U.S. Department of Transportation

Paratransit for the Work Trip: Commuter Ridesharing

January 1982

The cover photo shows Ted Newsom, Ridesharing Services Manager for Nashville, Tennessee's Metropolitan Transit Authority (MTA), handing Mr. James Buckner the keys to MTA's Van #9. This photo was provided through the courtesy of the Nashville MTA.

Paratransit for the Work Trip: Commuter Ridesharing

A Report in the Series
Paratransit: Options for the Future

Final Report
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NOTE: This report is one of a series commissioned to assess future options for the evolution of paratransit. Part of its content includes policy and other recommendations based upon this contractor's perception of the issues involved. Recognizing that there may be many alternative approaches to resolving transportation problems, these positions may not necessarily reflect those of the U. S. Government. As such, no endorsement of these recommendations is either expressed or implied by the U. S. Department of Transportation.

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Foreword

Paratransit - the "family" of transportation services between the private drive-alone auto and fixed route transit - is a concept which formally emerged in the early 1970's. Much has occurred since the seminal UMTA-sponsored Urban Institute study - Paratransit: Neglected Options for Urban Mobility (1) - popularized the term and the concept around 1975. However, despite the fact that paratransit is no longer a neglected option, there is still considerable controversy regarding what paratransit is and what it might accomplish. The attitudes towards paratransit are as diverse as the range of services which are included under the paratransit mantle.

Paratransit: Options for the Future is intended to unravel some of the controversy concerning paratransit. Specifically, the overall report is aimed at developing an understanding of the nature of the various paratransit concepts, the results and impacts they have had, and what roles they might play in the future.

The assessment of the experience of paratransit to-date is based on in-depth case studies of a number of services. These studies were designed to identify institutional, site-specific, and operational factors which have most directly influenced the impacts of various types of services. The effort has differed from other recent projects, in that no attempt has been made to develop a comprehensive list of paratransit systems. (Indeed, to provide a broader perspective, we have drawn upon the results of a number of previous studies, notably Barb and Cook (2), Multisystems (3), Systan (4), and Voorhees (5).) Instead, we have attempted to utilize a subset of experiences to provide a better understanding of what paratransit services can and cannot be expected to do. In adopting this approach, we are cognizant of the fact that, by focusing on specific cases, some of the important experiences of paratransit may be missed. However, it was felt that this approach would allow a more in-depth assessment of paratransit than would be possible if an attempt were made to review a greater number of services. The cases selected were intended to cover as wide a range of service permutations as possible. However, where appropriate, information on services not included as case studies has been incorporated as well.

The assessment of the "state-of-the-art" of paratransit traces the evolution of the concept for each market sector considered. Unlike the treatment of the individual paratransit experiences, this discussion is oriented towards an assessment of the forms to which paratransit has evolved, rather than a judgemental analysis of specific services.

Finally, the report addresses possible future directions for paratransit. The aim is to explore the potential future roles and forms of paratransit, partly to aid in guiding its future development in the most effective directions. An emphasis is placed on trying to explore how various future factors will influence paratransit, as well as the way paratransit itself may impact future trends.

The report itself is divided into stand-alone volumes addressing the specific market areas into which paratransit services generally fall: Paratransit for the Work Trip - Commuter Ridesharing; Paratransit for the Transportation Handicapped; General Community Paratransit (in Urban Areas); and Paratransit in Rural Areas. In addition, the report includes a volume on The European Paratransit Experience, covering the development of all types of paratransit in Europe. The Overview volume summarizes the characteristics of the individual types of service, and identifies issues and themes which are common to more than one specific market area. Finally, the Conclusions volume summarizes the findings of the overall study and presents recommendations concerning the future development of paratransit.

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1 Introduction: Paratransit for the Work Trip

Background

Prearranged commuter ridesharing programs, in the form of vanpooling, carpooling, and buspooling, have been implemented in a wide variety of settings, by both the public and private sectors. Carpooling is obviously not a new or recent idea; the practice is as old as the automobile. Sharing rides to work was commonplace through the 1940's, but the prosperity of the 1950's, combined with the marketing programs of the auto industry, led most commuters to believe that the practice was only for those who were too poor to afford their own cars. Some commuter carpools remained together during the highway boom of the late 1950's and 1960's (when average auto commuting times decreased relative to the generally longer distances being travelled). However, only with the dramatic slowdown in urban freeway construction in the late 1960's and the energy scares of the early 1970's did the ridesharing concept begin to receive attention as a strategy to relieve urban traffic congestion, conserve gasoline, and save commuting dollars.

Ridesharing programs proliferated during the past decade, as the federal government and private employers took the lead in promoting the concepts. Activity in this area began in earnest in 1973 and 1974 as a result of the oil embargo which occurred at that time. Activity continued after the energy "crisis" ended, but the level increased markedly in 1979, with the advent of the second energy shortfall. Current concerns over limited fuel availability and increasing commuting costs have clearly established the importance of ridesharing modes as alternatives to driving alone as we enter the 1980's.

Ridesharing Characteristics and Objectives

The major characteristics of the most common ridesharing modes (carpooling, vanpooling, and buspooling) are a regular share-the-expense financial arrangement and a service frequency of one trip in each direction. Carpooling usually involves a privately-owned vehicle, and commuters can choose to either share-the-expense (one person always drives) or share-the-driving (carpoolers rotate use of their own cars); the former approach is the more common of the two (6). Vans used for vanpooling can be

individually-owned or leased, employer-owned or leased, or owned/leased by a third party vanpool program. In most vanpool arrangements, one primary driver and one (or more) back-up drivers handle all the administrative details and are responsible for ensuring that routine vehicle maintenance is completed. A buspool is usually arranged by a residential group or an employer; the vehicle is most often hired (with driver) from a private bus company. In a few scattered instances, buses are leased or purchased and an employee drives the bus to and from work.

Ridesharing programs have been developed to meet a variety of objectives, most of which are related (directly or indirectly) to the basic goal of increasing average vehicle occupancy, thus reducing the number of vehicles (and therefore, vehicle-miles traveled) in use during peak-hours. The actual objective(s) of each program depends on the particular needs and point of view of the service initiator or sponsor, and include reducing energy consumption, reducing parking needs, reducing the cost of commuting, and reducing congestion.

In addition to the desire to save money, ridesharing participants have also been shown to join such arrangements to avoid the often tedious daily task of driving to work.

Overview

This volume examines the degree of success of the different types of ridesharing programs, discusses the state-of-the-art of ridesharing options and issues, and explores the nature of future directions in this area.

In order to develop a better understanding of the nature of different types of ridesharing programs and the implications of different organizational and institutional structures, we have developed brief case studies on a number of individual programs. The cases studied are the following:

- 3-M (St. Paul, Minnesota) - The Minnesota Mining and Manufacturing Company of St. Paul has operated a very successful commuter vanpool program since 1973. Started as a move to ease parking congestion, the program has, as yet, encountered no major problems. It represents the oldest formal vanpool program in the country.

- Tennessee Valley Authority (Knoxville, Tennessee) - The Tennessee Valley Authority, a federal agency based in Knoxville, initiated a vanpool program in 1974 to combat a parking problem. The program is now one of the largest in the country, involving carpools, vanpools, buspools, and subsidized transit use.

- Connecticut General Life Insurance Company (Hartford, Connecticut) - Connecticut General operates a comprehensive ridesharing program for its employees, although it has also played a significant role in the initiation of an areawide ridesharing agency in the Hartford area. Beginning with the operation of commuter buses in 1957, the company has now expanded its program to include vanpooling (featuring a company-owned gas station), carpooling (including preferential parking), and transit pass subsidies.

- Federal Highway Administration (FHWA) Carpool Demonstration Program (nationwide) - Spurred by the 1973 oil embargo, the FHWA funded (through the Emergency Highway Energy Conservation Act of 1974) 106 areawide carpool demonstration projects in 34 states. The projects relied on a combination of mass media promotion and advertising and direct employer contact to disseminate information and assist in the matching process.

- Raleigh (North Carolina) Carpool Program - The City of Raleigh, the site of an FHWA demonstration, has operated a carpooling program since 1975. Originially aimed at major employees in the area, the program now focuses on attracting individual employees. Raleigh's Carpool Office is also currently involved in a regional ridesharing coordination effort along with nearby Chapel Hill and Durham.

- Commuter Computer (Los Angeles, California) - Commuter Computer is a third party ridesharing program serving the Los Angeles area since 1974. A non-profit corporation providing matching services and promoting employer programs, Commuter Computer is funded through a combination of public and private sources. It is currently among the largest ridesharing programs in the country.

- Knoxville Transportation Brokerage Service (Knoxville, Tennessee) - The Knoxville Transportation Brokerage Service (KTBS) was formed, in 1976, at the University of Tennessee to serve as the broker for ridesharing services within the 16 county East Tennesseee Development District. In 1977, the KTBS (sponsored largely through an UMTA demonstration grant) moved to the Knoxville Department of Public Transportation Services. As the broker, KTBS has responsibility for a wide range of functions related to the provision of transportation services.

- RIDES for Bay Area Commuters, Inc. (San Francisco, California) - RIDES for Bay Area Commuters, Inc. is a third party ridesharing program which has been in operation since late 1977. A non-profit corporation funded primarily by the California Department of Transportation (Caltrans), RIDES provides vans and matching services for a 10-county area with a total population of 5 million.

- Norfolk Vanpool Program (Tidewater, Virginia) - The Tidewater Transportation District Commission (TTDC) operates a ridesharing program for U.S. Navy civilian and military employees working at the naval bases in the Tidewater/Norfolk area. The TTDC is responsible for all phases of the program, including the purchase and leasing of vans. This was originally an UMTA demonstration.

- Twin Cities Ridesharing Program (Minneapolis/St. Paul, Minnesota) - The Metropolitan Transit Commission (MTC) had overall responsibility for managing an UMTA-sponsored ridesharing demonstration project in the Twin Cities area. Providing day-to-day operation of the program were two other organizations: Public Service Options and Vanpool Services, Inc. The program was targeted at three multi-employer sites outside of the CBD's of Minneapolis and St. Paul. The nature of the program changed considerably following the conclusion of the demonstration period (1979). MTC currently has responsibility for ridesharing in half of the metropolitan area, while the Minnesota Department of Transportation (MnDOT) is responsible for the other half; the overall effort is now part of a statewide program administered by MnDOT.

- Reston Commuter Bus (Reston, Virginia) - The Reston Commuter Bus (RCB) sponsors a subscription bus and vanpool service providing commuter service between Reston, a new town in northern Virginia (about 20 miles from Washington, D.C.) and Washington, D.C. The RCB was initiated by Reston residents in 1968. Service has been contracted with both public and private carriers.

These case studies, supplemented with additional examples, serve as the basis for the following examination of ridesharing programs and options.

The remainder of this volume is divided into three chapters. The first reviews the level of success and impacts of the case study programs and presents important findings, including factors influencing program initiation and barriers to ridesharing programs. The next chapter assesses the state-of-the-art of this area, focussing on current organizational options, government regulations and initiatives, and the role of the private sector. The final chapter looks at possible future directions for ridesharing, including factors likely to be important, the role of the government, and changing organizational roles.

2 Commuter Ridesharing Programs: A Retrospective

In this section, the experiences of the case study programs are reviewed and key findings are presented; the case study characteristics are summarized in Table 1.

Introduction

Although commuter ridesharing has been taking place on an informal basis (i.e., through carpooling) for several decades, the formal promotion of ridesharing in response to specific economic/environmental objectives did not begin until the early 1970's. The 3M Company introduced the first vanpool program in 1973 as a means of reducing the need for parking at its main headquarters.

The 3M program was established shortly before the oil embargo of 1973; with the advent of that energy crisis, however, other employers quickly began to follow 3M's example. At the same time, a number of programs promoting carpooling on an areawide basis (i.e., targeted at commuters in general) were initiated by Chambers of Commerce and radio stations; the Westinghouse Broadcasting Corporation, for example, sponsored such efforts through a number of its local stations.

The oil embargo also stimulated federal involvement in the promotion of ridesharing. With the passage in January 1974 of the Emergency Highway Energy Conservation Act, Federal Highway funds were first authorized to finance 90 percent of the cost of carpool demonstration projects. Although this Act orignally authorized projects for one year only, it (along with the energy shortage) did spark considerable state and local interest in initiating organized ridesharing programs. The original authorization was amended in 1974 and 1976 to expand the scope of eligible projects, allow continuing project eligibility and adjust the federal share for these projects; in 1978, the Surface Transportation Assistance Act replaced the Emergency Act, making ridesharing assistance a permanent program.

