

# Transportation Demand Management: Case Studies of Medium-Sized Employers

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The effects of various transportation demand management (TDM) strategies on single-occupancy-vehicle (SOV) mode split are explored. Fourteen innovative and effective TDM programs that have been implemented by medium-sized employers (100 to 450 employees) in several areas of the western United States are described. Employers are found to practice a wide range of TDM strategies, including high-occupancy-vehicle incentives, such as transit pass subsidies, and SOV disincentives, such as parking charges. Parking charges are found to be the most effective TDM strategy in urban areas where transit service is good and where parking is often expensive and scarce. On the other hand, in suburban areas, where transit access is often poor and where parking is usually plentiful and free of charge, generous alternate mode travel allowances are found to be necessary ingredients in successful TDM programs.

Air quality degradation is a pressing issue, especially in urban areas, where much of the air pollution is caused by automobile emissions. To reduce the impact of excessive automobile use, some U.S. employers, often under legal requirements, have begun to practice transportation demand management (TDM). TDM reduces roadway demand by creating single-occupancy-vehicle (SOV) disincentives, such as parking charges, and high-occupancy-vehicle (HOV) incentives, such as transit pass subsidies and carpool parking discounts.

The purpose of this paper, which is based on a recent study for the Washington State Transportation Commission (1), is to survey and assess the TDM programs of selected medium-sized employers (100 to 450 employees). Most government and academic research on TDM has focused on large corporations (2,3). This focus may be because large organizations themselves are more prominent or because their programs tend to be better funded and, thus, more elaborate. Start-up costs for TDM programs may be significant; large companies are often better able to absorb these costs. Moreover, related economies of scale allow them to offer more attractive benefits at a lower cost per employee.

In focusing on medium-sized employers, this paper addresses a gap in the literature. It surveys the components of TDM programs implemented by 38 employers and assesses their effects. Detailed information on 14 of the 38 individual case studies is presented herein. These case studies represent TDM programs that the authors consider most successful or innovative.

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## CASE SELECTION AND ORGANIZATION

The first step in selecting cases was to find jurisdictions that had issued transportation demand reduction ordinances or policies. The Puget Sound region in Washington State and the South Coast area in southern California were identified for presentation in this paper. The original research also included Maricopa County, Arizona; Silver Spring, Maryland; and the San Ramon area in northern California. Representative employers in these areas were then selected on the basis of the following criteria: size (from 100 to 450 employees); SOV rate (at or below that of the surrounding area); and the availability of current, accurate, employer-specific mode split data.

The case studies are organized geographically. A brief description of each area's population, existing roadways and transit services, and transportation-related ordinances and policies precede the individual case studies from that area. Each case study is divided into four sections: employer description, TDM strategies, program assessment, and transportation mode split. Each of these divisions is described in this section.

Employer description covers the number of employees, type of business, land use, and location. Land use designates the type of activity (e.g., office use or manufacturing), whereas location is used to distinguish among urban centers, suburban centers, urban areas, and suburban areas. Urban centers are the downtown area of a region's major city; the rest of the city is defined as urban. Downtown areas of cities other than the region's center are defined as suburban centers. All other areas are described as suburban. (The case studies do not include any rural locations.) Also included in the employer description is the approximate number of employers in the building and in the surrounding area; this information reflects land use density.

TDM strategies encompass the supply and cost of employee parking as well as the other components of the organization's TDM program, which may range from parking charges to paid time off for alternate mode users.

Program assessment analyzes the organization's overall TDM program. Distinctive program features are highlighted, obstacles related to location or business type are noted, and in some cases suggestions for mode split improvement are offered.

Transportation mode split quantifies employee commute travel by mode (e.g., SOV, carpool, transit). Employee transportation coordinators (ETCs) were surveyed for mode split information in summer 1992; most based their estimates on data from the same year. Areawide SOV mode split averages are provided for comparison. In some areas, average vehicle ridership (AVR), as opposed to mode split, is the relevant unit of measurement. In such cases, ETCs were asked to estimate the SOV mode split.

The paper concludes with some general observations on the relative effectiveness of various TDM program components.

## PUGET SOUND REGION, WASHINGTON STATE

Seven case studies are drawn from the Puget Sound region in western Washington. Represented are the cities of Seattle, Bellevue, Kirkland, and Lynnwood. With a population of 500,000, Seattle is the state's biggest city. The region has three Interstate highways and four state highways. Most of the employers surveyed have access to Metro Transit, the ninth-largest bus system in the country. The region does not have a major rail system.

Seattle is the nation's seventh-most-congested city (4). To address this congestion, as well as poor air quality, the state legislature passed the Commute Trip Reduction Law in 1991. The law requires that organizations with 100 or more employees in eight counties take action to reduce SOV commutes. The base year against which progress is judged is 1992. Employer plans must accomplish the following:

- Reduce the number of SOVs by 15 percent by 1995, 25 percent by 1997, and 35 percent by 1999; and
- Reduce the number of vehicle miles traveled by 15 percent by 1995, 25 percent by 1997, and 35 percent by 1999.

