time rideshare matching
Encourage shared ride taxis	
Regional vanpool network	
Short-distance vanpools	Vanshare program providing access from transit to workplaces

2. Bicycle and Pedestrian Programs/Projects

Strategy	Examples
New bicycle paths, lanes, routes, or safety enhancements	Bicycle paths/lanes
	On-street bicycle routes
	Multi-use trails
	Rails-to-trails conversions
	Bicycle safety enhancements (lighting, grades, markings.)
Bicycle parking	Bicycle racks
	Bicycle lockers
	Attended bicycle parking
	Ordinances requiring bicycle parking
Bikes on transit programs	Bicycles on buses
	Bicycles on rail
Bicycle information	Informational signage (e.g., Share the Road signs, designated bicycle routes)
	Bicycle maps/plans
	Bicycle educational information, including bicycle safety information
	Bicycle coordinators
	Bicycle awareness/safety events
Bicycle share programs	Public use bicycles
	Bike stations providing maintenance facilities
Financial incentives to own bicycles	Free bikes program
	Cash rebates for bicycle purchases
Pedestrian connections/sidewalks	New sidewalks
	Sidewalk improvements (curb ramps, sidewalk gap closure)
	Pedestrian bridges/tunnels
	Mid-block pedestrian connections
Enhancing the pedestrian environment	Wider sidewalks
	Tree plantings
	Crosswalk light fixtures
	Street lights
	Sidewalk furniture (benches, etc.)
	Pedestrian safety modifications (count down pedestrian signals)

3. Transit

Strategy	Examples
New transit routes/services	New bus routes
	New rail lines
	Demand response shuttle
	Circulator buses
	Express bus service
More frequent service	Additional buses in service on existing routes (to reduce headways)
Longer service hours	Expansion beyond peak periods
	Late night hours
More capacity on services	Larger buses
	Additional railcars on trains
	Redesign of seating/standing
Faster travel times/improved system performance	Busways/bus rapid transit (BRT)
	Improved bus/rail integration
	Transit signal prioritization
	Improved connections/reduced transfer times
	Transit centers
	Change routing
Passenger amenities	Bus shelters
	Benches/seating at bus stops
	Improved maintenance of buses/trains and stops/stations
Improved transit access	Increased parking at transit stations
	Shuttle and feeder bus services
	Improved pedestrian/bicycle access and bicycle parking
Transit information	Signage/maps/schedules at bus/train stops
	Signage/maps/schedules at major activity centers (e.g., malls, sports venues)
	Terminal displays/kiosks with real-time passenger information
	Transit information kiosks (e.g., suburban employment, downtown, tourist sites)
	Web page with transit planning capabilities
	Inclusion of transit information in 511 and other travel planning services
	Real-time text messaging/on-line information on bus schedules
Transit marketing and promotions	Transit promotional campaign
	Branding of services / routes
Reduced fares/free services	Lower transit fares
	Fare free zones
	Free transit services
Fare structure/convenience improvements	Fare structure simplifications
	Elimination of fares for transfers
	SmartCards
	Automated fareboxes
Transit pass programs	Monthly passes
	Annual passes
	Ecopasses/universal passes
	Multimodal/Smart passes (for transit, parking, carshare)
	Off-peak pass (low cost pass for unlimited use in off-peak hours)
"Try it" transit pass give-aways	Promotional transit pass give aways
	First month free program for new services

4. Parking Management

Strategy	Examples
Parking pricing / fees	Increase public parking fees
	Increase taxes on parking providers
	Impose or increase fees/surcharges on SOVs
	Free or reduced priced parking for carpools/vanpools
Parking supply limits	Parking maximums for new development
	Regional parking caps
	Create parking/traffic-free zones
	Peak-hour parking bans
	Curb-parking restrictions

Preferential parking for carpools/vanpools	Premium parking spots for carpools/vanpools
	Guaranteed parking for carpools/vanpools
Parking cash out program	

5. Pricing

Strategy	Examples
Road pricing	New tolls
	Increase tolls on roads
	Increase bridge tolls
	High Occupancy Toll (HOT) lanes
Cordon pricing	Charge vehicles for entering high-use area, such as CBD
Variable priced tolls	Peak period surcharge
	Prices vary based on traffic levels
Variable parking fees	
Pay-As-You-Drive Vehicle Insurance	Incentives for per-mile vehicle insurance
	Pilot programs for per-mile vehicle insurance
VMT-based registration fees	
Increase in gas tax	
Employee tax credits	Tax credit for using transit, HOV, or bicycling

6. Employer-based TDM Programs

Note: A wide range of different employer-based demand management options are available, including: transit passes, vanpool subsidies, rideshare matching, bicycle lockers/showers, telecommuting programs, flexible work hours, compressed work schedules, etc. These programs typically are not promoted individually but as packages of strategies, and would be analyzed as a comprehensive program. As a result, the list below focuses on government policies or programs, not individual TDM program elements. The analysis of these strategies requires an assessment of levels of participation in different types of TDM activities.

