



TRAQ Technical Overview

Transportation Air Quality Center

Transportation Control Measures: Bicycle and Pedestrian Programs



EPA's main strategy for addressing the contributions of motor vehicles to our air quality problems has been to cut the tailpipe emissions for every mile a vehicle travels. Air quality can also be improved by changing the way motor vehicles are used—reducing total vehicle miles traveled at the critical times and places, and reducing the use of highly polluting operating modes. These alternative approaches, usually termed Transportation Control Measures (TCMs), have an important role as both mandatory and optional elements of state plans for attaining the air quality goals specified in the Clean Air Act. TCMs encompass a wide variety of goals and methods, from incentives for increasing vehicle occupancy to shifts in the timing of commuting trips. This document is one of a series that provides overviews of individual TCM types, discussing their advantages, disadvantages, and the issues involved in their implementation.

Bicycle and Pedestrian Programs

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Bicycle and pedestrian programs are one type of transportation control measure (TCM) which can be used to reduce air emissions associated with transportation. Although exercise and social/recreation have consistently been cited as the most common reasons for bicycling and walking, most people use motor vehicles for “serious” travel (i.e., commuting, shopping, and personal business), particularly in suburban areas. Across urban and suburban areas, private vehicles comprise 93 percent to 99 percent of trips taken for commuting purposes and 93 percent to 98 percent of trips taken for shopping purposes. Traffic congestion and air quality objectives would benefit from shifting low-occupancy vehicle trips of any purpose to bicycling and walking. [1]

Until the 1970’s, bicycling was considered strictly a recreational activity. In the early 1970’s, as bicycling underwent a renaissance and the country faced its first oil crisis, bicycling received a lot of attention not only as an attractive recreational activity, but as a viable commute alternative. Many communities developed bicycle plans and built facilities. Similar to bicycling, the idea of walking as a means of transportation was not widely recognized as an alternative to using an automobile, but is becoming more popular. Planners are beginning to incorporate criteria for pedestrian circulation and bicycle travel into the requirements for developing new activity centers. For example, Cleveland’s Walkway to Gateway program involves improving walkway access to downtown shopping, eating, and sports complexes.

1. How Bike and Pedestrian Programs Work

In the U.S., biking and walking are primarily used for recreation, exercise, and non-utilitarian travel. From a TCM perspective, bicycling and walking represent viable alternatives to most single occupancy vehicle trips. Each trip shifted from a single occupancy vehicle to a bicycle or to walking results in a 100 percent reduction in vehicle emissions for that trip.

Bicycle and pedestrian programs may include a wide array of elements amenable to a community’s characteristics (e.g., topography, population, existing infrastructure) and the budget of the administering agency. Some common types of bicycle and pedestrian facilities include the following:

- ➔ Routes, lanes and paths
- ➔ Sidewalks and walkways
- ➔ Plans and maps

- ➔ Bicycle coordinators
- ➔ Racks and other storage facilities
- ➔ Ancillary facilities (showers and clothing lockers)
- ➔ Integration with transit
- ➔ Ordinances for bicycle parking (Tucson, Seattle, and Madison have ordinances that require a certain defined proportion of parking spaces at new developments be set aside for bicycle parking)
- ➔ Education, media and promotion (e.g., “bike to work” days)

2. Costs and Benefits

A shift of automobile trips to either bicycle or walk trips has a direct, positive impact in that trip emissions are reduced by 100 percent. Bicycling and walking realistically can substitute for relatively short trips which make up approximately 60 percent of all trips (i.e.,

generally less than five miles in length). Although the amount of saved vehicle miles traveled (VMT) may be small, the air emissions benefits can be quite large because cold start and hot soak emissions comprise a large proportion of emissions from a vehicle trip. Cold start and hot soak trip-end emissions comprise 75 percent of a 5-mile auto trip, 61 percent of a 10-mile trip, and 45 percent of a 20-mile trip of the vehicles total emissions. [1]

Bike and pedestrian paths may result in large emissions benefits, even if the reduction in vehicle miles traveled may be small.