The following case studies demonstrate how several medium-sized employers addressed this new law.

### Johnson & Higgins

<i>Description</i>		<i>Transportation Mode Split</i>	
<i>Characteristic</i>	<i>Information</i>	<i>Mode</i>	<i>Percentage</i>
No. of employees	182	SOV	23
Business type	Brokerage firm	Transit	70
Land use	Office	Carpool	2
Location	Urban center	Other	5
		Area SOV	43

Johnson & Higgins is a single-site employer located in downtown Seattle. Environmental concerns prompted Johnson & Higgins to initiate a TDM program. The program has been in place for 2 years. ETC support averages 2 hr/week.

### TDM Strategies

The company's parking supply is tight, and the charge is \$180/month. Johnson & Higgins employees benefit from the following:

- Bus pass subsidy: \$10 per month;
- Motorpool: vehicles available free of charge to employees for business trips;
- Guaranteed ride home: employer-provided fleet car or taxi fare reimbursement; and
- Flextime: variable start times; core hours between 8:30 a.m. and 4:30 p.m.

### Assessment

The tight parking supply and very high parking cost appear to be the primary factors in this company's low SOV mode share. Good tran-

sit access and other TDM strategies may also contribute to the high transit mode share.

### William M. Mercer, Inc.

<i>Description</i>		<i>Transportation Mode Split</i>	
<i>Characteristic</i>	<i>Information</i>	<i>Mode</i>	<i>Percentage</i>
No. of employees	120	SOV	33
Business type	Employee benefits	Transit	64
Land use	Office	Carpool	3
Location	Urban center	Area SOV	43

William M. Mercer is a multisite consulting firm located in downtown Seattle. The company's motivation for beginning a TDM program was to provide employee benefits. The program has been in place for 11 years. ETC support averages 2 hr/week.

### TDM Strategies

Parking is adequate, and the charge is \$130/month. William M. Mercer's employees benefit from the following:

- HOV parking discount: \$39/month,
- Bus and ferry pass subsidy: 100 percent,
- Preferential parking: preferential HOV treatment,
- Motorpool: vehicles available free of charge to employees for business trips,
- Guaranteed ride home: employer-provided fleet car or taxi fare reimbursement, and
- Flextime: employees work their choice of hours.

### Assessment

William M. Mercer, Inc., supports alternate modes in a variety of ways, but its most effective strategy appears to be a 100 percent subsidization of transit passes coupled with a high parking charge.

### Puget Sound Blood Center

<i>Description</i>		<i>Transportation Mode Split</i>	
<i>Characteristic</i>	<i>Information</i>	<i>Mode</i>	<i>Percentage</i>
No. of employees	200 (day shift)	SOV	34
Company	Blood bank/center	Transit	60
Business type	Office (service)	Other	6
Location	Urban	Area SOV	59

Puget Sound Blood Center is a multisite medical facility located on First Hill, adjacent to downtown Seattle. It is surrounded by many businesses, primarily medical, and is the only employer in the building. Puget Sound Blood Center's motivation for beginning a TDM program was to address a severe parking shortage. The program has been in place for 6 years. ETC support averages 2 hr/week.

### TDM Strategies

The Puget Sound Blood Center has a 7-year waiting list for parking, which costs \$50/month. Employees at this organization benefit from the following:

- HOV parking discount: \$25/month for established 3+ carpools;
- Bus pass subsidy: 50 percent discount;
- Bicycle facilities: bicycle racks, showers, and lockers;
- Compressed work week and flextime: choice of many shifts;
- Guaranteed ride home: Metro-provided taxi ride home;
- Parking pass program: alternate mode users may park free of charge 1 day/month; and
- Private/public transit service: employers in the area cooperate to pay for additional transit service.

*Assessment*

Puget Sound Blood Center's transit mode split is very high. This is because of a combination of extremely scarce parking and a customized transit program tailored to employee travel patterns. Under this program, area employers cooperate to pay for additional express and regular transit service.

The mode split achieved by this agency reflects the commute patterns of the day shift only; those who work at night are encouraged to drive for reasons of personal safety.

**Bonneville Power Administration**

<i>Description</i>		<i>Transportation Mode Split</i>	
<i>Characteristic</i>	<i>Information</i>	<i>Mode</i>	<i>Percentage</i>
No. of employees	100	SOV	52
Business type	Public power agency	Transit	20
Land use	Office	Carpool	13
Location	Urban	Vanpool	5
		Other	10
		Area SOV	74

The Bonneville Power Administration is a multisite agency located in the lower Queen Anne Hill area, adjacent to downtown Seattle. The agency is surrounded by many businesses, but it is the only employer in the building. The Bonneville Power Administration's motivation for beginning a TDM program was to promote environmental and energy awareness. The program has been in place for 4 years. ETC support averages 2 hr/week.