Strategy	Examples
Employer marketing and support	Outreach to employers/information programs to encourage commute options
	Recognition/awards programs
Telecommuting support/incentives	Support in establishing telecommuting programs
	Telecommuting financial incentives
Telework centers	Remote/satellite offices close to residential areas
	Telework centers in communities
On-going incentives for employer-based transit/vanpool/carpool programs	Subsidized transit passes
	Subsidized vanpools
	Tax credit for employers that offer TDM programs, transportation coordinators
Start up incentives for employer-based transit/vanpool/carpool programs	Short-term (start-up) financial incentives for implementing transit pass program
	Short-term financial incentives for implementing vanpool/carpooling program
Implement programs at government worksites	Flexible work hours programs
	Compressed work scheduled programs
	Telecommuting
	Promote ridesharing, transit, bicycling, walking
Mandatory commute trip reduction programs	Mandatory programs for employers of certain size
	Mandatory program for employers in certain locations/business districts
Regional guaranteed ride home program	Guaranteed ride home program
	Emergency ride home program
Support proximate commuting	Reassigning employees so they can work at a location closest to home

7. Non-employer-based TDM Programs

Strategy	Examples
School-based programs	School pools
	Safe Routes to Schools programs
	"Walking bus" programs
Campus programs	University parking pricing / TDM programs
Community-based programs	Community association/residential building based TDM programs
Development-based programs	Require new developments to meet trip reduction targets, have TDM programs
Airport-based programs	Airport parking / TDM programs
Tourism promotions	Hotel partnerships to promote transit use, walking/bicycling

	Tourism site partnerships to promote transit use, ridesharing, walking, bicycling
Special events-based programs	Stadium events management
	Festivals and other events management
	Combined event ticket/transit pass

8. Outreach/Marketing/Education

Strategy	Examples
Regional TDM program outreach	Media campaigns/Public service announcements Voluntary "No Drive," "Share a Ride" Days
Episodic (Spare the Air / Ozone Action Days) programs	Media campaigns Ozone Action Coordinators Free/reduced price transit on Ozone Action Days Special incentives on Spare the Air Days Voluntary business closures / business practices
Educational curriculum	Incorporate air quality awareness into public school curriculum Incorporate information about transit, ridesharing into public school curriculum
Transportation management organizations	Regional Commute Management Organizations Local Transportation Management Associations

9. Integrated Land Use-Transportation Planning

Note: A wide range of different land use policy mechanisms are available, including: zoning requirements, impact fees, developer incentives, regional growth boundaries, etc. These policies typically would not be analyzed individually but as a package of strategies that affects land use patterns, and hence, travel and emissions. As a result, these strategies are not listed individually. Sometimes, strategies are identified based on the focus of the efforts: transit-oriented development, mixed-use activity centers, pedestrian-oriented design, etc. Five strategies are listed below that are organized around different types of programmatic approaches.

Strategy	Examples
Transit-oriented development (TOD)	Joint-development programs
Programs/requirements/ incentives to encourage better regional land use/transportation coordination	Developer incentives (e.g., density bonuses for development near transit/urban core, reduced impact fees in TOD) Impact fees Zoning requirements Regional growth boundaries Concurrency requirements (adequate public facilities ordinances) Accessibility contracts (e.g., preferred access to road system for land use projects)
Programs/requirements/ incentives to improve community design	Design standards (requirements for amenities, layout to street, etc.) Incentives for developers to incorporate public spaces and other amenities
Neighborhood schools	Locate schools in communities, with access via walking and bicycling
Incentives to live near work/transit/downtown	Location Efficient Mortgage Energy Efficient Mortgage Tax credits for redeveloping in blighted neighborhoods Tax credits for living downtown

10. Vehicle Use Restrictions

Strategy	Examples
Auto-free zones	Pedestrian malls Transit malls Car bans in CBD
Limit access to HOVs only	Require 2+ vehicle occupancy to enter designated congested activity centers/parking facilities during peak periods
No Drive Days	

11. Other Options to Reduce Auto Ownership / Avoid Vehicle Trips

Strategy	Examples
Carsharing programs	Car-sharing programs Station cars Incentives for use of carsharing programs
Using technology to avoid vehicle trips	E-government initiatives Use teleconferences/web conferences

Transportation System Management / Vehicle Driver Behavior-Oriented Strategies

Transportation system management (TSM) strategies focus on changing the operation of the transportation system, typically with a primary focus on improving traffic flow and reducing traveler delay. TSM programs can reduce emissions by changing vehicle speeds, reducing rapid vehicle accelerations and decelerations, and reducing vehicle idling. Many of these strategies are under the umbrella of Intelligent Transportation Systems (ITS). In addition, some strategies focus directly on encouraging changes in driving behavior through educational information, incentives, or restrictions on driving speeds, operating patterns, and idling. These strategies are listed below.