This primary funding mechanism was supplemented by greatly increased ridesharing information dissemination through FHWA, UMTA, the Environmental Protection Agency (EPA), and the now defunct Federal Energy Administration (FEA), most of whose duties have been assumed by the Department of Energy

TABLE 1: RIDESHARING PROGRAM CHARACTERISTICS

Program	Type of Program	Date of Formation	Sponsor	Operator/ Administrator	# of Vans		Target Market	% of Market Participating	Year of Data
					At Inception	Now			
3-M	employer-based ridesharing	1973	3-M	3-M	6	145	11,500	15%-vanpools 20%-carpool 2%-commuter bus	1980
TVA (Downtown Knoxville)	employer-based ridesharing	1974	TVA	TVA	6	80	4,200	48%-express buses and vanpools; 37% carpool	1981
Connecticut General	employer-based ridesharing	1957	Connecticut General	Connecticut General	-	39	5,000	11%-vanpools 25%-carpools 8%-commuter bus	1980
FHWA Carpool Projects (26 continuing projects)	areawide and employer-based carpool matching	1974	FHWA	local, regional or state agencies	-	-	19,300 (average)	0.8% of areawide employment (average)	1977
Raleigh, N.C.	city-wide carpool matching	1975	FHWA, city	city	-	-	55,000	1% of areawide employment	1977
Commuter Computer	third party ridesharing	1974	Caltrans, private firms	Commuter Transportation Services, Inc.	20	95	1,000,000	8.7% (direct) 2.0% (indirect)	1980
Knoxville Transportation Brokerage Service	ridesharing brokerage	1976	UMTA	KTBS (city), KAVA	39	91	190,000	0.8% of core area commuters	1980
RIDES for Bay Area Commuters	third party ridesharing	1977	Caltrans	RIDES	10	255	5,000,000	0.7%	1980
Norfolk	regional ridesharing	1977	UMTA	Tidewater Transit District Comm.	50	95	86,000	0.5%-vanpool 14.0%-carpool	1980
Twin Cities	regional multiemployer ridesharing	1977	UMTA (through 1979) MnDOT (current)	MnDOT, Metro. Transit Comm.; Vanpool Services, Inc.	7	104	70,000	5%	1981
Reston Commuter Bus	commuter bus (through 1979); vanpooling	1968	RCB	WMATA (buses); RCB (vans)	-	8	6,000	33%	1981

Sources of data: individual sponsors, operators, or administrators

(DOE). Additional federal funding for ridesharing also became available through the Energy Conservation Policy Act of 1978 (via the FEA and state energy offices), and through the UMTA Services and Methods Demonstration (SMD) Program.

Concurrent with the federal efforts, state and local government initiatives in the 1970's focussed on programs to encourage ridesharing, especially through working with larger private employers. California and Massachusetts were among the first states to organize ridesharing programs to promote both carpooling and vanpooling on a statewide basis. Numerous individual urban areas responded to the gas shortages by quickly assembling carpool matching programs, although there has since been some erosion of interest and support for these programs.

The most recent framework through which ridesharing has been promoted is the so-called "third party" arrangement.* In this arrangement, an organization established through either government, private sector, or joint public/private efforts, organizes vanpools and carpools, and often provides (or arranges for) vans. The initial efforts in this area involved the formation of non-profit organizations; the third party vanpool concept, for instance, was introduced in 1976 by Commuter Computer of Los Angeles. Non-profit corporations entered the ridesharing scene mainly because they were able to avoid certain institutional burdens which existing public agencies were reluctant to face in establishing vanpooling programs; these burdens included the financial and legal liability associated with organizing and providing vans and the administrative requirements of such a program. It was originally felt that, for those reasons, a new non-government organization devoted solely to ridesharing would be a more appropriate setting than would an existing body such as a chamber of commerce, metropolitan planning organization, or transit agency. However, as the experience with - and interest in - ridesharing has grown, such organizations, as well as for-profit companies, have themselves taken on ridesharing functions.

The sheer number of programs (see PROGRAM SUMMARIES AND RESULTS below) testifies that ridesharing is a viable form of transportation. More specifics on the experiences and impacts of the various types of programs are reviewed below.

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* In discussions of ridesharing, "third party" is often used in connection with vanpooling arrangements only. However, the term third party is used here to apply to the overall provision of ridesharing assistance (including the leasing of vans).

Program Summaries and Results

Employer-Sponsored Programs

The number of employer-sponsored programs has grown dramatically since 3-M instituted its vanpooling program - with 6 vans - in 1973. As of 1981, over 500 employer-sponsored vanpooling programs, comprising nearly 10,000 vanpools, were operating at 700 different sites throughout the U.S. (7). Most of these operations also include carpool-matching provisions, and many sponsor commuter bus arrangements as well.

As the first company-sponsored vanpooling program in the United States,the 3-M effort became the prototype for many subsequent endeavors. The ridesharing program, which came to include carpools, vanpools, and buspools, was the culmination of efforts to accommodate a growing parking demand without having to construct new parking facilities, and to alleviate traffic congestion near the 3-M center. Since the inception of the vanpool pilot program in April 1973, the number of vans transporting 3-M commuters has increased from 6 to 145, indicating that 3-M has achieved considerable success in encouraging its employees to participate. By 1981 over 1,600 employees, representing approximately 14% of the 3-M work force of 11,500 employees, commuted by vanpool. Moreover, the vanpool program has not adversely affected carpooling, as was originally feared; in fact, it may have encouraged the growth of carpools. It has been estimated that between 20 and 25% of 3M's workforce currently carpool to work, in contrast to 1970, when only 14% commuted by carpool.* In addition, another 2% of the work force commute to work on one of five subscription buses operated by the Metropolitan Transit Commission (MTC), the regional transit operator.

The impacts of the 3-M ridesharing project are significant. As a result of the shift in commuting patterns, over 1,000 parking spaces have been "freed," enabling 3-M to increase the work force at its central facility without concern over parking demand. The reduction in vehicle use has also contributed to less congestion. An annual reduction of 3,670,000 vehicle-miles traveled (VMT) and 81 tons of pollutants can be attributed to

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* Of course, this has been influenced by the energy situation, as well as by 3M's ridesharing activities.

the vanpool program alone. Also, with regard to energy conservation, the vanpool program is responsible for saving approximately 300,000 gallons of fuel per year.

The potential effectiveness of a comprehensive ridesharing program is well-demonstrated by that administered by the TVA. The amount of ridesharing at TVA has grown continuously since the introduction of express bus service in 1973, with a significant jump occurring following the introduction of a special incentive plan in 1975. This plan includes discounts on bus fares or parking fees, and the incentives are treated as part of the employee benefit package. As of mid-1980, 85% of TVA's 4200 employees at its Knoxville location were involved in some form of ridesharing (37% in carpools, 26% in commuter buses, and 22% in vanpools).

The impacts of the TVA's efforts have been significant in terms of change of travel mode, reduction in parking demand, and general reduction in vehicle-miles traveled. Following implementation of the incentive plan, there was a virtually immediate reduction of 12% in the number of TVA's Knoxville employees driving alone to work; by 1977 this percentage was around 18% of the total work force and by 1980 it had dropped to 15%. The demand for parking spaces, meanwhile, was reduced by over 1100 between 1973 and 1977, even though employment increased by 450 during this time. Moreover, the reduction in parking needs enabled the TVA to avoid building a new parking garage which had been planned (this also occurred at TVA's Chattanooga location). Vehicle-miles traveled were reduced over the same period of time by approximately 31,000 per day, with nearly half of this reduction coming during the first few months of the ridesharing program. This reduction can be translated into an annual savings in fuel consumption of approximately 460,000 gallons, as compared to the level of the modal use pattern prior to the ridesharing program (8).

In addition to the primary location - Knoxville - the TVA sponsors work trip services at its other sites in Tennesse, Mississippi, Kentucky, and Alabama, producing a total "fleet" of over 60 buses and 600 vans.* At the

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* A number of other large companies have also instituted multiple-site ridesharing programs. These include Continental Oil Company (CONOCO - based in Stamford, CT), which sponsors nearly 200 vanpools in 10 states, and the Prudential Insurance Co. (based in Newark, NJ), which sponsors over 200 vanpools at 18 sites throughout the U.S.

Hartsville (TN) site, for instance, 90% of the 4800 employees are currently ridesharing (40% in carpools, 32% in vanpools, and 18% in commuter buses), while at Chattanooga (TN), 69% of the 3400 workers are ridesharing. The total TVA program has reportedly conserved 4 million gallons of gasoline per year, has led to over 5400 autos being taken off the road (for commuting purposes, that is), and has eliminated 1800 tons of pollutants per year.

Another company, Connecticut General Life Insurance Company of Bloomfield, Connecticut, has also become heavily involved in the promotion of ridesharing, and its program has been very successful in getting its employees out of solo commuter status.* As of the end of 1980, 44% of the work force (5000 employees) was participating in one form of ridesharing or another: 25% in carpools, 11% in 550 vanpools, and 8% in commuter buses. This represents a 16% increase in ridesharing from the 1979 total.

Connecticut General was actually one of the first companies in the U.S. to promote alternative commuting options to the private auto: commuter buses were chartered beginning in 1957. Organized carpooling was introduced in 1973, and vanpooling in 1978. To support the ridesharing effort, the company operates its own service station to provide fuel and perform maintenance activities; autos can be repaired there, while all vans receive routine check-ups on a bi-weekly basis. Connecticut General's ridesharing program has also considerably reduced the parking need, and the company has been able to save an estimated $2 million in parking structure construction costs (9).

Early Areawide Carpooling Programs

In general, government-sponsored ridesharing programs were spawned by the energy crisis of 1973, and most have been funded, at least in part, by the Federal Highway Administration. Over 100 carpool demonstration projects in 34 states and 96 urbanized areas were generated by the Emergency Highway Energy Conservation Act of 1974. Thirty-five of these projects were still active as of the beginning of 1978; 26 are considered continuing and comprehensive. The results and impacts of these projects were evaluated in 1978 (10), and the major findings are discussed below.

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* In addition to its own program, Connecticut General has been instrumental in the formation of a regional "third party" ridesharing agency, the Greater Hartford Ridesharing Corporation (GHRC). Connecticut General provided $75,000 towards the establishment of GHRC and donated office space. This program is discussed later.

Very early carpooling programs, such as those sponsored by Westinghouse Broadcasting Corporation radio affiliates in a number of cities in 1973, focussed on areawide promotion (i.e., to the public at large); these efforts were generally unsuccessful. It was quickly realized that areawide promotion to the public could not, by itself, generate sufficient demand to allow for the formation of many pools. As a result, most of the federally-sponsored demonstration programs quickly moved to a focus of employer-based matching and promotion. The continuing comprehensive projects have also sponsored general public carpool matching and vanpooling, but largely as supplemental elements of the employer focus.* The demonstration efforts have generally relied on a combination of mass media promotion and advertising and direct employer contact to disseminate information and assist in the matching process. The carpool offices in the demonstration sites have generally worked closely with

Carpool Matching Board (Source: U.S. DOT)

* In one of the case study projects - the City of Raleigh, NC, Carpool Program - the focus shifted at one point from the original employer-based approach to a general public one; downtown commuters were then encouraged to join carpools. Currently, ridesharing is being promoted on the regional level, through a new region-wide program.

the major employers in the area, providing technical assistance and marketing materials to be used to inform and encourage employees to participate.

The Carpool Project Evaluation (10) examined the results of the 26 continuing comprehensive projects (see Tables 2 and 3), and included an evaluation of the broader impacts of 6 projects; this involved surveying a larger population base and accounting for indirect impacts beyond just the participating employers. The following are the key impacts, as calculated for the average demonstration project.

Market Penetration:

- o 143 employers agreed to cooperative participation.
- o 129,000 persons (25 % of the average total areawide employment) were exposed to ridesharing promotional activities at their place of employment.
- o Approximately 17% of the employees exposed to promotional activities (or 4% of areawide total employment) applied for carpool matching assistance (some of these people were already carpooling and sought new members).
- o 39% of those requesting matching assistance were carpooling and 16% of those requesting assistance (0.8% of the total areawide employment) joined or expanded carpools as a result of the program.

Travel Impacts:

- o The average vehicle occupancy increased from 1.2 before the project to 2.85 for new carpools.
- o The annual total work trip VMT was reduced by 6 million miles (0.3% of the areawide total); the evaluation of the broader impacts of six projects indicated an average annual reduction of 12.7 million VMT (or 1.2% of areawide total work trip VMT).
- o The annual consumption of energy was reduced by approximately 463,000 gallons (or 986,000 for those sites subjected to broader evaluation).
- o The annual vehicle operating cost was reduced by $504,000 (compared to an average annual project cost of $108,000; the Raleigh project is the least expensive, with an annual cost of $20,000; the most costly is that in the Los Angeles area, at over $1 million per year). For broader evaluation sites, the reduction in annual vehicle operating cost was $1.1 million, compared to an average annual project cost of $131,000.
- o The demand for commuter parking has been reduced by over 1,000 spaces (nearly 3,000 spaces in the broader evaluation sites).