Many cities and states have calculated the air quality impacts of a shift in auto trips to bicycle trips. Oklahoma’s State Implementation Plan estimated that a 25-mile network of bicycle facilities would result in a 1 percent modal shift to bicycles and a corresponding 0.4 percent reduction in air pollutants. [1]

Biking and walking are cost-effective solutions to society at large and to individuals. Society and individuals benefit from every commute trip shifted from single occupancy vehicles to bicycles or walking because of reductions in the following:

- ➔ Vehicle expenses
- ➔ Costs associated with municipal services devoted to vehicle traffic
- ➔ Air, noise, and water pollution
- ➔ Resource consumption

- Barrier effect (the disamenity motor traffic imposes on pedestrian and bicycle mobility)
- Land use impacts
- Waste disposal

Investments in bike and pedestrian paths can be investments in both recreation and the commuter. Dollars spent for facilities may reduce the overall cost of a community's programs. Trails can offer economic benefits by raising the value of property adjacent to once idle land.

To the degree that bike and pedestrian programs provide benefits to individuals, these benefits also accrue to the companies whose employees walk or bike to work because these employees tend to miss fewer work days. Additional cost savings to employers consist of reduced parking costs, which must be traded off against bike lockup facilities and possibly shower and change facilities (which mostly apply to bicycle users).

The main costs associated with bicycle and pedestrian programs and facilities include reduced travel range and usually longer travel times. Bicycle and pedestrian safety also pose potential concerns. Furthermore, transporting goods by these modes of travel can be difficult.

The costs of implementing a program or facility range from supplying a bike rack or trail map to developing a trail corridor such as the Atlanta/DeKalb Greenway Trail Corridor, which is estimated to cost \$2.5 million. Costs for developing, maintaining and operating a bicycle or pedestrian program may include the following:

- Salary and benefits for a program coordinator and other staff
- Land acquisition
- Bike lane construction
- Bike path construction
- Publications
- Bicycle lockers and racks
- Signage striping
- Maintenance
- Enforcement
- Educational materials

The potential for bicycling and walking as alternatives to auto travel mainly depend on three factors: trip distance, route safety, and weather conditions.

3. Implementation

Biking and pedestrian programs may be used in transportation management as primary modes, feeder modes (media to connect with transit or ridesharing modes), or circulation (movement within an area such as an activity center or employment development).

The potential for bicycling and walking as alternatives to auto travel mainly depend on three factors: trip distance, route safety, and weather conditions. The degree to which destination sites or activity centers allow convenient and safe circulation affects travelers' decisions on how to reach the site in the first place. Weather conditions also may affect the extent to which bicycling and walking represent viable alternatives to driving or transit. Since most bicycle trips are five miles or less in length, and most walk trips are less than one half mile, individual concerns over the physical condition of the trip maker also affect whether or not the trip can be shifted to these modes.

Commuters in the 25 to 40 age group are most likely to bicycle to work. Because walking does not require as great a physical demand or exposure risk, the age and health of a pedestrian are not as critical to program success. While a very small portion of the population may not have the physical capabilities to walk to a destination or ride a bicycle, for most people these activities are well within their abilities.

Local governments generally finance bicycle and pedestrian facilities and programs, although implementation may be passed on to others (e.g., volunteer groups maintaining trails). Municipalities also facilitate these programs by imposing municipal or regional trip reduction ordinances. Thus, employers and developers are paying increased attention and financing elements of these programs.

Since the enactment of the Intermodal Surface Transportation and Efficiency Act (ISTEA) of 1991, there has been an impetus for increased spending on bicycle and pedestrian projects. The dollar figure spent on these projects has risen dramatically from 3-4 million annually to nearly 180 million. The latest summary of federal-aid highway obligations spent on independent bicycle and pedestrian projects show an increase from \$4.6 million in FY 1992 to \$179.5 million in FY 1996. The majority of these funds have been allocated under the Transportation Enhancements category of the Surface Transportation Program. [2]

A major barrier to implementation are missing links, (e.g., non-continuous bike routes or lanes along a commute and walking corridors). Other factors that have limited bicycling include lack of safe routes to work destinations, conflicts with traffic laws that give preference to autos, and lack of facilities to accommodate these activities (e.g., bike racks or access to showers).