12. Traffic Signal Synchronization

Strategy	Examples
Signal retiming	
Advanced traffic signal controls	Adjust traffic control/signals based on traffic levels

13. Roadway / Intersection Improvements

Strategy	Examples
One-way streets	Convert two-way streets to one-way to improve operations
Turn restrictions	Restrict left turns on two-way streets
Turning lanes	Separate turning vehicles from through traffic to avoid unnecessary backups
Roundabouts	Implement traffic circles to improve traffic movement
Limit on-street parking	Remove or limit on-street parking during peak hours Enforce on-street parking limits
Intersection improvements	Construct interchanges instead of signalized intersections Develop tunnels/overpasses Grade separations at railroad/transit crossings
Bus pullouts	Bus pullouts in curbs Queue jumper lanes for passenger loading/unloading

14. Incident Management / Operations

Strategy	Examples
Incident management programs	Intersection/corridor monitoring and response
	Call number to report incidents
	Roadside assistance vehicles
	Motorist aid call boxes
	Rerouting traffic at incidents
	Active/dynamic traffic management systems (e.g., manage speeds; routes)
Ramp metering	
Encourage use of underutilized capacity	Route marking directing traffic to underutilized capacity Reversible traffic lanes
Allow use of road shoulders during peak periods/to get around incidents	

15. Traveler Information Systems

Strategy	Examples
Real-time traveler information systems	Variable message signs (directing traffic from incidents)
	Variable message signs and information including comparative travel times
	Real-time information services (including integrated, multi-modal information)
	Web site with real-time traffic information, speed information
	Toll-free phone number (511)
Real-time parking information	Availability updates (to reduce unnecessary searching for parking) Automated reservations and payment

16. Speed Control

Strategy	Examples
Lower speed limits	55 mph highways
Increased speed enforcement	Photo speed enforcement
	Increased police enforcement
	Enforcement against aggressive driving (reduce incidents which cause delay)
Driver training/education	Information about saving fuel with less vehicle stops/starts

17. Access Management

Strategy	Examples
Access management	Limit development of access points to arterials/highways
	Parallel access roads

18. Shifting/Separating Freight Movements

Strategy	Examples
Shifting freight movement to off-peak periods	PierPASS program
Truck-only lanes/routes	Truck-only lanes
	Truck-only roads/routes
Truck restrictions	Road restrictions on trucks
	Restrictions during peak hours
Consolidated freight/package delivery	Consolidation at peripheral CBD locations or neighborhood locations
Rail shuttles	Containers brought to inland distribution center
Container matching services	Transport of empty containers minimized

19. Anti-Idling

Strategy	Examples
Anti-idling restrictions	School bus anti-idling restrictions
	Truck anti-idling restrictions
	Personal vehicle anti-idling restrictions (in specific zones, near schools, etc.)
Anti-idling information campaigns	Idling reminder hang-tags for trucks and commercial fleets
	Remote idling reminders (On-Star-type service)
	Inclusion of information in drivers education and at auto dealerships
Restrictions on drive-through services	
Freight facility improvements	Expansion/improvement of port terminals, intermodal facilities, etc. to reduce queuing and idling

Vehicle, Fuels, and Technology Strategies

Vehicle, fuel, and technology projects and programs are designed to change the emission rates of vehicles either by changing the fuel being used, the type of vehicle or emissions control technology, or a combination of both. Some programs also focus on eliminating gross polluters, or vehicles whose emissions controls have failed, or on controlling specific types of emissions (e.g., road dust). These strategies are listed below.

20. Accelerated Vehicle Retirement/Fleet Renewal/Replacement

Strategy	Examples
Vehicle buy-back programs	Vehicle scrapping program
Fleet renewal / clean vehicle programs	School bus replacements
	Transit bus purchases/replacements
	New purchases/replacements of heavy-duty trucks for solid waste trucks, etc.
	New purchases/replacements of light-duty vehicles (e.g., government fleets)
	Repowering / replacing existing older diesel engine with a newer, cleaner engine.