*TDM Strategies*

The agency's parking supply is tight, and monthly charges range from \$25 to \$40. Some free, on-street parking is available. Bonneville Power Administration employees benefit from the following:

- Bus pass subsidy: \$21/month;
- Bicycle facilities: bicycle racks;
- Compressed work week: flexible work schedules; employees keep track of their hours and may take time off when they reach 80 hr over a 2-week period;
- Flextime: variable start times; core hours between 8:30 a.m. and 3:00 p.m.;

- Ridematching: regional, computerized system available on site; and
- Vanpools: two Metro-supplied vehicles.

*Assessment*

The Bonneville Power Administration is located near the Seattle Center complex, which offers relatively inexpensive parking for an urban area. However, the employer-provided parking supply is tight, which discourages employees from driving alone. Bus pass subsidies, ridematching, vanpools, and the program environment encourage employees to use alternate modes. The resulting mode split is excellent for an urban area.

**CH<sub>2</sub>M HILL**

<i>Description</i>		<i>Transportation Mode Split</i>	
<i>Characteristic</i>	<i>Information</i>	<i>Mode</i>	<i>Percentage</i>
No. of employees	420	SOV	52
Business type	Engineering	Transit	19
Land use	Office	Carpool	9
Location	Suburban center	Other	20
		Area SOV	81

CH<sub>2</sub>M HILL is a multisite consulting firm located in downtown Bellevue. It is surrounded by other businesses, and there are other employers in the building. CH<sub>2</sub>M HILL's motivation for beginning a TDM program was to provide employee benefits and to respond to concerns about traffic congestion and limited parking. The program has been in place for 6 years. ETC support averages 6 hr/week.

*TDM Strategies*

The company's parking supply is adequate, and the charge is \$56/month. CH<sub>2</sub>M HILL employees benefit from the following:

- Travel allowance: \$40/month to all employees;
- Bus pass subsidy: \$15/month;
- Carpool subsidy: \$15/month;
- On-site facilities: automatic bank withdrawals for payment of bus, vanpool, and parking fees;
- Motorpool: vehicle available free of charge to employees for business trips and on a rental basis for personal use;
- Compressed work week: 9/80 work week, all employees participate;
- Flextime: variable start times, core hours between 9:00 a.m. and 4:00 p.m.;
- Guaranteed ride home: Metro-provided taxi ride home; and
- Ridematching: on-site vanpool and carpool postings.

*Assessment*

The \$40/month travel allowance is an important component of CH<sub>2</sub>M HILL's innovative TDM plan. CH<sub>2</sub>M HILL introduced the travel allowance to soften the impact of the concurrent \$40 parking charge. The parking charge has since been raised to \$56/month. CH<sub>2</sub>M HILL's plan has resulted in a remarkably low SOV mode split for a suburban center.

### Kirkland City Hall

<i>Description</i>		<i>Transportation Mode Split</i>	
<i>Characteristic</i>	<i>Information</i>	<i>Mode</i>	<i>Percentage</i>
No. of employees	287	SOV	68
Business type	Government agency	Transit	3
Land use	Office	Carpool	22
Location	Suburban	Other	7
		Area SOV	85

The city of Kirkland is a multisite agency; the city hall is located in Kirkland, a Seattle suburb. There are few employers in the area, and the agency is the only employer in the building. The motivation for initiating a TDM program was to provide area leadership in transportation management. The program has been in place for 4 years. ETC support averages 1/2 hr/week.

#### TDM Strategies

The agency's parking supply is adequate because of the TDM program, and there is no charge. Employees benefit from the following:

- Alternate mode travel allowance: \$25/month for employees who carpool, vanpool, use transit, bicycle, or walk to work;
- Telecommuting: home-based work options available to employees on a limited basis;
- Bicycle facilities: bicycle racks, showers, and lockers;
- Flextime: flexibility for alternate mode users only;
- Ridematching: on-site postings; and
- Guaranteed ride home: employer-provided taxi fare reimbursement.

#### Assessment

Despite the fact that parking at the city hall is adequate and free of charge, this organization has achieved an SOV mode split well below the area average. The alternate mode travel allowance, active management support, and additional TDM strategies contribute to a low SOV mode split for a suburban area.

### Pacific Pipeline

<i>Description</i>		<i>Transportation Mode Split</i>	
<i>Characteristic</i>	<i>Information</i>	<i>Mode</i>	<i>Percentage</i>
No. of employees	138	SOV	69
Business type	Book distribution	Transit	2
Land use	Manufacturing	Carpool	24
Location	Suburban	Other	5
		Area SOV	85

Pacific Pipeline is a single-site company located in Kent, a Seattle suburb. The company is in an industrial park, and there is one other employer in the building. Pacific Pipeline's motivation for beginning a TDM program was to address environmental concerns, a lack of parking, and the CTR law. The program has been in place for about 1 year. ETC support averages 1 hr/week.

#### TDM Strategies

The company's parking supply is tight, but there is no parking charge. Pacific Pipeline employees benefit from the following:

- Alternate mode travel allowance: \$24/month for employees who use alternate modes at least 60 percent of the time;
- Preferential parking: preferential HOV treatment;
- Ridematching: on-site postings; and
- Guaranteed ride home: employer-provided taxi fare reimbursement.