4. Keys to Success

Settings that facilitate successful programs include the following:

- Places with short travel distances between residential areas and key trip attractions
- Areas with high concentrations of people under age 40
- Areas with compatible infrastructure that can be modified into appropriate facilities

Areas with localized congestion or crowded parking facilities also have good potential, so long as the congestion does not present a safety threat to bike or pedestrian travel. Because participation in these programs is voluntary (in the absence of ordinances), marketing and education efforts are often necessary accompaniments. Education efforts may include maps and plans, safety training, promotions, and media events.

5. Equity Issues

People with severe income limitations may have to walk or bike out of necessity. One study in 1991, which surveyed bicycle commuters, found that 23 percent of those commuting by bicycle had annual incomes less than \$7,500, where as those with incomes between \$30,000-\$50,000 comprised only 1 percent of the group. An interesting observation is that the percentage of bicycle commuters increased to 7 percent when incomes exceeded \$50,000. Although cost savings are generally not a major reason people choose to bike or walk, (i.e., people cite exercise as the top reason for commuting by bike followed by enjoyment, environmental concerns, and cost savings) bicycle and pedestrian programs increase equity by providing more low-cost travel options. People who do not apply high values to their leisure time will gain from trading their increased travel time for decreased travel costs. [3]

6. Summary of Recent Examples

Bicycle and pedestrian programs may be found throughout the U.S. Some examples of these programs include a \$1 million program in Chicago that will provide bicycle lockers and racks throughout the metropolitan area, including 169 lockers at nine commuter rail stations. The city of Albuquerque, New Mexico's Trails and Bikeways Program is a state and local government effort to form an interconnected network of multi-use trails and on-street bicycle improvements for recreation and transportation purposes.

Bicycle and pedestrian programs are often paired with other TCMs. For example, many employers provide bike and pedestrian facilities as part of their employer-based transportation management program. This relationship is critical if bicycle and pedestrian programs are to succeed as alternative commute

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options. Many improved public transit programs also support bicycle and pedestrian programs by incorporating elements to improve access to transit facilities, or by adding bicycle carriers to transit vehicles. Florida's DOT is involved with a Busway program that will link bus lines to a metrorail line and an adjacent bikeway/walkway. Traffic flow improvements may indirectly support bicycle and pedestrian programs by improving signal intersections and increasing safety for bicyclists and pedestrians. An example of a successful bicycle and pedestrian program that combines usage of other TCMs is UC-Davis, whose program includes the following:

- Bicycle registration requirements
- Active enforcement of bicycle and motor vehicle laws
- High parking fees on the UC-Davis campus
- Development patterns which enhance access to biking facilities and reduce reliance on autos.

7. Sources

[1] *Transportation Control measure Information Documents*, Cambridge Systematics, Inc., U.S. Environmental Protection Agency, Washington, D.C. (March 1992).

[2] "Federal Dollars for Bicycle and Pedestrian Projects," in *Pro Bike News*, Bicycle Federation of America, Volume 16, Number 12, Washington, D.C. (December 1996).

[3] *Implementing Effective Travel Demand Management Measures: Inventory of Measures and Synthesis of Experience Final Report*, Report No. DOT-T-94-12, U.S. Department of Transportation, Washington, D.C. (September 1993).

8. On-line Resource

The Environmental Protection Agency's Office of Mobile Sources has established the TCM Program Information Directory to provide commuters, the transportation industry, state and local governments, and the public with information about TCM programs that are now operating across the country. This document and additional information on other TCMs and TCM programs implemented nationwide can be found at:

<http://www.epa.gov/omswww/transp/traqtcms.htm>