TABLE 2

PROJECT IMPACTS AND CHARACTERISTICS: CARPOOL PROGRAMS

Project Location	Pop. Surveyed (Matchlist)	# New Carpoolers	% New Carpoolers	% of Area-wide Employment	Annual Reduction in Work VMT (thousands)	% Reduction in VMT	Annual Energy Conservation (thousand gallons)	Prior Average Vehicle Occupancy	New Average Vehicle Occupancy	Commuter Parking Space Demand Reduction
Direct Impacts of Carpool Matching										
New Orleans	3,491	419	12.0	0.1	308	0.04	24	1.20	2.70	130
Los Angeles	100,000	11,600	12.0	0.3	38,300	0.2	2,980	1.20	3.02	3,094
Sacramento	16,940	3,752	22.0	1.4	7,400	0.6	576	1.50	3.20	941
San Diego	24,672	3,207	13.0	0.8	7,000	0.3	545	1.18	2.93	1,082
Denver	19,350	2,128	11.0	0.4	3,000	0.2	233	1.20	2.73	663
Connecticut	104,660	4,186	4.0	0.3	14,300	N/A	1,112	1.06	2.85	1,654
Tampa	6,720	336	5.0	0.1	630	0.05	49	1.20	2.50	97
Atlanta	940	244	26.0	N/A	1,010	N/A	79	1.14	2.84	110
Boise, ID	2,402	168	7.0	0.4	200	0.2	16	1.20	2.53	51
Louisville	12,275	4,222	34.0	1.3	5,180	0.4	403	1.19	2.56	1,266
Alexandria, LA	1,232	185	15.0	0.9	175	N/A	14	1.20	2.60	56
Baton Rouge	3,357	336	10.0	0.3	340	0.1	26	1.20	2.70	104
Minneapolis	26,000	6,760	26.0	0.9	17,600	0.6	1,369	1.00	2.89	2,947
Agusta, ME	1,000	130	13.0	1.4	98	N/A	8	1.22	3.00	43
Omaha	11,000	2,700	20.0	1.1	2,200	0.3	171	1.18	2.90	608
Salem,OR	4,997	398	8.0	0.6	288	0.1	19	1.20	2.90	130
Reading, PA	414	70	17.0	0.06	59	0.03	5	1.20	2.50	20
Pittsburgh	15,700	1,885	12.0	0.2	3,945	0.2	307	1.43	3.30	747
Raleigh, NC	4,993	949	19.0	1.0	1,110	0.3	86	1.42	3.27	310
Rhode Island	5,070	1,972	39.0	0.6	4,260	N/A	331	1.20	3.30	805
Dallas	26,650	1,600	6.0	0.2	4,120	0.2	320	1.20	2.30	564
Ft. Worth	10,000	3,000	30.0	1.1	4,320	0.3	336	1.27	2.61	901
Houston	10,242	2,955	29.0	0.4	7,300	0.3	568	1.20	2,80	938
San Antonio	20,000	7,140	36.0	2.7	9,520	0.8	741	1.20	2,89	2,320
Seattle	15,000	4,350	29.0	0.8	3,350	0.1	261	1.42	2.70	726
Wash.,D.C.	110,000	15,400	14.0	1.3	18,900	0.4	1,470	1.20	3.00	5,134
Average	19,313	2,747	16.0	0.8	6,000	0.3	463	1.20	2.85	1,009
Broader Aspects of Ridesharing Programs										
Portland	106,000	11,049	10.4	2,9	15,000	1.0	1,167	1.18	2.51	3,295
Boise	15,000	616	4.0	1.4	1,040	0.8	81	1.20	2.53	263
Boston	260,000	9,307	3.3	0.7	15,400	0.3	1,198	1.20	2.50	3,675
Milwaukee	Random Sample	8,080	—	1.6	10,500	0.7	817	1.40	2.37	2,363
Louisville	"	7,282	—	2.2	13,400	1.0	1,043	1.19	2.56	3,274
Tuson	"	8,400	—	8.0	20,700	3.6	1,610	1.00	2.40	4,900
Average		7,411		2.8	10,085	1.2	986	1.20	2.48	2,977

Source: (10)

TABLE 3

COST-EFFECTIVENESS OF RIDESHARING PROJECTS

Location	Annual Project Cost	Estimated Annual Cost per New Carpooler	Estimated Cost per Carpooler Trip (a)	Estimated Cost per Vehicle Mile Reduced
Tucson (b)	$ 58,000	$ 7	$.015	$.003
Los Angeles	660,000	85	.18	.089
Sacramento	85,000	32	.07	.011
San Diego	210,000	98	.21	.030
Denver	125,000	88	.19	.042
Connecticut	65,000	23	.05	.005
Boise (b)	45,000	75	.16	.043
Louisville (b)	65,000	9	.02	.005
Boston (b)	325,000	37	.08	.021
Minneapolis	60,000	13	.028	.003
Omaha	84,000	69	.15	.038
Raleigh	20,000	26	.06	.018
Portland (b)	190,000	26	.06	.013
Pittsburgh	134,000	71	.15	.034
Rhode Island	70,000	46	.10	.016
Dallas	60,000	38	.08	.015
Ft. Worth	30,000	15	.033	.007
Houston	220,000	112	.24	.038
San Antonio	160,000	34	.07	.017
Seattle	215,000	99	.22	.064
Washington, DC	110,000	11	.024	.006
Milwaukee (b)	100,000	12	.027	.010
Average (c)	$140,000	$ 47	$.10	$.024

Notes: (a) Assuming carpooler makes 2 trips per day for 230 days per year, or 460 annual trips to or from work.

(b) Based on broad impacts of ridesharing programs in these cities. Impacts for other locations are those directly attributable to carpool matching.

(c) Values shown are arithmetic averages of the individual city data. If averages are computed based on summations of annual project costs for all above cities divided by summations of number of new carpoolers and annual VMT reductions from Table 15, the following cost effectiveness indicators result: $35 per new carpooler, $.075 per new carpooler trip, and $.014 per VMT reduced.

Source: (10)

Project Costs (for 22 major projects):

- o The annual project cost for each new carpooler was $47 ($28 for those projects whose broader impacts were assessed).
- o The project cost for each person trip made by new carpoolers over the life of the project was $0.10 ($0.06 for those subject to broader assessment).
- o The project cost per vehicle-mile reduced due to new carpoolers over the life of the project was $0.024 ($0.016 for the broader impacts).

The results vary widely between projects, obviously, but certain general conclusions are suggested by the overall evaluation. First of all, approximately two-thirds of the original projects did not achieve significant results and were terminated, or at least considerably reduced in scope (major reasons for their failure are discussed later in this chapter). However, the remaining projects, especially those that were better funded and more comprehensive in nature, were able to achieve significant increases in carpool participation. Whereas the average VMT reduction of 0.3% is not especially significant, several urban areas did produce reductions greater than 1%. Moreover, the broader impacts of such programs were estimated to be twice as great as the direct impacts.

One of the early carpool projects - the Raleigh Carpool Program - has undergone several major transitions during its existence. It began as a one-shot effort in response to the 1973 energy crisis, was then reestablished on a continuing basis in 1975, and was scaled down in 1977. It is now being phased out, with its functions to be subsumed by a new regional program. Originally (in 1975) a three-phase areawide employer-based program, the program was narrowed in focus, in 1977, to the central business district, and shifted in approach from employers to the general commuting public. The employer-based approach had been only moderately successful and the demand for matching outside of the CBD was deemed insufficient to warrant continuation of the program at that level. The next stage of the program involved a considerably lower level of effort than the previous one; however, efforts were then begun to coordinate regional ridesharing activities with the nearby towns of Chapel Hill and Durham. In addition, Raleigh area employers have begun to contact the carpool office about establishing programs to help combat

the rising costs of fuel. Ridesharing efforts for the entire "Triangle" region have been taken over by a regional planning agency (the Triangle J Council of Governments).*

Third-Party Ridesharing Programs

The newest form of ridesharing program is that involving a "third party" organization whose purpose is facilitating ridesharing arrangements. These organizations differ from those described previously in that, in addition to general matching services and promotion, they may also lease vans (or buses) to employees or interested commuters. Third party programs have been sponsored by existing organizations, but more often involve the formation of a new organization.

The earliest initiator of a third party ridesharing program was Commuter Transportation Services, Inc., of Los Angeles (commonly called Commuter Computer). A non-profit corporation, Commuter Computer is a rather unique effort in that it was sponsored by both public and private organizations. The corporation was formed through support from the Atlantic Richfield Co. (ARCO), the California Department of Transportation (Caltrans), the Southern California Automobile Club, Crocker National Bank, Security Pacific National Bank, and other private and governmental organizations. ARCO's role was an extension of its own ridesharing program. Crocker bank was looking to obtain profits from the vehicle leasing operation. Currently, the program is funded almost entirely by Caltrans, which funds ridesharing programs throughout the state.

Commuter Computer began with a carpool matching project in 1974, and initially focused on employers. In 1976, a vanpool element was added in the mid-Wilshire district only. The latter initially involved 20 vans, which were made available to poolers on a straight fare basis (i.e., they were maintained by the corporation, not leased to the poolers). Based on the success of this pilot effort, the program was expanded to 70 vans. An additional 160 vans were subsequently obtained by the corporation, but not all of them were placed into service. The reasons for this included the following: 1) a substantial administrative overhead charge was assessed each rider, making the fares quite high; 2) the fare for each rider was at a fixed rate, regardless of the number

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* The impacts and results of Raleigh's Carpool Program are summarized in Tables 1 and 2.

of riders in the vanpool (i.e., there was no incentive for increasing the ridership of any vanpool); 3) Commuter Computer had problems providing in-house maintenance support for its vans; and 4) Commuter Computer simply overestimated the demand at the time. As a result of the difficulties in placing those vans, Commuter Computer significantly altered its approach. While many of the original vans are still in operation, the corporation no longer provides new or replacement vans. Commuter Computer will still help form vanpools, but the vans are provided by the statewide vanpooling program being managed by Vanpool Services Inc. (VPSI), a subsidiary of the Chrysler Corporation. (The role of VPSI on a national level is discussed further later.)

As of 1981 Commuter Computer was the largest ridesharing effort of its kind in the country, with over 80 employees and a total annual budget of around $2 million. Commuter Computer works with an estimated 1000 companies, maintains a data base of 470,000 commuters, and estimates that it has been responsible (either directly or indirectly) for the placement of nearly 60,000 persons into carpools and the formation of 95 vanpools, as of mid-1980 (11).

Commuter Computer estimates that the annual reductions in VMT, energy consumption, and pollution from its carpooling efforts are substantial: 151 million fewer VMT, 9.5 million gallons of gasoline saved, and 7.7 million pounds of pollutants reduced. The impacts of the vanpool program were estimated to be 4.5 million fewer VMT, 267,000 gallons of gasoline saved, and a reduction of 92,000 pounds of pollutants (11).

Commuter Computer carpoolers have largely been drawn from other ridesharing modes, according to a 1979 study (12): 25% were already carpoolers and over 30% used transit (usually express type); only 37% formerly drove alone. Among the vanpoolers, almost 75% formerly drove alone (of those vehicles left at home during the day, only 20% were reportly being used, i.e., by spouses or children). Approximately 30% of the vanpoolers had heard about the program through Commuter Computer's advertising and presentations; the rest found out by word of mouth. Among the carpool applicants, 9% made use of matchlists to form or become a member of a carpool. Roughly 80% of all carpool partners were co-workers; 40% of these people knew some or all of their fellow poolers before forming a carpool.

Third party ridesharing programs offering matching services in addition to van leasing are generally known as ridesharing "brokers." In general terms, the transportation broker identifies and matches individual traveler needs within a range of existing and/or new transportation services to provide a more efficient and effective overall system. The Knoxville Transportation Brokerage Service (KTBS) was the first and best known attempt at formalizing this concept within a ridesharing framework. An advocate of shared-ride modes, the KTBS has worked for those institutional/regulatory changes necessary to facilitate their expansion.

The KTBS was an UMTA Service and Methods Demonstration (SMD) project running from late 1975 through 1978. The project began at the University of Tennessee's Transportation Center, and was relocated, in 1977, within the City's Department of Public Transportation Services. (It has now shifted back to the University, following the close of the initial demonstration). The primary tool of the brokerage effort was an areawide employer-based surveying program designed to identify interested commuters. A total of 829 employers were contacted, and 391 participated in the program. By the end of the official evaluation period for the demonstration (June 1978), 22,000 employees (about 11% of the market population) had returned surveys. Although about 22% of all matchlist recipients contacted others and/or were contacted about forming or joining a pool, the percentage of all list recipients influenced into making or modifying ridesharing arrangements was less than 7%, which extrapolates to approximately 0.8% of the core area commuting population (13).

Among the major accomplishments of the brokerage demonstration - besides the formalization of the concept - were its achievement of significant institutional changes facilitating the expansion of ridesharing; these changes had statewide and even national impacts. The major achievements include legislation effecting statewide reforms governing vanpooling operations (Tennessee was one of the first states to deregulate vanpools), and a new local taxi ordinance. The demonstration also included a unique aspect in KTBS's purchase of fifty-one vans for lease to individual driver/operators. The intent was to use these "seed" vans to demonstrate the viability of vanpooling and thereby spur the growth of a large privately owned fleet of vanpools. KTBS was successful in leasing its entire seed van fleet; these vans were subsequently purchased by individuals. The van owners thus became

individual "entrepreneurs," and an organization representing these entrepreneurs - Knox Area Vanpoolers Association (KAVA) - was established. As of mid-1980, KAVA had 101 members, including 91 vanpools and 10 buspools.

A more recent example of a third party effort is RIDES for Bay Area Commuters, Inc., located in San Francisco. A non-profit corporation initiated with the support of Caltrans (along with the California Energy Commission and the Metropolitan Transportation Commission), RIDES provides vans and matching services for a 10-county area with a total population of 5 million. The corporation was formed in September 1977, and the vanpool program began in March 1978. In July 1978, 10 vanpools were in operation; within a year, the number had grown to nearly 100. As of 1981, 255 RIDES vanpools were on the road. The vanpool leases are guaranteed - if a pool breaks up, RIDES will take the van back; vanpoolers are committed to the program only on a month-to-month basis.

The program focuses on both employer-based matching and, unlike Commuter Computer, areawide marketing to the public in general.* RIDES reports that these approaches have been equally successful. RIDES attributes its success in general public marketing, where others have failed, to: the geography of the Bay area, with only a few major travel corridors into downtown San Francisco; and the fact that the combined public/employer program yields a sufficient number of potential poolers to make areawide matching feasible.

RIDES has been fairly successful in attracting participants to both vanpooling and carpooling. Matching of riders (for carpools, vanpools, and buspools) was expedited through the implementation, in 1979, of a mini-computer system, providing an on-line interactive matching capability. It is estimated that more than 30,000 persons (60% of whom formerly drove alone and 11% of whom formerly used transit) have joined carpools as a result of RIDES's efforts (14). This mode change has reduced annual VMT by an estimated 17 million, and has reduced air pollutants by 1.2 million pounds. Furthermore, only 12% of those autos left at home during the day by carpoolers are apparently used, and then for only 7 miles per week on average (15). A survey of vanpoolers (January 1979) indicated that 20% formerly drove alone,

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* RIDES also provides information on transit as part of its range of services, working directly with the regional transit agency (MTC).