#### Assessment

The tight parking supply, coupled with a \$24/month travel allowance, results in a very high carpool rate. The SOV mode split achieved by this company is very low for a suburban area.

### SOUTH COAST, CALIFORNIA

The cities of Glendale, Irvine, La Habra, and Los Angeles provide five case studies from the South Coast area of southern California. Los Angeles has a population of approximately 3 million, which makes it one of the biggest cities in the country. The South Coast area has 7 Interstate highways and about 20 state highways. It features 26 mi of light rail and a commuter rail system; however, none of the employers surveyed have access to the rail network.

Los Angeles is the most congested city in the country, and its air quality is the poorest (4). Because the region's air quality does not meet federal standards, four counties in the area adopted Regulation XV in 1987. The South Coast Air Quality Management District (SCAQMD) is the governing agency. The regulation requires that affected employers submit trip reduction plans designed to achieve specific AVR targets. Employers having 100 or more employees who report to work between 6:00 and 10:00 a.m. are affected. Regulation XV's requirements include the following:

- Employers in high-density areas are to have an AVR of 1.75, those in medium-density areas an AVR of 1.5, and those in low-density areas an AVR of 1.3.
- Employers are not to be fined for failing to reach AVR goals; however, they can be fined if they fail to submit a plan or if they fail to demonstrate a good-faith effort to implement an approved plan.
- Employers are to update their plans biennially; if no significant progress is made in reaching AVR targets then the SCAQMD may require them to adopt more aggressive measures.

Since adoption of Regulation XV, the following improvements have been documented (5):

- The urban center AVR has increased from 1.34 to 1.40.
- The urban area AVR has increased from 1.21 to 1.24.
- The suburban center AVR has increased from 1.16 to 1.20.
- The SOV rate has decreased from 76 to 71 percent.
- The carpool rate has increased from 14 to 18 percent.

### Commuter Transportation Services

<i>Description</i>		<i>Transportation Mode Split</i>	
<i>Characteristic</i>	<i>Information</i>	<i>Mode</i>	<i>Percentage</i>
No. of employees	117	SOV	58
Business type	Transportation	Transit	17
Land use	Office	Carpool	20
Location	Urban	Other	5
		Area SOV	74

Commuter Transportation Services, located west of downtown Los Angeles, is surrounded by other businesses. Many other employees share the same building. This private, nonprofit consulting firm works with employers to develop TDM programs. Thus, its primary motivation for beginning a program of its own was to model TDM strategies. The program has been in place for 16 years. ETC support averages 4 hr/week.

### TDM Strategies

The company's parking supply is plentiful, and the charge is \$60/month. Commuter Transportation Services employees benefit from the following:

- Travel allowance: \$40/month for all employees;
- Bus pass subsidy: subsidization of bus pass costs not covered by the travel allowance;
- Alternate transportation bonus: \$20/month for those who use an alternate mode 4 to 10 times a month; \$40/month for those who use an alternate mode 11 or more times a month;
- Ridematching: on-site, regional computerized system;
- Guaranteed ride home: employer-provided personal ride home, taxi fare reimbursement, or rental car;
- Flextime: variable start times; core hours between 9:00 a.m. and 4:00 p.m.;
- Telecommuting: home-based work options used by 12 percent of employees and generally available; and
- Compressed work week: schedule options; 18 percent of employees participate.

### Assessment

The \$40/month travel allowance is an important component of this company's innovative TDM plan. The travel allowance softens the impact of a parking charge that is high for an urban area. The additional alternate mode allowance further encourages transit and HOV use. In an area where the SOV is the primary means of transportation, this organization has achieved a low SOV mode split.

### Gotcha Sportswear

<i>Description</i>		<i>Transportation Mode Split</i>	
<i>Characteristic</i>	<i>Information</i>	<i>Mode</i>	<i>Percentage</i>
No. of employees	175	SOV	60
Business type	Sportswear	Other	40
Land use	Manufacturing	Area SOV	91
Location	Suburban center		

Gotcha Sportswear is a single-site company in downtown Irvine. Surrounded by other businesses, it is the only employer in the building. It began a TDM program to comply with Regulation XV. The program has been in place for 6 years. ETC support averages 3 hr/week.

### TDM Strategies

The company's parking supply is plentiful, and there is no charge. Gotcha Sportswear employees benefit from the following:

- Time off: 1/2 day off per quarter for employees who use an alternate mode 60 percent of the time; 1 full day off per quarter for employees who use an alternate mode 95 percent of the time;
- Guaranteed ride home: employer-provided personal ride home up to 3 days/year;
- Ridematching: personalized attention;
- Compressed work week: schedule options; 23 percent of employees participate; and
- Flextime: flexibility for alternate mode users only.

### Assessment

Gotcha Sportswear's SOV mode split is relatively low; the employee transportation coordinator believes that this is due to its location in a suburban center with good transit connections and a program that allows employees to earn up to 4 paid days off per year on the basis of alternate mode use frequency.