21. Heavy-Duty Diesel Vehicle Repowering/Retrofits

Strategy	Examples
Mandatory fleet retrofits	
Government contracting requirements	
Voluntary programs with funding	Carl Moyer, TERP-type programs

22. Idle Reduction Technologies

Strategy	Examples
Truck stop electrification	
Purchase of auxiliary power units	APUs Electronically-driven auxiliary systems

23. Purchases of Advanced Technology and Alternative Fuel Vehicles

Strategy	Examples
Cleaner diesel fuels	Emulsified diesel
	Oxygenated diesel
	Biodiesel
	Fuel borne catalyst
Purchases of alternative fuel vehicles (buses, other heavy-duty vehicles, light-duty vehicles)	LNG vehicles
	CNG vehicles
	Ethanol / methanol
	LPG vehicles
	Electric vehicles

24. Programs to Encourage Purchases of Advanced Technology/Alternative Fuel Vehicles

Strategy	Examples
General tax / financial incentives	Tax credits for purchase of low emissions vehicles
	Tax credits for purchase of alternative fuel vehicle
	Feebates
	Vehicle emissions fees
Specific target market programs	CNG taxicab program
HOV lane use allowed for advanced technology/ alternative fuel vehicles	
Preferential/free parking for advanced technology/ alternative fuel vehicles	
Government contracting requirements	Contracts requiring alternative fuel/low emissions vehicles

25. Inspection and Maintenance

Strategy	Examples
Basic I&M	
Enhanced I&M and on-board diagnostics	
Remote Sensing	Roadside pullovers
Smoking vehicle programs	Toll-free number for reporting high polluting vehicles
Heavy-duty vehicle inspections	

26. Road Dust Reduction Strategies

Strategy	Examples
Mitigation for unpaved roads	Apply water
	Apply wet gravel
	Apply chemical/organic dust suppressant
	Use vegetative matter to reduce blowing dust
Road paving	Pave previously unpaved roads
	Pave road shoulders
Street sweeping	Regular street sweeping on paved roads
	Sweeping to remove sand and other de-icing/de-skid materials on paved roads
Transportation construction site mitigation efforts	Require water or chemical stabilizers to be applied
	Require wind barriers

Non-Road Strategies

27. Encourage Replacement/Repowering/Retrofits*

Strategy	Examples
Mandatory fleet retrofits	Only CA requirements can be adopted
Scrappage programs	Equipment buy-back programs
	Replacement of gasoline lawnmowers with electric
	Replace older yard tractors with newer, lower emission ones
Government contracting requirements regarding vehicle/equipment technologies	
Voluntary repower / retrofit programs	Carl Moyer, TERP-type programs

28. Encourage / Implement Use of Alternative Fuels

Strategy	Examples
Encourage use of on-road fuels by non-road diesel vehicles	Use of ultra low-sulfur on-road diesel
Purchase alternative fuel vehicles / equipment	Purchase CNG street sweepers
Incentives for purchase of alternative fuel vehicles / equipment	
Rail electrification	Commuter rail electrification

29. Encourage / Implement Operational Improvements and Anti-Idling Technologies

Strategy	Examples
Rail infrastructure improvements	Track geometry improvements
	Use of concrete ties/heavier rails
Rail operational strategies/practices	Switcher yard locomotives (anti-idling)
	Idle reductions using APUs
	Idle reductions using automatic shut-down
Airport operational strategies	Idling reduction policy
	Full electrification of gates / ground electrification / HVAC systems at gates
	Improved airport configuration and expanded capacity (to reduce idling)
Government contracting requirements limiting idling	Contracting requirements limiting idling during construction/maintenance activities

Samples of Technology Approaches/Options

Approach	Options
Heavy-duty diesel engine retrofits (trucks, locomotives, marine vessels, other)	Particulate filters
	Flow through filters
	Diesel oxidation catalysts
	Crank case filters
	NOX reducing catalysts
	Exhaust gas recirculation (EGR)
	Selective catalytic reduction
Locomotive engine modifications	Low heat rejection
	Bottoming cycles
	Improved engine lubricants
	Use of hybrid switcher locomotives
	Scrappage/fleet renewal
Railroad equipment modifications	Tare weight reduction, higher capacity cars
	Use of low-friction bearings
	Use of improved suspensions
	Use of hopper car covers
	Use of steerable rail car trucks
	Energy-minimizing train control
	Improved drive-train lubricants
Railroad alternative fuels	Use of natural gas
	Use of cellulosic ethanol