25% used transit, and 35% carpooled (the remainder used other modes, such as walking or train, were new to the area, or shared a ride with one other person).

RIDES has introduced several ridesharing innovations into its operation. As a means of increasing the load factor of its vans, for instance, it introduced an incentive program, offering reduced fares for each passenger in a vanpool as the number of riders increases. This was partially necessitated by another innovation: extensive use of 15-passenger vans, as opposed to the 12-passenger vans which had been predominantly used elsewhere; the use of higher occupancy vehicles offers the opportunity for lower average fares than had previously been feasible. RIDES was also one of the first programs to provide matching for buspools. Finally, RIDES is involved in a rather unique shuttle van program, involving four hospitals in Oakland: a RIDES van operates on a route connecting the hospitals with a nearby BART station.

Another framework in which ridesharing has been managed and/or promoted on a third-party basis is through the regional transit agency. The case studies of the programs in the Norfolk (VA) and Twin Cities (MN) areas provide examples of this framework. These projects, the Knoxville project, and projects initiated by the Golden Gate Bridge Transit District in the San Francisco Bay area and Tri-Met in Portland represent early involvement by UMTA in ridesharing; all of these projects were sponsored by UMTA's SMD Program. While they differ from other third-party programs in that they do not represent newly established organizations, they do offer the same types of services, including van leasing, as new third party ridesharing agencies. More recent transit authority-sponsored programs have been initiated in Orange County (CA) and Detroit (MI).

One of the first transit authority-sponsored ridesharing programs was initiated in the Tidewater area of Virginia, which includes Norfolk, Virginia Beach, Portsmouth, Chesapeake, and Suffolk. This area contains five navy bases employing 105,000 personnel, 86,000 of whom commute to work. In an attempt to provide an efficient alternative to single-occupancy commuting, so as to ease congestion of the roads and parking facilities, the Tidewater Transportation District Commision (TTDC) initiated a ridesharing program for Navy employees in 1976. The program now serves non-Navy personnel as well, and currently has 95 vanpools in operation. The program is managed (and the vans are owned) by the TTDC.

After a rather shaky first year, plagued by limited interaction between the TTDC and the Navy, the TTDC program became quite successful in generating commuter participation. The 50 vans orginally purchased through the demonstration grant are all still in use, with an average occupancy of 11; the overall average occupancy is approximately 9. The TTDC's efforts have also resulted in the creation of new carpools, although no figures are available as to the number of employees participating. Finally, the TTDC is also leasing thirteen 40-passenger buses: 8 to a single private commuter bus operator and 5 to individuals operating buspools (several of these are "graduates" of vanpools).

The impacts of the TTDC project on parking demand, traffic congestion, and VMT have been modest. In terms of parking, the vanpools have freed up at least five spaces for every van in service, but the net reduction has not been significant given the total number of spaces available. Similarly, the impact on traffic congestion is not very significant in light of the estimated 65,000 commuters who drive alone. The annual VMT reduction is estimated to be 50,000 miles per van, or 2,250,000 total miles. This represents less than 0.3% of the estimated total annual VMT for the project area. The project has, however, demonstrated the ability of a transit agency to manage a range of public transportation options. This, in itself, represents an important breakthrough, in light of the fact that many transit operators have traditionally viewed ridesharing as direct competition for the commuter market.

In the Twin Cities of Minneapolis and St. Paul (MN), the regional transportation operator - the Metropolitan Transit Commission (MTC) - requested and received two federal grants to set up a demonstration project offering ridesharing services to employees at multi-employer suburban work sites. The Share-A-Ride demonstration program included: (1) marketing three alternative commuting options (carpooling, vanpooling, and conventional bus transit); (2) matching prospective poolers; (3) providing vanpooling through a third party arrangement; and (4) supplying bus information.

Although sponsored through the MTC, the project was operated by three organizations: Public Service Options, Inc. - a non-profit corporation responsible for initial marketing, planning and evaluation; Van Pool Services, Inc. (VPSI) responsible for the formation and administration of the vanpools as a third-party operator; and Commuter Services - a division of the MTC

responsible for carpool matching, providing bus information, and on-going marketing.

Marketing formally commenced in July 1977. Application response rates from direct employee marketing varied between 12% and 30%, while more passive marketing efforts generated a limited return of less than 5%. After eight months (when marketing was completed), only 7 vans were operating, in contrast to the initial projection of 20. Similarly, there were only 250 applicants placed in carpools, in contrast with initial estimates of twice as many. The failure to meet expectations was attributed to the decision to focus marketing efforts on large firms (although small employers accounted for almost half of the target employment) and the broad array of intracompany working hours, which significantly reduced the number and size of poolable groups.

Interest in the program increased dramatically during the second year, as a result of the escalating price and limited availablibility of gasoline. The target area was also expanded to eight other multi-employer sites, as well as two single employers who requested assistance in setting up vanpool programs. By April 1980, 104 vans were operating and 2270 applicants had been placed in carpools.

While marketing efforts generated approximately a 20% response from the target population over the two years of the demonstration, the level of participation doubled from two to four percent. Hence, although this project demonstrated the ability of a regional transit agency to manage a market-oriented ridesharing program for selected multi-employer sites, the problems inherent in generating poolable matches from these sites proved to be a major obstacle; in fact, it took the 1979 fuel "shortage" to reverse the disappointing results of the first year's efforts. The level of participation alone, however, does prove that there is a potential commuter ridesharing force at such sites, and that their placement into carpools and vanpools is feasible.*

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* The nature of the program has changed considerably since the conclusion of the demonstration (1979). Ridesharing in the Twin Cities area is now promoted as part of a statewide program administered by the Minnesota Department of Transportation (MnDOT), although responsibility for the program within the Twin Cities is divided between MnDOT and MTC. MnDOT, which has subcontracted to VPSI, is responsible for half of the area, MTC is responsible for the other half. VPSI, under a separate contract, supplies vans for the entire area.

Neighborhood-Based Services

All of the previous examples of ridesharing programs attempt to organize pools on the "destination-end;" that is, they focus on employees with common destinations. This approach has generally been found to be more successful in generating pools than one in which both origins and destinations must be matched. An alternative approach, however, is to try to organize ridesharing at the origin end of the trip.

The best known example of such a program is the Reston Commuter Bus (RCB), originally a buspool program developed and administered to respond specifically to the needs of Reston-area residents commuting to Washington, D.C. Service was contracted to a private bus operator (Colonial Transit Company) for a period of five years, with generally positive results. In September 1979, however, Colonial Transit defaulted (primarily as result of failing to adequately maintain the buses) and the contract service ceased; the buspools were subsequently replaced by express transit service operated by the Washington Metropolitan Area Transit Authority (WMATA). Reston Commuter Bus, Inc. now serves as an advisory group for WMATA's express bus operation, and also operates vanpools for Reston-area residents. As of the end of 1980, eight vans were in operation, serving four different destinations in Northern Virginia; ridership is booked on a month-to-month basis. At that time, WMATA was making approximately 75 express runs per day between the Reston area and Washington.

RCB was organized in 1968 by a group of residents of the new community of Reston, who were looking for a commuting alternative for the 22-mile trip to Washington, D.C. These individuals formed a cooperative venture and arranged for bus service. Ridership grew dramatically from the beginning of service in 1968: monthly patronage in March 1968 was just over 1000; by March 1977 it had reached 57,000 (During that same period, the population of Reston grew from 3,000 to 30,000). It is estimated that approximately one-third of the workers who live in Reston and work in downtown Washington patronized the RCB service. In addition, the vehicle productivities were relatively high for such a specialized transit service (25 to 30 passengers per in-service vehicle hour).

RCB's bus service was managed such that revenues covered operating costs. Additional runs were not scheduled until existing patronage warranted their

introduction. System costs rose steadily, though, due to increased service contract costs (administrative costs have been 5% or less over the past ten years). The cost per passenger-trip in 1979 was approximately $1.44, up from $1.12 in 1974.

Key Findings

The case studies, examination of other projects, and research by others in the field have produced important insights into the myriad impacts of, and issues associated with, the initiation and use of ridesharing options. Key findings are presented below.

Impacts of Ridesharing Programs on Energy Consumption

The previous section described the impacts of ridesharing programs on furthering such goals as the reduction of parking needs, air pollutants, and energy consumption. In light of the continuing level of concern over the latter issue, it is helpful to review the role of ridesharing efforts in this direction.

Ridesharing is obviously more energy-efficient than solo commuting, and may be more efficient than transit, depending on load factors (see Exhibit 1 and Table 4). In fact, according to Pratsch of the U.S. DOE (16), vanpooling in particular is the most energy-efficient mode (see Table 4). Although all researchers agree that ridesharing can save energy, there is some debate as to the relative impact of ridesharing on reducing energy consumption when compared to other conservation activities. Altshuler (17), for instance, has estimated that even a shift of 32% of all drivers to passenger status (thus achieving an overall occupancy rate of 2.0 for auto work trips) would save less than 200,000 barrels of oil per day - slightly over 4% of the total auto fuel consumption. The Federal Energy Administration (now part of the Department of Energy), on the other hand, estimated that such a shift would save more than twice the Altshuler projection (18).

Pratsch (18) has estimated that the average vanpool saves approximately 5000 gallons of fuel per year over previous commuting modes (and accounting for fuel consumed by autos left at home during work hours). Assuming approximately 10,000 vanpools currently operating in the U.S. (7), the total annual energy saving is about 50 million gallons. Carpooling, though harder

TABLE 4

ENERGY INTENSIVENESS OF DIFFERENT MODES

Mode	BTU/Vehicle Mile	Pass-Mi./Veh. Mi.	BTU/Passenger-Mile
Automobile	11,350	1.6	7,500
Carpool	11,350	3.0	3,800
Vanpool	13,100	11.0	1,200
Taxicab	N/A	N/A	15,600
Dial-a-Ride (Small Bus or Van)	16,700	2.0*	8,350*
Transit Bus	33,450	13.5	2,900
Light Rail	43,000	23.4	1,800
Heavy Rail	77,300	24.0	3,400

Source: (20)

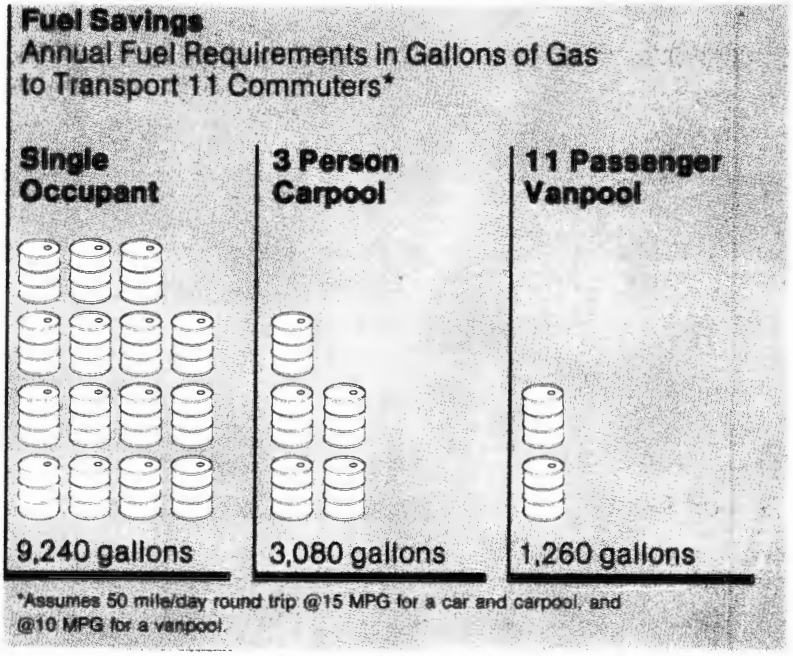
(NOTE: This table presents propulsion energy only, and does not include construction or maintenance energy.)

* Based on average of 7 systems, as reported in Ewing and Wilson (1976).

to measure, has been estimated to save over 2 billion gallons of fuel per year (16). Thus, the total annual energy savings of these two modes alone is approximately 2.05 billion gallons, which is equivalent to roughly 13% of the total annual fuel consumption for auto commuting.* This represents a substantial savings, and if ridersharing is given a significant push by public and private promotional efforts and rising fuel prices, the savings could increase significantly in the future. Regardless of the exact level of potential energy savings, it is clear that ridesharing represents an important component of an overall energy conservation program.

* It should be kept in mind, however, that estimates of actual energy savings are difficult to make due to two key factors. First of all, as indicated in the case studies, not all "poolers" come from the ranks of solo commuters; thus, a carpool made up of former bus riders, for instance, actually represents an increase in energy use, since an additional vehicle is now on the road. Second, the fuel used for vehicles left at home (i.e., formerly used for commuting) should be considered. Since different computations do not include these factors on a uniform basis, it is difficult to ascertain which of the various estimates are the most accurate.

EXHIBIT 1
COMPARATIVE FUEL SAVINGS



Source: (19)

Factors Influencing Program Initiation and Success

Ridesharing programs have been developed for various reasons. The case studies and recent research efforts have identified those issues which have been most important in motivating the implementation of such programs, as well as other factors contributing to their successful operation and/or promotion.

Consider first the factors which influence employers. In examining fifty-eight employer-sponsored vanpool programs, Jacobson (21) identified the most important issues/problems spurring the initiation of the programs. The most important motivating factors, as indicated by the program managers, are shown in Table 5.

The most important factor - poor transit service - is representative of the fact that many of the employers sponsoring vanpooling are located in suburban areas in which there is no direct transit service, or there are long headways or long walking distances from stops. Vanpooling has also flourished in cities where there is limited transit service (e.g., Houston and Knoxville).