### Heller Financial

<i>Description</i>		<i>Transportation Mode Split</i>	
<i>Characteristic</i>	<i>Information</i>	<i>Mode</i>	<i>Percentage</i>
No. of employees	253	SOV	65
Business type	Financial services	Transit	4
Land use	Office	Carpool	27
Location	Suburban center	Other	4
		Area SOV	81

Heller Financial is a multisite business located in Glendale, a suburb north of Los Angeles. The company is surrounded by many businesses, and there are 20 other employers in the building. Heller Financial's motivation for beginning a TDM program was to comply with Regulation XV. The program has been in place for 2 years and ETC support averages 5 hr/week.

### TDM Strategies

The company's parking supply is plentiful, and the charge is \$55/month. Heller Financial employees benefit from the following:

- HOV parking discount: 100 percent coverage for established 3+ carpools;
- Carpool subsidy: \$20/month for established 3+ carpools;
- Time off (Program A): 12 hr of time off per quarter for frequent (at least 5 days/week) alternate mode users;
- Time off (Program B): 1 day off for infrequent (less than 3 days/week) alternate mode users; once employees have used an alternate mode for 32 days, they receive 1 day off;
- Bicycle facilities: bicycle racks;
- Ridematching: on-site, computerized system;
- Guaranteed ride home: taxi fare reimbursement; and
- Flextime: flexibility for alternate mode users only.

### Assessment

The parking charge, HOV discount, and carpool subsidy work together for a relatively favorable SOV mode split. The innovative early-leave strategy, which allows employees to earn up to 48 hr of time off per year, may also be a significant factor in the high carpool rate.

Occasional alternate mode users may earn 1 paid day off after 32 days of alternate mode use. Strategies that encourage occasional alternate mode users are often neglected, but they can be effective in reducing total vehicle miles traveled.

### City of La Habra

<i>Description</i>		<i>Transportation Mode Split</i>	
<i>Characteristic</i>	<i>Information</i>	<i>Mode</i>	<i>Percentage</i>
No. of employees	123	SOV	60
Business type	Government	Other	40
Land use	Office	Area SOV	85
Location	Suburban		

The City of La Habra is a multisite agency located in a suburb 100 mi north of Los Angeles. There are other employers in the area, but the City of La Habra is the only employer in the building. The agency's motivation for beginning a TDM program was to comply with Regulation XV. The program has been in place for 3 years. ETC support averages 15 hr/week.

#### *TDM Strategies*

The company's parking supply is adequate, and there is no charge. City of La Habra employees benefit from the following:

- Compressed work week: schedule options only for those employees who use alternate modes; almost half participate;
- Guaranteed ride home: employer-provided use of fleet car or personal ride home;
- Ridematching: on-site, computerized system combined with personal attention;
- Telecommuting: home-based work options available to employees on a limited basis;
- Flextime: flexibility for alternate mode users only;
- Bicycle facilities: bicycle racks, showers, and lockers;
- Bicycle loan program: city-provided loans of bicycles for commute purposes; and
- On-site services: bus pass sales at work, lunch delivery, and personal check cashing services.

#### *Assessment*

Without offering any financial incentives or imposing parking charges, the City of La Habra has achieved a remarkably low SOV mode split. The employee transportation coordinator believes that the primary factor in this low SOV mode split is the compressed work week program, which is available to alternate mode users only. The fact that almost half of the employees participate indicates that this program is valued highly.

### Shur-lok Corporation

<i>Description</i>		<i>Transportation Mode Split</i>	
<i>Characteristic</i>	<i>Information</i>	<i>Mode</i>	<i>Percentage</i>
No. of employees	174	SOV	78
Business type	Aerospace	Other	22
Land use	Manufacturing	Area SOV	91
Location	Suburban		

Shur-lok Corporation is a single-site business in Irvine. The company is surrounded by other businesses and is the only employer in the building. Shur-lok Corporation began a TDM program to comply with Regulation XV. The program has been in place for 4 years. ETC support averages 7 hr/week.

#### *TDM Strategies*

The company's parking supply is plentiful, and there is no parking charge. Employees benefit from the following:

- Bus pass subsidy: \$21/month;
- Carpool subsidy: 8 to 12 times/month, \$10; 13 to 17 times/month, \$15; and 18 or more times/month, \$20;
- Bicycle/walk subsidy: 8 to 12 times/month, \$15 gift certificate; 13 to 17 times/month, \$20 gift certificate; and 18 to 20 times/month, \$25 gift certificate;
- Vanpool subsidy: 50 percent or \$25/week;
- Ridematching: a regional, computerized system;
- Guaranteed ride home: employer-provided fleet car or taxi fare;
- Flextime: flexibility for alternate mode users only;
- On-site services: home grocery delivery, dry cleaning delivery, and shoe repair service; and
- Bicycle facilities: bicycle racks.

#### *Assessment*

Shur-lok Corporation recognizes that many commuters need their automobiles for grocery shopping and errands during the work day. To reduce the need for a vehicle, the company reimburses the delivery costs of groceries, dry cleaning, and shoe repair. Shur-lok also provides additional alternate mode incentives. These creative strategies help lower SOV use for companies with free and plentiful parking.

### VENTURA COUNTY, CALIFORNIA

Two case studies are drawn from Ventura County, which is 40 mi northeast of Los Angeles. The cities of Simi Valley and Ventura are represented. Ventura is the biggest city in the county; its population is about 150,000. The county has access to one U.S. highway and seven state highways. A commuter rail system links Simi Valley with downtown Los Angeles.

Air pollution in the county exceeds federal ozone standards by 50 percent and state standards by 100 percent. The county adopted Rule 210 in 1989 and designated the Ventura County Air Pollution District (APCD) as the governing agency. Rule 210 requires that organizations with 50 or more employees submit trip reduction plans designed to obtain an AVR of 1.35. In 1994, the AVR level will increase to 1.5 for organizations with 100 or more employees. Specific provisions of the law require that employers do the following:

- Designate an employee transportation coordinator and send that person to a Rule 210 training session conducted by APCD;
- Survey employees who arrive at work between 6:00 and 10:00 a.m. to determine their commute patterns;
- Develop and file a trip reduction plan that specifies measures to encourage employees to alter their commute patterns;

- Carry out the approved trip reduction plan to reach the AVR target; and
- File an updated report with APCD each year documenting results and listing further steps to be taken if the required AVR has not been achieved.

### City of Simi Valley: Public Services Center, Municipal Utilities

<i>Description</i>		<i>Transportation Mode Split</i>	
<i>Characteristic</i>	<i>Information</i>	<i>Mode</i>	<i>Percentage</i>
No. of employees	150	SOV	48
Business type	Government	Other	52
Land use	Office;	Area SOV	85
Location	Suburban		

The City of Simi Valley is a multisite agency; its Public Services Center is located outside the city in a suburban area. This center is the only employer in the vicinity. The city's motivation for beginning a TDM program was to comply with the county ordinance. The program has been in place for 2 years. ETC support averages 20 hr/week.

#### *TDM Strategies*

The parking supply is plentiful, and there is no charge. Employees benefit from the following:

- Alternate mode travel allowance: \$3/day or \$2/day if carpooling in a city-owned vehicle;
- Transit subsidy: an additional 50 percent or \$0.75/day;
- Time off: 1 day off after 70 days of alternate mode usage within a 6-month period;
- Ridematching: regional, computerized system;
- Guaranteed ride home: employer-provided fleet car, personal ride home, taxi fare reimbursement, or rental car;
- Compressed work week: schedule options; 90 percent of employees participate;
- Flextime: flexibility for alternate mode users only;
- Bicycle facilities: bicycle racks, showers, and lockers;
- Equipment allowance: reimbursement for 25 percent of equipment costs (mainly bicycle related); up to \$200 per 6-month period; and
- Motorpool: clean-fuel vehicles available free of charge to employees for business trips.

#### *Assessment*

This TDM program offers an unusual variety of monetary incentives, including alternate mode travel allowances, transit subsidies, and an equipment allowance, resulting in very low SOV use. In addition to the financial incentives, employees may earn time off for using alternate modes. Although this case study indicates that a variety of generous incentives may be necessary in suburban or semi-rural areas to achieve SOV rates comparable with those of urban centers, it also indicates that low SOV mode splits are possible in suburbs.

### Kinko's Service Corporation

<i>Description</i>		<i>Transportation Mode Split</i>	
<i>Characteristic</i>	<i>Information</i>	<i>Mode</i>	<i>Percentage</i>
No. of employees	283	SOV	70
Business type	Photocopying	Other	30
Land use	Office	Area SOV	88
Location	Suburban		

Kinko's Service Corporation (KSC) is a multisite business whose corporate headquarters is located in Ventura. KSC is surrounded by other businesses but is the only employer in the building. Its primary motivation for beginning a TDM program was to comply with the county ordinance. The program has been in place for 2 years. ETC support averages 20 hr/week.

#### *TDM Strategies*

The company's parking supply is plentiful, and there is no charge. KSC employees benefit from the following:

- Ridematching: on-site, computerized system;
- Guaranteed ride home: employer-provided fleet car, personal ride home, or taxi fare reimbursement;
- Preferential parking: preferential HOV treatment;
- Bicycle facilities: bicycle racks and clubhouse showers and lockers; and
- On-site services and facilities: bus pass purchases, clubhouse, day care, dry cleaning, car wash, and mail services.

#### *Assessment*

KSC's SOV rate is substantially lower than that of the surrounding area. Although this cannot be clearly attributed to a single component, the most noteworthy features appear to be the on-site facilities, including day care, and the substantial amount of time (20 hr/week) the ETC spends encouraging employees to use alternate modes.

### EVALUATION

It is difficult to evaluate the case studies collectively because so many disparate factors affect mode split. Nonetheless, a few conclusions about the effectiveness of selected TDM strategies can be made. But before turning to the TDM strategies themselves, a brief discussion of location, an important contextual variable, is in order.