TABLE 5

FACTORS MOTIVATING EMPLOYER-BASED VANPOOL PROGRAMS

Factor	Percent of employers citing as most important factor*
poor transit service	43%
rising gasoline prices	41%
parking problems	29%
long employee commuting time	28%
congestion	9%
other (includes intraplant transportation needs, energy conservation, headquarters relocation, public relations)	3% (for each factor)

* The total is over 100% because some respondents felt that two or more were especially important.

Source: (21)

The second factor - rising gasoline prices - declined in importance following the 1973-4 energy crunch, but became important once again in 1979. The problem of high gas prices is also related to that of long commuting times, another important factor; savings in fuel costs in vanpool travel will obviously increase as commuting distances increase.

The next most frequently cited factor was the need or desire to reduce employee parking demand. This factor has most often motivated those employers located in downtown areas who subsidize employee parking; in such cases, ridesharing cuts down on employer costs and saves money for the participating employees. Instituting ridesharing services has also enabled some employers to avoid or delay expansion or construction of parking facilities. The TVA program, for example, was largely the result of a parking shortage; the Authority decided to sponsor ridesharing services as an alternative to building new parking garages. The vanpool operation at 3M also grew out of a parking shortage and the prospect of having to expand parking facilities.

The TVA (22) and other employers have also found that ridesharing can reduce employee tardiness and absenteeism. This can certainly serve as an important inducement to employers to promote ridesharing.

The above issues were important in motivating employers to implement ridesharing programs; they have also been factors leading to the development of government-sponsored programs, although to a less significant degree. By far the most important issue motivating areawide (or statewide) programs has been energy conservation. As Wagner (10) points out, a great many carpooling projects were started (in 34 states, covering 40% of the SMSA's) as a direct response to the 1974 oil embargo.

The control of air pollution was also a significant factor leading to many of the earlier large-scale ridesharing efforts, especially where such efforts were included as mandatory requirements in legislation. For example, the EPA established a set of regulations governing non-attainment areas (air quality control regions), defined as those regions which do not meet federal air quality control standards. Included in this legislation was a requirement for a Transportation Control Plan in which employers in the affected areas were required to implement and maintain carpool and vanpool programs at employment facilities to which a designated number of employees commute. In several areas, areawide efforts to develop ridesharing programs have been enhanced through such requirements.* Similar legislation is currently being introduced throughout the country in states with non-attainment areas.

Beyond the factors motivating ridesharing program development, a number of other factors have contributed to the successful operation of the programs. These include location-associated issues and the existence of identifiable benefits and incentives. The most important locational issues have been identified as including the population of the service area (in areawide programs) and the existence of other programs in the area. For example, Wagner's carpool project evaluation revealed that 85% of the continuing comprehensive carpool projects are located in areas with populations greater than 500,000 (Raleigh's is one of four in smaller areas). On the other hand,

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* In Los Angeles, requirements that employers implement ridesharing on days of smog alerts at certain levels have certainly contributed to Commuter Computer's success in building up a substantial matchlist.

area population is a less significant factor in the development of employer-based programs, because the target markets in these programs are generally restricted to company employees.

As for the other major location-specific factor - existence of other programs - Jacobson found that over one third of the existing employer vanpool operations were started in areas where another such program already existed. The presence of one program makes it easier for other employers to enter the "market;" the existing program can potentially provide useful promotional and technical expertise gained in its own development and operation, thereby enabling a new program to avoid or at least anticipate certain of the usual start-up problems.

What is probably as important as the technical assistance (which is available through general "how to" manuals and workshops), however, is the (presumably) successful example that the existing program offers those employers considering, but hesitant about, developing a similar one. The best example of such "spinoffs" is in Houston. The growth of vanpool operations there (60 programs with over 1800 vans as of mid-1980) has been significantly abetted by the successful example of that city's first operation - Conoco, begun in December 1974.

While examples of successful programs have had some influence in motivating employers to implement their own programs, certain employers (and others) have taken a more active role in promoting ridesharing activities through support of, and participation in, the National Association of Vanpool Operators (NAVPO). NAVPO has become an active advocate of vanpooling and a "spokesman" for vanpoolers and their sponsors. Among a variety of promotional and informational activities, NAVPO publishes a bi-monthly newsletter and sponsors national conferences.

Barriers to Program Initiation

The expansion of ridesharing programs has been hindered by a variety of institutional and regulatory barriers. The nature and severity of these barriers often vary from one location to the next and tend to differ between service or program arrangements. In many cases, the problems have not been as serious as anticipated by program participants, but the mere anticipation of difficulties is often enough to discourage interest.

The major barriers - perceived and real - fall into two basic categories: (1) those which are constraints to development and provision of actual ridesharing services; and (2) those which impede promotion and expansion of ridesharing on an areawide basis (i.e., affecting government ridesharing programs). Those barriers in the first category include legal and regulatory issues, insurance availability, labor concerns, and attitudinal issues. The second category includes lack of employer interest, lack of strong advocates/implementors, and funding/budgeting problems. The barriers and the means used to overcome them are discussed below.

The first category of barriers includes those facing an employer or organization seeking to implement and operate a ridesharing program. Constraints related to legal/regulatory issues are concerned primarily with state (and sometimes local or federal) regulations governing and defining forms of public and private transportation. Virtually all states regulate passenger transportation in some way, and vanpools have traditionally been included under certain carrier regulations. Such regulations have posed problems to organizations establishing vanpool and commuter bus services (i.e., third party operations), although a number of states have deregulated vanpooling (California, Connecticut, Tennessee, and Maryland were the first to do so, beginning in 1974). In most states, employer-sponsored services and carpools have been exempted from restrictive legislation over the past several years; some states (e.g., Massachusetts, Texas, and Minnesota) have passed legislation which encourages vanpooling. Such exemptions often do not apply to non-employer based programs, however. Programs such as the Knoxville Transportation Brokerage Service and the Reston Commuter Bus have thus been forced to seek special rulings or legislative changes.

When the KTBS, for instance, purchased its seed vans to demonstrate the viability of vanpooling, the Tennessee State Public Service Commision policy was interpreted as prescribing regulation of vanpools as "for hire" or "contract carrier" transportation. This would have severely limited vanpooling's public acceptance. Therefore, KTBS pushed for, and achieved, the statewide deregulation of commuter vanpools carrying fifteen or fewer passengers.

In Reston, the (former) contract provider (Colonial Transit Co.) was opposed by WMATA and the Amalgamated Transit Union in its application for the

required certificate of public convenience and necessity. Despite WMATA's traditional regulatory authority in such matters, the certificate was granted by the Washington Metropolitan Area Transportation Commision, which ruled that the Reston system was inherently different from WMATA's regular route service, and that it (the Commission) therefore had jurisdiction to grant a certificate. (As discussed earlier, however, WMATA has taken over the service, following a default on the service by Colonial Transit.)

Regulations governing ridesharing modes vary considerably between states and within particular situations. Exemptions have been defined in many different ways, including by seating capacity, route, type of fare or charge, type of vehicle, and ownership of the vehicle. In some states, the definitions are quite narrow and thus legally prohibit certain types of vanpooling (e.g., vanpools coordinated by community groups, such as RCB, are technically considered illegal in many states (23)). For traditional employer-based vanpooling programs, however, regulation has generally not posed a significant problem. In surveying vanpool program managers on the importance of barriers to vanpool planning and implementation, Jacobson (21) found that 38 out of 58 respondents considered "private transportation and motor vehicle regulations" not important during program implementation.

A second constraint to implementing ridesharing programs has been obtaining liability insurance. Companies owning or leasing vans can generally be held liable for van-related accidents. Insurance covering such accidents has often been hard to obtain and, when available, has been quite expensive. With the increasing number of vanpooling programs in operation, premiums have gone down somewhat, but insurance continues to be at least a perceived problem. In Jacobson's survey, liability insurance was considered a "very important" problem by 25 of the 58 respondents during the original consideration of a vanpool program, but only 5 of the managers considered it very important during the actual implementation of the program (35 considered it "not important").

The situation for private vanpools was improved considerably as a result of KTBS's efforts. KTBS was instrumental in the establishment, in 1977, of a national insurance classification scheme particularly favorable to private vanpools. KTBS also drafted and guided to passage legislation extending Tennessee's insurance statutes to provide improved underinsured motorist coverage for passengers in high-occupancy vehicles.

A third barrier concerns opposition to ridesharing programs from transit workers (i.e., through Section 13(c) of the Urban Mass Transit Act of 1964).* In Knoxville, a 13(c) agreement was reached only after achievement of two other agreements among the city, the transit operator, and the union. The first agreement was a contract between the city and the transit operator for performance of major maintenance (by union employees). The second component was a verbal agreement that vanpools would be targeted for areas which did not have conventional transit service. The Norfolk 13(c) agreement incorporated the same basic stipulations, the major difference from Knoxville being that, in the Norfolk case, the transit operator was the grantee.

Other barriers to successful implementation and operation of ridesharing programs involving employers are "internal" to the employer. The most basic problem is a shortage of potential poolers, generated either because employee interest is too low to enable the formation of pools or because their residential locations are too dispersed to make pool formation feasible. The latter problem is difficult to overcome, although carpools are feasible in many instances where vanpools are not. The former problem must be attacked through aggressive marketing (i.e., dissemination of promotional/informational materials pointing out the benefits of pooling), as well as through the undertaking of matching activities and/or the use of ridesharing incentives. (See Exhibits 2 and 3).

Another internal barrier relates to the costs of the program. Many employers do not feel that the benefits of ridesharing are worth the costs. Vehicle costs are generally recovered through user fares, but the other expenses (i.e., marketing, administration, matching, etc.) are normally not. Thus, the program costs can be a significant hindrance, especially in smaller firms. Jacobson reports that this was considered by the managers he contacted to be the most severe of all the problems associated with the implementation of vanpool programs. This is an area in which government-sponsored or other third party ridesharing programs can help by providing administrative and/or financial assistance.

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* Section 13(c) relates to labor protection in the transit industry. It requires that the Secretary of Labor sign off on any transportation project which may, in any way, "worsen the status" of transit workers in the location of the proposed project.

RIDE-SHARING SAVES...

MONEY

If you join just one other person in a carpool, you slash your driving cost by up to 50%. Vanpool passengers save up to 80%. As a vanpool driver you save 100% of the cost of both owning and commuting in your private car—it's a free commute!

MONTHLY COMMUTE COSTS*

Daily Commute Miles	Driving Alone	3-Person Carpool	Vanpool (13 riders)	Vanpool Driver
30	$180	$100	$42	$0
50	300	166	47	0
70	417	233	54	0
90	536	300	59	0

*Source: U.S. Dept. of Transportation, FHWA

TIME

No gas lines — Vanpools are allocated special gasoline supplies and are often served by appointment. Odd/even restrictions do not apply.

Express lanes — At many bridge approaches and freeway ramps ridesharers enjoy fast lanes while others crawl.

Preferential parking — Many employers give special close-in parking spaces to vanpools and carpools.

ENERGY

Driving by yourself in a subcompact, you might think you've done well to get 30 mpg. But carpool with 3 others and you get *120-passenger mpg!* That's how to measure energy use these days. The vanpool tops the list at 150 passenger miles per gallon.

PEACE OF MIND

Every day each of us is subject to stress--both at work, at home and on the road. A friendly, supportive ridesharing environment provides an island of relaxation during the day.

WHAT'S A VANPOOL?

A vanpool is a super-carpool. RIDES provides a luxurious new van for groups of neighbors who share a similar commute. The riders split all costs through a monthly fare that is a fraction of the cost of driving alone.

The driver, in exchange for driving and taking care of the van, gets a free ride and personal use of the luxury van evenings and weekends.

Your van will be fully-equipped with front and rear air-conditioning, automatic transmission, and luxury interior. Vanpools provide express service and reserved seating for 15 passengers. Your group picks its own route, schedule and rules.

WHO CAN SHARE MY RIDE?

RIDES will tell you, *at no cost!* Call us or return the attached form. We will instantly match you to others with your commute and hours, and then we'll rush you a matchlist.

rides
FOR BAY AREA COMMUTERS, INC
100 Van Ness Ave.
San Francisco, CA 94102
(415) 861-POOL, (408) 996-POOL,
(707) 447-POOL

EXHIBIT 2

No Postage Necessary if Mailed in the United States

BUSINESS REPLY MAIL
FIRST CLASS PERMIT NO. 20859 SAN FRANCISCO, CA 94102

Postage will be paid by Addressee:

rides
FOR BAY AREA COMMUTERS, INC
100 Van Ness Avenue,
San Francisco, California 94102

FOLD OUT AND SEAL

PLEASE SEND ME MY FREE MATCHLIST

MB 12/80

Please print the following information using only one letter per box. ABBREVIATE where necessary. Be specific in home and work address. Example: Is it a Street (St.), Road (Rd.), Avenue (Ave.), etc? Provide apartment number where applicable. Forms without a phone number cannot be processed.

NOTE: Home and work addresses are confidential. The rest of the information will only be used for ridesharing purposes. No obligation is involved in filling out this form. *Home phone number is optional.

I'm interested in carpooling in an emergency. ☐

First Name

Last Name

Home Address (Incl. Apt. No.)

Nearest Cross Street

Home City

C A

Home Zip

Area Code

Home Phone*

Employer

Work Address

Nearest Cross Street

Work City

Work Zip

Area Code

Work Phone

Extension

Are your hours flexible by more than 45 minutes? ☐ Yes ☐ No

Begin Work Hour : Minutes ☐ AM ☐ PM

Leave Work Hour : Minutes ☐ AM ☐ PM

Please check as many as apply:

I am interested in a Carpool ☐

I have a car available for Carpooling ☐

I am interested in a Vanpool ☐

I am interested in being a Vanpool Driver/Coordinator or backup driver ☐

I normally get to work by:

A ☐	Driving alone	F ☐	Vanpool
B ☐	Carpool	G ☐	SP
C ☐	Bus	H ☐	Club Bus
D ☐	BART	I ☐	Ferry
E ☐	Drop Off	Z ☐	Other

I heard about RIDES through:

A ☐	Employer	F ☐	TV
B ☐	Freeway signs	G ☐	Radio
C ☐	Friend	H ☐	Utility bill
D ☐	Saw Vanpool	I ☐	Public Event
E ☐	Newspapers	Z ☐	Other

Funded by Caltrans and MTC

CUT HERE

RIDE-SHARING SAVES...

EXHIBIT 3

Funded by Caltrans and MTC

MB

The perception of difficulties associated with program administration is another problem in the initial consideration of developing a ridesharing program. Jacobson found this to be a major concern for over 80% of the organizations he studied. Such difficulties, which can also be eased through outside technical assistance, include assigning riders and routes, setting fares, establishing guidelines, and handling general day-to-day operations.

Probably the most important stumbling block to involvement of employers in a ridesharing program is lack of interest on the part of upper level management. Jacobson found this to be, by far, the greatest concern to those firms initially considering vanpooling; 40 out of the 58 respondents cited it as very important, and another 17 considered it moderately important. Without the approval of the upper level managers, no formal programs could be implemented.

Other factors which have limited the success of areawide ridesharing programs, as cited by Wagner (10) and others, include: the fragmentation of the transportation infrastructure (e.g., MPO's, state DOT's, regional FHWA offices, and transit agencies are all potential ridesharing sponsors); the unwillingness of a single agency to play the lead role or, in some cases, competition among agencies for that role; overreliance on impersonal matching methods; inadequacy of available staffing and budget; lack of aggressive marketing; and poor working relationships with the private sector.

Impact of Incentives on Ridesharing Development and Use

The success of a ridesharing program depends on a number of interrelated factors dealing with program initiation, development, implementation, and operation/promotion. Some of the factors are external to the program itself and may vary from site to site, while others are related to the way the program is developed and operated. In either case, factors such as high energy costs and limited parking may not, by themselves, be sufficient to motivate the initiation of a ridesharing program or to encourage the use of ridesharing modes by commuters. Certain incentives (and disincentives to driving alone) appear to have a significant impact in encouraging ridesharing.

Incentives generally can be grouped into three categories:

1. Employer actions to encourage employee participation in ridesharing;

2. Government actions (at all levels) to encourage employers to initiate on-site ridesharing programs; and

3. Government actions (at all levels) to encourage individual ridesharing participation.

The various types of incentives are discussed below.

Employer-Sponsored Incentives

Perhaps the single most important action that employers can take to encourage higher occupancy commuting is to correct a current widespread inequity in their subsidizing of the various modes. Free or partially subsidized employee parking is probably the greatest obstacle to increased use of ridesharing and public transit. Auto drivers have traditionally received a valuable fringe benefit in the form of free parking, while auto passengers have received only a portion of this benefit, and transit users no benefit at all. Employers can provide subsidies for both ridesharing and transit use. Ridesharing subsidies might involve just the cost of the vehicle, or a share of operating costs, as well.

Other incentives offered by employers have also played an important role in promoting ridesharing. A review of successful employer ridesharing programs indicates that the following program elements were especially important to program success:

1. A well-planned, continuous agenda of internal promotional efforts and a responsive mechanism for employee matching assistance - Employers must show top management support for any successful ridesharing program. The best way to do this is with periodic promotional efforts which utilize innovative, effective strategies to draw attention to the importance of the program. Regular recognition of poolers through company newsletters or special lotteries are commonly used strategies. It is also important to regularly canvas employees to maintain an updated carpool matching list in order to provide quick and accurate information to existing or new employees who express an interest in ridesharing.

2. The provision of preferential parking for poolers - For employers with large parking lots, spaces up front can save as much as 10-15 minutes a day for a commuter who would otherwise be forced to walk long distances. For those employers with limited employee parking, reservation of available spaces for carpoolers and vanpoolers (possibly based on occupancy) is a powerful incentive in certain locations.

3. The provision of flexible work hours for ridesharers - While some disagreement exists over the impact of companywide flexible working hour programs on ridesharing, it is clear that a selectively implemented program for poolers would attract new high-occupancy commuters. The provision of this option for transit users would allow employees to schedule their work trips to coincide with the most ideal scheduled service.

The incentives listed above have been applied individually, or in combination. The TVA's incentive plan, an integral element of its ridesharing program, provides a good example of the combination approach. It includes the following components:

- o a discount (one-third) on commuter bus tickets;
- o a municipal parking ticket (worth $5/month) for each carpool (three or more riders, including at least two TVA employees);
- o credit or vanpool accounts (of $11/month) for each TVA employee participating in a vanpool;
- o reimbursement to handicapped employees for the cost of parking in a commercial lot convenient to where they work.

The impact of the incentives, as described earlier, has been substantial. TVA has achieved the most impressive results of any of the programs studied, in terms of degree of employee participation and reduction in annual VMT. None of the other programs studied offers as comprehensive an incentive package.

In order to be effective, such incentives must truly offer obvious benefits to the user. Although actual quantitative impacts are difficult to determine, it is clear from the TVA and other experiences that, where properly applied within the context of organized vanpool or carpool matching programs, incentives have certainly encouraged ridesharing.

Government Actions to Encourage Employers

Government incentives (and disincentives) have been applied to both employers and individual employees. Examples of employer-aimed incentives include assistance in the development of ridesharing promotional and matching materials, tax advantages for offering certain types of programs or achieving certain ride-sharing goals,* and better legislation to clarify the insurance

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* The major tax advantage currently in force is an "energy investment" tax credit of 10% of the purchase price of a van which is purchased by an employer and used for ridesharing by his employees.

and regulatory status of vanpooling and buspooling arrangements. The major negative action which the federal government has taken to encourage employers to initiate effective ride-sharing programs is the aforementioned requirements for initiation of specific ridesharing program elements (e.g., through Air Quality Transportation Control Plans). While such a disincentive is not always considered an acceptable expression of government authority, it should be pointed out that it has been among the most effective means to encourage significant, widespread employer action to promote ridesharing.

Government Actions to Encourage Commuters

Government actions to encourage individual commuter choice ridesharing modes have included such incentives as: use of government vehicles for ridesharing purposes (e.g., use of state cars for carpooling in California); preferential and reduced-fee parking at publicly owned lots and garages; preferential roadway lanes for high-occupancy vehicles; and lower tolls (or none at all) for high-occupancy vehicles. Preferential roadway lanes for high-occupancy vehicles have included both physically separated lanes (e.g., Shirley Highway in Washington, D.C., El Monte, California Busway, or Houston's contra-flow lanes) and non-separated reserved lanes (e.g., Portland's Banfield Freeway or Miami's I-95 Corridor). The results of this type of effort have been mixed. The physically-separated lanes have proven successful in reducing travel times for users and have thus attracted increasing numbers of carpools. The non-separated lanes, on the other hand, have not generally met with much success. Several such efforts, including those on the Santa Monica Freeway and the Southeast Expressway in Boston, were terminated after unsuccessful experimental periods (approximately six months in each of these cases). Perhaps the key issue in the success of reserved lanes is whether the reserved lane is "old" or "new." Where an existing lane is designated for use only by high occupancy vehicles, a greater disincentive to driving alone is created (i.e., the remaining lanes become more congested) than where a new lane is built. The enforcement problem is exacerbated by the fact that non-pool drivers tend to resent having an existing lane removed from common use. Of course, physical separation is also important; non-separated lanes may represent significant problems with enforcement and may experience higher-than-usual accident rates.

Other government actions aimed at helping individuals form commuting ridesharing arrangements have included, for example, provision of matching informational services (the federal government has made available for local use several carpool matching computer programs. These programs, including the FHWA Carpool Matching Program and the Commuter Information System, can be adapted for local use). Disincentives for commuters driving alone may include parking surcharges and increased tolls, surcharges, or outright exclusion from peak period use of certain street or traffic lanes.

Impact of Ridesharing on Transit Use

During the past five years, new ridesharing programs and proponents have had a variety of relationships with existing conventional transit properties, ranging from welcome sponsorship, assistance and cooperation to open hostility. The most common relationship, though, has been one of benign neglect. Many transit operators fear that aggressive promotion of ridesharing will measurably hurt peak period transit ridership; they have quietly refused to support larger and more effective programs within a region's transportation planning bureaucracy. A few properties, including those noted earlier, have actively embraced ridesharing programs, in part because of the recognition that the formation of carpools and vanpools can reduce the demand for new services from suburban markets which cannot feasibly and cost-effectively be served by conventional public transit. The issue of whether ridesharing is, in fact, competition for transit is an important one. The experience of the past decade has shed some light on this issue.

The major argument against significant transit/ridesharing competition is the fact that most transit services operate on a reasonably frequent schedule, especially during peak hours, while ridesharing arrangements arrive and leave at only one time each day. It is probably unlikely that many current transit riders who receive a reasonable quality, low cost service would give up this schedule flexibility to join a carpool or vanpool. However, it could be argued that current auto drivers may be more likely to form ridesharing arrangements than begin to ride transit. Thus, the major competition between the two modes may be for potential newly converted auto drivers.

It has been shown that the largest potential market for new ridesharing is at suburban locations with little or no transit service. In most large

metropolitan areas with established transit systems, the percentage of commuters driving alone to CBD locations is only 10 to 40 percent, while the same percentage for suburban locations may range from 64 to 80 percent. A 1979 survey of more than 300 vanpool programs showed that 93 percent of the vanpools operated serve suburban or rural employment locations (24). There is also evidence that suggests that the typical ridesharing participant commutes longer distances than the typical public transit user. Data from the U.S. Census 1975 "Journey to Work Survey" show a significant difference in reported median commuting distances between all carpoolers (11.4 miles) and public transit users (9.1 miles for all transit users including subway and commuter rail users, but only 7.1 miles for bus and streetcar users, which represent the predominant transit modes in all but a handful of U.S. cities). In addition, a Department of Energy survey of vanpool operators shows that the average one-way commuting distance for currently operating vanpools is about 25 miles, far greater than the average public transit rider commuting distance.

The case studies provide some hard data on the impact of ridesharing on transit use. For example, data from RIDES indicate that 11% of (newly generated) carpoolers and 25% of vanpoolers formerly commuted by transit. This translates into a transit ridership loss of fewer than 1500 commuters per day, a very small component of the 300,000 plus persons who use Bay Area Transit facilities each day. In Los Angeles, 30% of carpoolers formerly utilized transit; this represents a somewhat larger, but still small, percentage of total transit users.

Thus, it would appear that ridesharing can have some impact on transit use, but probably a very small one. The key question to ask is not whether ridesharing and transit compete for the same riders, but whether ridesharing and transit can be integrated in a way such that each addresses the market it serves best, and the overall transportation system is made as effective as possible.

3 *Ridesharing: State-of-the-Art*

The increased interest in ridesharing over the past few years has been marked by rapidly changing organizational options and governmental programs. This section summarizes the state-of-the-art in these areas.

Current Service and Organizational Options

Ridesharing options have evolved from programs oriented toward a single mode (i.e., vanpooling or carpooling only), with funding coming from either the public (i.e., FHWA) or private (i.e., employers or media outlets) sector, to jointly funded programs offering a comprehensive range of commuting alternatives and incentives to use them. Current alternatives are discussed below.

Ridesharing Service Options

The basic ridesharing options are carpooling, vanpooling, and buspooling. (Various other options, such as taxi pooling and organized hitchhiking, have been proposed and/or attempted, but have not been adopted for widespread use, and thus are not discussed in this section; they are addressed in Chapter 4: FUTURE DIRECTIONS FOR RIDESHARING. The choice of a particular mode depends on the specific travel needs and desires of the commuter and the available options, including the availability of enough compatible fellow commuters to fill out the pool. Moreover, the operating and economic characteristics of the different modes differ considerably; the distance from place of employment, for instance, may rule out certain options.

Carpools involve the use of private autos and are relatively easy to arrange, due to the small number of participants (2 to 6 persons, depending on the capacity of the vehicle and the number required to quality for ridesharing incentives - e.g., reserved high occupancy vehicle lanes, reduced tolls, or preferential parking). Because carpools involve private autos, there is no minimum "fare" for participants (i.e., those who do not share in the driving) which makes the pool economically viable. Thus, carpools are feasible for any commuting distance. However, perhaps because of the informality of many carpooling arrangements, they are subject to a frequent turnover of members and often dissolution.

Vanpools represent a more formalized arrangement, in which one person typically drives all the time. Fares for the 8 to 14 passengers (the driver typically rides for free) are carefully computed so as to cover all operating costs (including depreciation), as well as, in some cases, a portion of program administrative costs. Fares, typically in the range of $3 to $5 per passenger (per day) are based on mileage, the number of pool members, the nature of any driver incentive arrangement (e.g., the opportunity to keep all fares above a predetermined breakeven point), and any administrative cost adjustment (either a payment to or a subsidy from the program sponsor). The van is purchased or leased through either the employer or a third party. Because of the significant fixed expense involved in operating a van, as well as the time spent picking up passengers (or traveling to a central pick-up point), vanpools are generally attractive only for longer commute distances; vanpool trip lengths are typically 20 miles or longer (25).*

Buspools (or subscription buses) are the highest capacity ridesharing mode and, for that reason, the most difficult to organize. A buspool requires the advance commitment of at least 35 riders traveling to a single (or possibly one of two) employment destinations; fares (ranging from 1.4 to 6.8¢ per passenger mile; (25)) are usually paid in advance, to insure that the costs of each run are covered.