#### *Location*

Among the organizations surveyed, SOV rates generally rose as the distance from the urban center increased. Organizations located in urban centers generally have lower SOV rates than their suburban counterparts for two main reasons. First, parking in urban centers is usually scarce and is often quite expensive. Second, transit service in urban areas is generally much better than in the suburbs. When these factors are combined with urban congestion, many commuters find HOV modes more attractive than driving alone.

One-half of the organizations surveyed located in urban centers have SOV rates of under 49 percent. Only one organization in an

urban center had an SOV rate exceeding 70 percent; transit service to this area is poor.

Organizations located in suburban areas have the highest SOV rates because of their geographical isolation, poor transit access, and parking that is plentiful and free of charge. Most of the organizations with SOV rates exceeding 80 percent are located in suburban areas.

Because of its relationship to transit access and the supply and cost of parking, location is an important variable that should be taken into account whether one is studying TDM programs or putting one into place. Although parking charges alone may be enough to deter SOV commutes in urban centers, suburban employers may have to offer sizable financial incentives to encourage alternate mode use.

### Parking

Parking, which raises the cost of SOV commuting directly, affects mode choice much more than does any other factor. In fact, parking costs and SOV rates, are, by and large, inversely related. The charge must be quite high to reduce SOV rates. Data from this study indicate that relatively low charges have only modest effects. It is not uncommon for employers to impose parking charges for SOVs in conjunction with parking discounts for HOVs; this strategy creates an SOV disincentive and an HOV incentive at the same time.

Four ETCs reported that parking scarcity, in and of itself, is also a factor in reducing SOV rates. However, the sample size in this study is too small to make any conclusive determinations about its effect on mode split.

Parking charges are most effective in urban areas and centers and in suburban centers, where parking is typically scarce and where charges are customary. This strategy is much less effective and less frequently practiced in suburban areas, where parking is generally plentiful and free of charge.

### Travel Allowances

There are basically two types of travel allowances: those given to all employees, regardless of how they get to work, and those restricted to alternate mode users. Alternate modes include transit, carpools, vanpools, walking, and cycling. Some organizations simply pay all employees a set monthly stipend to defray travel costs, including SOV parking charges. Such allowances may reach \$60/month. Other organizations make monthly or quarterly payments to employees who use non-SOV modes at least part of the time. Another variation is to give daily payments to non-SOV commuters, or variable payments, on the basis of the number of times alternate modes are used each month.

Travel allowances have two benefits: they provide an excellent method of introducing a parking charge, and they subsidize alternate mode use. However, this study indicates that travel allowances that are given to all employees, regardless of mode choice, diminish the impact of parking charges. Those who wish to continue to commute in SOVs simply use the money to pay the parking charges. For this reason, restriction of travel allowances to alternate mode users may be desirable.

Alternate mode travel allowances can be quite effective in suburban areas, where, as noted, parking charges are not generally viable. Like parking charges, alternate mode travel allowances have

a direct effect on the commuter's pocketbook and are helpful in reducing the SOV mode split. For example, one suburban company achieved an SOV rate of just 48 percent by offering alternate mode users \$3/day.

### Transit, Carpool, and Vanpool Subsidies

Many of the organizations surveyed offer some type of transit subsidy regardless of the quality of transit service to the work site. However, only those organizations with good transit service and access, such as those in central business districts, had high transit mode splits. Such subsidies may include HOV parking discounts, direct payment to carpools, and gasoline reimbursement.

Carpool subsidies are more viable in areas not well served by transit. In fact, carpooling is the preferred alternate mode in many suburban areas. The highest carpool rates in this study were those associated with significant cost savings for the employees. For example, one company achieved a carpool mode split of 24 percent with a substantial alternate mode travel allowance, and another achieved a carpool mode split of 30 percent with an HOV parking discount.

Although they are the most cost-effective and energy-efficient means of transportation per person trip, vanpools are uncommon (6). Expensive to obtain and service, vanpools require considerable administrative effort. Although vanpools often receive the same parking discounts as carpools, their mode split is much lower. The pros and cons of vanpools, as well as strategies for facilitating their use, would be a fruitful topic for further research.

### Alternate Work Hours

Most alternate work-hour programs focus on reducing vehicle miles traveled rather than reducing SOV rates directly. Although the effects of parking charges and travel allowances are clearly visible, it is more difficult to assess the effectiveness of alternate work-hour programs. They are not as common, and comparisons are problematic because they can take so many different forms. Telecommuting, flextime, compressed work week, and time-off programs all fall into this category.

In addition, results from the few that have been implemented are mixed. At one organization the employees have enthusiastically embraced a time-off program, and almost half have shifted to alternate modes to earn additional time off. On the other hand, several ETCs reported that the alternate work-hour programs offered at their organizations have had little or no effect on mode split. More research in this area is needed.

### Ridesharing

Ridesharing programs are the single most common TDM strategy. They are often inexpensive, and many employers believe them to be a significant factor in determining mode choice. A total of 66 percent of the organizations surveyed offer ridesharing services, ranging from simple bulletin boards to computerized programs and, in some cases, personal assistance from an ETC.