Although some companies have been contracting out bus service for many years, early subscription bus programs (widely considered to be formal paratransit operations), such as the one serving Rochester's (NY) Kodak Park from 1973-1976, involved publicly-sponsored efforts. These efforts typically involved minimal private sector participation, no minimum level of employee participation, and some government subsidy. More recent programs have shifted away from government subsidy. Some, like the program sponsored by United Airlines in San Francisco, are effectively vanpool programs with larger vehicles; the employees themselves do the driving.** Similarly, in Knoxville, Washington (D.C.), and elsewhere, buspools are run by "owner-operators," who

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* In several instances, vanpools have been used to provide feeder service to transit for longer commuting distances. Digital Equipment Corporation (in the Boston area), for example, operates vanpools which interface with commuter trains.

** This situation may be somewhat unique, in that the employees include diesel mechanics who are able to maintain the vehicles themselves.

Vanpooling at 3M Corporation (Source: FEA)

have "graduated" from vans when the demand grew to a point where buses could be justified (and were probably both cheaper to the user and more profitable to the operator).

Most current subscription bus programs, however, involve paid drivers and vehicles contracted from either private or public operators. Such services may be arranged by corporations (e.g., Aetna in Hartford, Connecticut), and may or may not involve employer subsidy. Others have been arranged by individuals, as in the Reston case. A variation is the service sponsored by the Orange County (CA) Transit District for employers who can guarantee a minimum number of participants.

Like vanpools, the ratio of pick-up time to trip time dictates that buspools have fairly long trip lengths, generally averaging more than 20 miles each way (25). An alternative, which has been termed Employment Center Bus Service (ECBS), or Bus Express Employee Program (BEEP), has been tested as a means of efficiently serving shorter trips (26). Essentially, several express buses each make several scheduled runs of pre-defined lengths, so as to serve

staggered work shifts at large employment centers.* Virtually all commuting distances are covered by the different runs. In this service, the fares are set proportional to distance traveled. The first demonstration of this concept was operated by the Southern California Rapid Transit District at an employment center in El Segundo.

Organizational Options and Roles

There now exist a wide range of institutional frameworks through which ridesharing programs are being initiated. However, these can be condensed into two basic options:

- o employer-sponsored programs - Many employers (e.g., 3-M, TVA, Connecticut General) have developed programs to encourage ridesharing among their employees. These programs include vanpool development (and provision of vans), carpool matching, and provision of incentives promoting these activities (e.g., preferential parking, flexible working hours, etc.). Programs have been initiated both by individual employers and associations of employers; such associations are also known as transportation management associations, or TMA's (e.g., the Santa Clara County Manufacturing Group, and Tyson's Transportation Association).

- o third-party ridesharing agencies - These are "areawide" agencies which promote ridesharing among the general public and assist employers in developing ridesharing programs. These agencies often provide vans and promote the development of vanpools as well as carpools. Ridesharing agencies have been initiated and operated by non-profit organizations, for-profit companies, transit operators, community groups, regional planning organizations, and governmental agencies.

Of course, the majority of ridesharers form carpools on their own. A more recent innovation is the development of the vanpool "entrepreneur," an individual who acquires a van and arranges for passengers, either as a profit-making venture or to cover the costs of commuting (as well as the cost of the van). According to Pratsch (27), in 1980 over 150 "independent" vanpools were operating on the reserved HOV lanes of the Shirley Highway, outside of Washington (representing an increase of over 100% from 1978). Vanpool operators may make use of a third party ridesharing program, or they may participate in an association of vanpool owner-operators (e.g., Knox Area Vanpoolers' Association), which can provide certain support services (e.g., central purchase of parts, matching assistance, etc.).

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* A variation on this concept involving vanpools was tried, with little success, as part of the 3M program.

It is important to realize that the organizational options described above do not represent mutually exclusive arrangements. Employer-sponsored programs are generally available only to the employees of the sponsoring firm (or firms); however, areawide ridesharing programs often focus on individual employers, as well. Because the employee commuting trip is the basic element of ridesharing, the role of the employer can be crucial. With a few exceptions (e.g., RIDES), those areawide programs which have not targeted their efforts predominantly at employers have not experienced great success. Because of the direct incentives and internal marketing capabilities offered by employers, they continue to be the primary actors in the promotion of ridesharing - whether they have initiated the program or are part of a larger effort.

Although ridesharing agency efforts have increased considerably over the past several years, the employer-sponsored program remains the most important (and most widespread) arrangement. As mentioned earlier, there are now over 500 employer-sponsored programs, which have spurred more than 10,000 vanpools (7). Employer-sponsored programs are generally easier to implement than are other types; for instance, a company may be able to readily obtain insurance for vanpools by including them under corporate fleet policies.

The most recent employer-related approach to promoting ridesharing is the TMA. TMA's are non-profit organizations representing employers located within an industrial park other major employment area. TMA's generally have staffs funded through membership fees and other (public and private) contributions. TMA's provide a variety of services which may include the following: carpool matching assistance, parking management strategy development, vanpool program administration, subscription bus service development, and local transportation improvement (both service and infrastructure) funding. For example, the Tyson's Transportation Association (TTA) administers a vanpool program for employees of the Tyson's Corner, Virginia area (outside of Washington, D.C.), and operates a free shuttle service within that area; the latter enables vanpoolers to travel within the area (i.e., during their lunch hour) and also serves other commuters and shoppers. In addition, the TTA is promoting a joint public-private effort to develop an integrated highway and transit network through the area. The TTA is funded by the following: 35 area businesses, each of which has agreed to contribute $5 for each employee; 2 large developers, each of whom has agreed to contribute one cent for each square foot of interior building space they own; and Fairfax County, which has contributed $10,000 in seed money.

The predominance of employer-sponsored programs notwithstanding, third party ridesharing agencies have been established in most cities; a recent listing prepared by the National Ridesharing Information Center lists over 225 such agencies (28). Not all such agencies have an active program on the order of RIDES. Funding is the key issue; RIDES and Commuter Computer - the largest such organizations - benefit from significant Caltrans funding for ridesharing. Most other programs, which rely on limited federal or local funding, have small staffs and function in a support role, rather than in the more aggressive role of the larger agencies. Obviously, such programs cannot be expected to produce the larger-scale impacts of the California programs.

Some employers are contributing to the formation of ridesharing agencies, through a joint private-public effort. In Hartford, for instance, the Greater Hartford Ridesharing Corporation was initiated through funds provided by Connecticut General, combined with state funds (actually FHWA Federal-aid secondary funds). A similar project (Metropool, Inc.) has been developed to provide ridesharing services in another part of Connecticut; this was established by the Southwestern Area Commerce and Industry Association to serve employers/employees in the state's southwestern portion. The Connecticut DOT anticipates that such regional non-profit corporations will eventually take over all ridesharing activities in the state. Commuter Computer provides an older example of a joint public-private endeavor.

A variation of the jointly-sponsored program can be found in Houston. A developer (Century Development Corporation) has implemented a vanpooling program for persons working at the Greenway Plaza, a large shopping center; this effort is supplemented by carpool matching provided by the Houston Metropolitan Transit Authority's Car Share program. A similar Houston program is being operated by the City Post Oak Association (a TMA in the Galleria/Post Oak area), also in conjunction with Car Share. The City Post Oak Association assesses each of its tenants a fee, based on square footage, to support the ridesharing program.

Other ridesharing agency efforts are funded either predominantly with public funds or completely with private funds. The public programs have been fairly successful at promoting ridesharing; however, they are not as "easy" to implement as employer-sponsored programs, and often must charge higher rates for vanpool leasing than the employers. This is due to the fact that employers

may be able to offer lower insurance rates, and can bury certain administrative costs which must be passed on to the lessee in third party arrangements.*

Most ridesharing "agencies" are non-profit corporations (e.g., RIDES and Commuter Computer), transit operators (e.g., Twin Cities' MTC, TTDC, SEMTA, OCTD), or state departments of transportation (e.g., Massachusetts' EOTC's Masspool, Minnesota DOT's Ride-Share, and the statewide Caltrans program). Ridesharing has long been an "orphan" in public transportation, not fitting neatly into any particular institutional setting. This explains the variety of settings responsible for local ridesharing activities. In light of the current interest and emphasis on ridesharing, this has resulted, in some areas, in competition between different agencies serving overlapping markets and seeking common funding. The different settings may also dictate different funding sources; the transit operators generally use UMTA Section 5 money, for instance, while, the state programs largely use FHWA (Federal-aid Primary, Secondary, and Urban Systems) funds. The non-profit organizations receive funding from a variety of sources, including the state, municipalities, and private contributions.

Ridesharing agencies typically support employers in developing ridesharing programs, with activities ranging from employee surveys to matching to vanpool leasing. In theory, the ridesharing agency should help employers (or individuals) identify the most cost-effective commuting alternative. In recent years, conventional transit has been included among the alternatives considered under the ridesharing umbrella - indeed, the FHWA definition of "ridesharing" includes transit. Thus, ridesharing agencies may help identify changes to transit service which would improve access to a particular employer, or help an employer administer a pre-paid transit pass program.

The inclusion of transit options under the ridesharing mantle is extremely significant, because it moves away from the preoccupation on ridesharing-transit competition towards a recognition that ridesharing and transit are both elements in an overall transportation system. The most effective overall system is one in which all of the options are integrated and coordinated.

The role of the ridesharing agency in identifying the most "cost-effective" alternative is consistent with the concept of transportation brokerage, as

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* In addition, employers are permitted to take advantage of the 10% Investment Tax Credit (ITC) which can further reduce the cost of capitalizing vanpools.

pioneered by the University of Tennessee. The major contribution of this concept is the recognition that all modes should be considered simultaneously, rather than individually.

Existing ridesharing programs typically fall short of achieving an ideal brokerage in at least two respects. First, in a true brokerage, the broker is independent of all modes, and treats them equally. In practice, the broker may operate a third-party vanpooling program and heavily promote vanpooling. Alternatively, if the broker is a transit agency, there may be a natural, though perhaps subconscious, favoring of the transit alternative. Second, in theory, the broker should have some degree of influence over service, so that decisions can be implemented. In Knoxville and other cases, the broker has had limited control over transit service; in such cases, the broker may not be able to achieve the most effective results. Furthermore, existing ridesharing agencies are not comprehensive brokerages, in that they focus on a subset of travel needs (i.e., commuter trips) only. Nevertheless, the fact that existing ridesharing agencies do not achieve "ideal" brokerage status can not take away from the fact that the concept has had a significant impact. The existence of ridesharing agencies has, among other things "legitimized" ridesharing as a travel mode, by creating a central "spokesman" for the concept. Whether or not the ideal can ever be achieved, brokerage-type ridesharing programs offer the potential for improving the overall effectiveness of commuting.

Finally, in addition to the public agency and employer, another actor that has become involved in ridesharing activity is the private vendor. Unlike other transportation modes, where vehicle suppliers do nothing more than provide vehicles, in the ridesharing arena, vehicle suppliers have taken a more active role. For example, Chrysler's VPSI provides turnkey van leasing programs, in which VPSI may handle all contracting with vanpool drivers, as well as all maintenance. In some cases, including programs in Denver and Minneapolis, VPSI has been retained to essentially manage an entire ridesharing program, and thus must handle activities such as marketing, as well. In general, however, these programs are much less active than those sponsored by organizations such as RIDES. Van America Network (VAN) is another example of a company established (by Senate Motor Leasing) specifically for ridesharing. VPSI and VAN, combined, have approximately 1000 vans in operation nationwide. In the Boston area, a company called VANGO customizes lower-priced commercial

vans and markets them to employers with or without ridesharing programs. Similar companies exist in other areas.

A more recent development is potentially more significant, in that it marks the first move of the auto rental industry into the public transportation arena. The Hertz Corporation is currently managing a vanpool program for federal employees in the Washington area (largely because the federal government cannot use government-owned vehicles for commuting purposes). The program has achieved only minimal participation to-date, in part because Hertz is unable to expend the marketing resources which have been demonstrated to be necessary (by other ridesharing programs) to attract ridesharers. This limited success has slowed Hertz' plans to expand the program elsewhere. Nevertheless, other auto rental companies, such as Avis and Thrifty, have been trying to enter the market by competing with VPSI and VAN in providing vehicles for ridesharing programs.

Government Programs and Initiatives

The various levels of government have directly implemented ridesharing programs, but, perhaps more important to the promulgation of ridesharing are the governmental roles of removing barriers and providing incentives. Regulatory restrictions have been eased considerably over the past several years, but certain legal restrictions are still in force, notably at the state level. Various types of governmental incentives (and disincentives) currently exist, but some that could potentially prove more effective have not yet been instituted. This section discusses the major governmental programs and initiatives which apply directly to ridesharing.

The federal government's interest in promoting ridesharing has increased over the past couple of years, primarily in response to energy concerns. Several initiatives have recently been implemented in an effort to encourage increased ridesharing and to identify innovative, successful approaches to achieve this goal.

One such effort, already underway, is the U.S. DOT's National Ridesharing Discretionary Program, which combines new federal grants promoting ridesharing. In the first phase of this program (in 1979), 17 sites were awarded demonstration grants totaling $2 million. As of mid-1982, 64 projects had received a total of over $7 million in DOT (FHWA) funds. Under this

program, each grantee providing a local match equivalent to twice the federal grant; the local portion has generally come from federal highway or transit funds.

Other recent federal initiatives include the formation of a National Ridesharing Task Force and the presentation of ridesharing workshops throughout the country. The Task Force, with representatives from private industry and government, was mandated with the general task of promoting ridesharing, and performed activities such as advising the President on ridesharing activities, establishing the National Ridesharing Information Center, and instituting an Executive Loan Program (to aid organizations in the initiation or expansion of ridesharing programs). The Task Force issued a final report, with recommendations, in October 1980 (30), and subsequently disbanded in January 1981.