ETCs reported that regional computerized programs are often inadequate because employees prefer to carpool with people who work in the same building; regional systems based on zip codes do



not provide such specific service. This study could find no direct correlation between ridesharing programs and lower SOV rates. However, these services may encourage a higher use of alternate modes when combined with other TDM strategies.

### Management Support

What role does management support play in determining mode choice? Such support may be demonstrated in several ways, chief among them creation of an ETC position (or, where such a position is already in place, dedication of additional resources).

Management support may also be communicated through internal publications, statements by top executives, and new employee orientations. In addition, employers may foster alternate mode use by installing transit information centers at the workplace, by disseminating brochures and other printed materials, and by sponsoring special events, such as transportation fairs, drawings, or parties for alternate mode users.

Although some ETCs reported that their efforts encourage carpool formation and maintenance and that a lack of management support prevents organizations from achieving lower SOV rates, this study was unable to discern exact relationships among alternate mode promotion, management support, ETC effort, and SOV rate reduction. One's impression is that the effects of marketing, support, and "promotion" are minor compared with strategies that have concrete economic components.

### Net Effects of Financial Incentives and Disincentives on SOV rates

Figure 1 shows the relationship among financial HOV incentives, SOV disincentives, and SOV rates. A variety of factors affect an employee's choice of a specific alternate mode; therefore, to simplify the analysis, for Figure 1 only economic incentives that apply to all employees were used to calculate the net HOV incentive. Parking charges and alternate mode travel allowances are both

counted as HOV incentives, whereas a general travel allowance is assumed to decrease the HOV incentive of a parking charge. Therefore, if a company offers both a parking charge and a general travel allowance, the allowance is subtracted from the parking charge to derive the net HOV incentive. This may not be a true reflection of commuter behavior because they may spend the allowance on anything; that is, it is not like an offer of free parking.

Although HOV incentives are significant, they are not the only effective TDM strategy. Some case studies in Figure 1 have achieved very low SOV rates, beyond what one would expect given their relatively low parking charges. What accounts for these successes? One organization has a 7-year waiting list for parking space; another enjoys excellent transit service and fully subsidizes the cost of passes; two others offer alternate work schedules to non-SOV commuters only. The data shown in Figure 1 represent only part of the picture in terms of what influences TDM success; clearly much more study, including statistical analysis, is needed.

Linear regression analysis on all 38 cases included in the main study (1) indicates that net economic incentives account for 54 percent of the variability in SOV rates ( $r^2 = 0.54$ ). The following statistics were also obtained:

- Coefficient of fit,  $-0.27$ ;
- Constant of fit,  $74.32$ ;
- Standard error,  $0.04$ ; and
- $t$ -test,  $-6.21$ .

The absolute  $t$ -test value,  $6.21$ , suggests that one can be 99 percent certain that HOV incentives are a significant indicator of SOV rates.

### CONCLUSION

As demonstrated herein, case studies can reveal a great deal about the success of TDM programs. The culture of various organizations often decides what the TDM program will be. The finding that high parking costs and good transit result in less SOV use is not new and

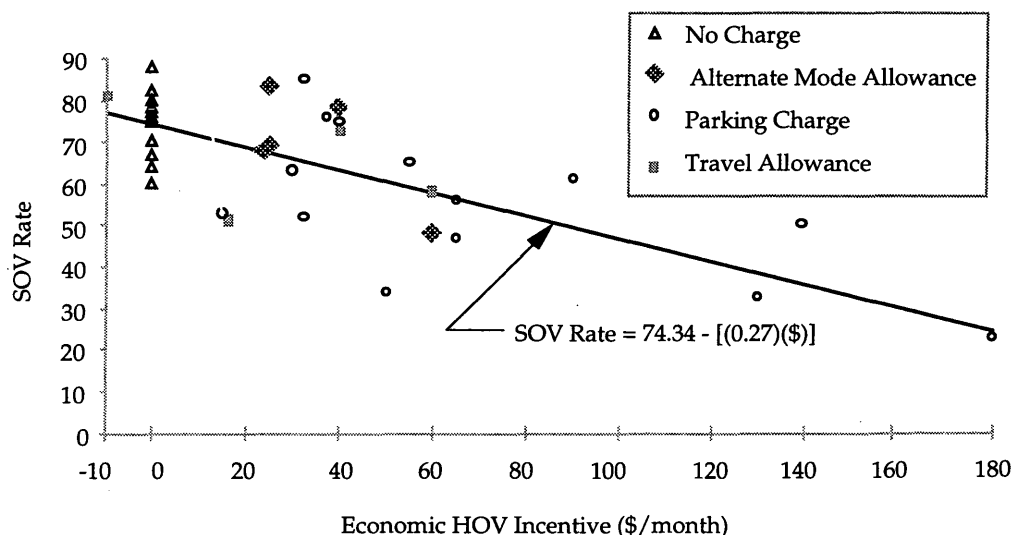


FIGURE 1 Effect of economic incentive structures on SOV rates.

is only reinforced in this paper. The success of TDM programs in the suburbs is less well understood but very important given today's development patterns and the increase in TDM-related policies and regulations.

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