The federally-sponsored workshops have taken two different forms. The first series, sponsored by the FHWA and UMTA during 1980 and early 1981, was targeted at regional (public) ridesharing agencies. A second series, sponsored solely by FHWA, was aimed at private sector employers; these were undertaken during 1981. Both series were intended to assist the target organizations in the establishment and operation of ridesharing programs.

The expansion of federal funding alternatives also represents an important initiative. Over recent years the broad acceptance of the Transportation Systems Management (TSM) concept* has aided ridesharing, especially in easing restrictions as to how certain federal (i.e., highway-related) funds are used. As the states have shifted their transportation emphasis from building new highways to making better use of the network currently in place, interest in ridesharing has grown considerably.

As a result, federal-aid highway funds now comprise the largest source of ridesharing funds. FHWA Federal Aid Urban Systems (FAUS) funds is the single largest source: approximately $4 billion per year is available for ridesharing, highway construction, and certain vehicle acquisition purposes;

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* TSM represents a set of federal efforts to promote low-cost, non-capital-intensive ways of achieving traditional public transportation goals (e.g., reducing VMT, increasing highway capacity, and improving traffic flow). The emphasis is placed on optimal use of existing facilities.

the decision on how these funds are used is made by state and local officials. Federal-Aid Primary and Secondary funds, as well as Highway Planning funds, can also be used for ridesharing purposes; the latter are eligible only for certain types of functions, such as staff and computer matching. The Federal-Aid funds are now administered under the authority of Section 126 of the Surface Transportation Assistance Act of 1978. This replaced the authority formerly resting in Section 3 of the Emergency Highway Energy Conservation Act of 1974, through which the areawide carpool demonstration projects were initiated. The newer Act includes a number of changes affecting ridesharing (including allowing secondary funds to be used); these can be summarized as follows:

- the ridesharing program is now a regular element of the Federal-Aid highway program (i.e., it has shed its demonstration status)
- ridesharing projects are now eligible for a 75% federal share, as opposed to the former 90% share
- interest-free vanpool acquisition loans can now be repaid over the passenger service life of the van, rather than over four years, as was stipulated previously
- the vanpool "abort" fund - protecting the purchaser from financial loss due to inability to maintain a vanpool - is now available beyond the former one-year limit
- the former limit of $1 million per project has been removed
- carpool parking facilities are no longer required to be constructed "in conjunction with mass transit service" (existing or planned), but should be designed so as to "accommodate mass transportation in the event such service may be developed."

FHWA also provides ridesharing funds through Comprehensive Transportation Systems Management Assistance (jointly funded with UMTA and the National Highway Traffic Safety Administration). This program is available to support a variety of TSM actions, including ridesharing efforts. Awards of up to $500,000 are available under this program.

Other federal funding sources which have been available for ridesharing purposes include the following: UMTA Section 5, which has provided money to support a number of projects in the National Ridesharing Discretionary Program; UMTA Section 8, which can be used for planning ride sharing projects; UMTA Sections 6 and 4(i), which are designed to demonstrate and apply innovative approaches; and EPA Section 175, which has provided funds for

certain planning activities. However, these sources, especially the latter, are rather limited.

The final major federal initiative involves efforts to remove remaining regulatory barriers and to provide new incentives for the promotion of and participation in ridesharing programs. In an attempt at eliminating legal obstacles at the state level, the U.S. DOT, in conjunction with the National Committee on Uniform Traffic Laws and Ordinances, has developed a model state law to serve as a guide for the revamping of state motor carrier legislation. A number of states still regulate ridesharing modes in a way that restricts their legal operation. The model law basically exempts ridesharing arrangements from motor carrier and commercial vehicle regulations and liability laws, and also permits the use of government-owned vehicles for ridesharing (if their full cost is recovered).

The Department of Energy provided a potentially important incentive in the promotion of ridesharing through amendments to its fuel availability rules, which gave vanpools priority access to fuel and removed purchase limitations during times of restricted fuel availability. This was designed to enhance vanpooling's attractiveness as a hedge against future energy emergencies. (However, these rules expired in March 1981, and have not been reinstated.)

In addition to participating in federal programs, state and local governments have instituted their own initiatives promoting ridesharing. To supplement the direct formation of ridesharing agencies, various agencies provide funds for planning, purchase of vans, and other support activities. Caltrans, for instance, provides vans to regional ridesharing agencies, as well as funds for agency operation (RIDES, for example, receives no federal funds and only limited private funds). The State of Connecticut has reserved Federal-Aid Secondary funds for ridesharing purposes which are to be matched by contributions from the private sector. For example, Connecticut General's initial $75,000 contribution was used to leverage $225,000 in federal funds in the formation of the GHRC.

In conclusion, although the employer continues to be the most successful initiator of ridesharing programs and the private sector in general is showing growing interest in ridesharing, the federal government (in conjunction with state and local agencies) is an important contributor to the promotion of ridesharing - through provision of funding, introduction of incentives, sponsorship of marketing and advisory efforts, and information dissemination.

4 *Future Directions for Ridesharing*

Ridesharing has been demonstrated to be a practical, relatively inexpensive commuting alternative which provides solutions for energy shortage-induced crises, as well as for site-specific problems such as inadequate employee parking. Ridesharing potential is not boundless, yet it is clear that the single occupant auto mode share is currently much higher than work requirements actually dictate. A full 65% of all commuters in a typical area drive alone to work (31). This market can and will be penetrated as the costs of auto commuting climb, and as long as the future availability of gasoline remains questionable.

This section examines future directions for ridesharing options and programs, in terms of factors influencing the future directions, the changing nature of organizational roles and service options, and the potential future market for these options.

Factors Influencing the Future Direction of Ridesharing

The potential for changing work trip travel patterns is clearly significant, yet the habits which must be altered to accomplish this are often longstanding, ingrained routines which are not easily modified. Changes in work trip modal shares will not occur without the existence of a number of factors which cause real or perceived changes in either the travel choices available to commuters or in conditions which affect their modal decisions. Certain factors, such as an oil embargo, could produce rather abrupt, although perhaps short-term, changes in travel options, while others, such as development patterns, will occur more gradually and are likely to have a longer-term impact.

The most important forces affecting the future of ridesharing are expected to be those related to energy availability and cost. However, the future direction of ridesharing options will also be influenced by development and settlement patterns, the nature and extent of incentives/disincentives, and the nature of remaining institutional barriers. These issues are discussed below.

Energy Availability and Cost

The availability and cost of fuel to commuters will both influence the level of ridesharing. However, it is likely to be the former which has a greater impact on encouraging the promotion and use of ridesharing options. For instance, the 1979 fuel shortage spurred renewed interest in both government and employer-sponsored carpool and vanpool programs, and caused transit ridership to increase dramatically in many cities. One way to view the availability factor is as a type of congestion effect: as traffic congestion on particular work trip routes increases, ridesharing normally increases. Employers in areas with a significant degree of traffic congestion generally have had greater success in encouraging carpooling and vanpooling than those located in areas with little or no congestion.

In addition to the normal traffic congestion, the gasoline shortage introduced a new commuter aggravation factor (i.e., having to wait in a gas line as often as a fill-up is required, and quite possibly, slightly more often because of the fear that a station will not be found open when gasoline is actually required). The uncertainty of the length of the gas line delay probably makes it more aggravating than an expected traffic delay of approximately the same length each day, although most commuters need not obtain gasoline more than once or twice a week. The impact of such shortages over a sustained period would probably be to encourage commuters to find ways to reduce the frequency of gas purchases (i.e., to make fewer trips or find alternative travel options). Ridesharing becomes an easy-to-implement solution for most commuters, although it may only last the duration of the fuel shortage. On the other hand, a shortage provides the opportunity for the psychologically-important "first try" at carpooling or vanpooling, and the "emergency pooler" may find ridesharing to be to his/her liking, especially if it reduces commuting time because of the availability of special reserved lanes.

Gasoline rationing would also probably motivate a similar shift to ridesharing modes, since many drivers would want to save their fuel rations for those types of trips (e.g., shopping, medical, social/recreational) for which there may be no suitable alternatives. These persons are therefore likely to switch from solo driving to ridesharing or transit for the work trip - a trip generally more easily served by these options than are those trips mentioned

above. Furthermore, if the cost of excess ration coupons approaches or exceeds the cost of gasoline, commuters who require more than the rationed amount of gasoline for commuting purposes will be faced with sudden and dramatic increases in commuting costs. Those unable or unwilling to pay these increases will surely consider alternative arrangements (i.e., ridesharing or transit), if only on a part-time basis, to decrease their overall monthly gasoline requirement.

Assuming use of one auto is confined to work trips, commuters traveling, on average, more than 34 round trip miles per day would use more than the proposed monthly standby rationing limit of 48 gallons for traveling to and from work under plans promulgated in 1979 (assuming an average mileage figure of 15 miles per gallon). Of course, those persons who need to use the same auto for other trip purposes can travel proportionally fewer miles to and from work without purchasing excess ration coupons. It is estimated that between 10 and 15 percent of all auto "drive alone" commuters travel more than 34 round-trip miles, and another 10-15 percent travel between 20 and 34 round-trip miles (24). Thus, perhaps 25-30 percent of all commuters who currently drive alone would be directly affected by the proposed gasoline rationing plans. Some auto commuters may also choose to rideshare if the market for excess ration coupons becomes financially attractive enough to promote conservation.

The price of gasoline is also likely to have a significant impact on ridesharing mode share. The direct impact is obviously felt through increased out-of-pocket commuting costs (see Exhibit 4). Although gasoline price increases have had only a small impact on mode shares in the past, it is expected that further price increases will begin to produce more significant shifts in work trip travel modes. From 1970 through 1978 (except during the energy crisis of 1973-4), overall increases were about the same as increases in average household income and, therefore, could not be expected to cause significant shifts in commuter travel habits. (Between 1970 and 1978, gas prices increased by an average of about 84%, while average household income for the same period increased by about 77%.) The 1979 price increases (placing 1980 prices more than 200% higher than 1970 prices), however, were obviously felt by the average auto commuter; the increases in transit ridership reported by the American Public Transit Association during 1979 and 1980 seem to confirm a trend towards lower cost commuting alternatives.

EXHIBIT 4

COMPARATIVE COMMUTING COSTS

Increase in Cost of Gas	Comparative Additional Cost Per Month, Per Person*		
	Single Occupant 	3 Person Carpool 	11 Passenger Vanpool 
.00/gal.	$ .00	$ .00	$ .00
.10/gal.	7.00	2.33	.95
.20/gal.	14.00	4.67	1.91
.30/gal.	21.00	7.00	2.86
.40/gal.	28.00	9.33	3.82
.50/gal.	35.00	11.67	4.77

Source: (19)

Growth in transit ridership averaged about 7% during 1979 - and almost 6% during the non-summer months when gasoline lines where the longest (32).

The indirect impact of rising fuel prices, however, may be more significant than the direct impact discussed above. The ripple effect of rapidly rising gasoline and fuel oil prices throughout the economy will likely impact the average household's disposable income to a far greater extent than its cash outlays for higher priced gasoline purchases. If income does not keep pace with continued inflation, there will be real pressure on the average commuter to cut commuting costs along with other routine expenditures. Therefore, a continued emphasis on the economic benefits of ridesharing should reap results in the form of marginal shifts to group-riding modes. As general inflation accelerates and fuel prices continue to climb, national and regional promotional campaigns should reemphasize the direct savings which can accrue to commuters who rideshare.

Another indirect impact of rising energy prices is the impact on overall auto ownership levels and on the conversion to smaller, more fuel-efficient cars. In combination with significantly higher auto ownership fixed costs, rising gas prices have put a damper on previous trends towards higher household auto ownership rates. New car sales since 1979 have dipped far below expectations, as rising costs have induced many people to keep their cars on the road longer and forego purchases of second or third household autos. As the ratio of autos owned to workers in each household drops, the use of ridesharing and transit modes should increase accordingly.

Another recent trend - the switch to more fuel-efficient cars - will obviously not increase the amount of ridesharing (in fact, it might tend to decrease it, since auto operating costs will decrease). However, it is worth noting that the redesign of auto interior space to allow more passenger room should offset any negative impact the overall "downsizing" trend might have on carpooling potential.

Development Patterns and Land Use Planning

The future extent and directions of ridesharing will also be influenced, to some extent, by the nature of development and settlement patterns and land use planning. The future patterns will directly impact both the level of participation in ridesharing modes and the choice of mode itself, which will also be indirectly influenced through the impact of development patterns on energy-related trends.

The most significant migratory/development trend of the past several decades has been the movement of people and business from high to low density areas (i.e., "suburbanization"). This trend was expedited by the evolution of the automobile as the dominant means of travel, and has now created the major opportunities and potential for ridesharing. The suburbanization trend is continuing, but it is being paralleled, at least in certain areas, by a move back to denser development in certain central city and older suburban areas.

The long term trends will be influenced largely by the energy situation, as shortages and/or high costs tend to promote interest in higher density, more-efficient settlement arrangements. This could mean increased redevelopment of the urban core and/or the development of "satellite" industrial/residential centers. The latter would create greater potential for

multi-employer or employment center-type ridesharing services, such as are beginning to appear in many of our faster growing areas (e.g., Houston and Los Angeles). "Redensification" of residential areas, meanwhile, would enhance opportunities for origin-based matching. Of course, where densities reach high enough levels, these trends will tend to favor the growth of transit use more than ridesharing.

On the other hand, if the energy situation remains "stable" (i.e., fuel prices grow only gradually, and the public perception of future availability is optimistic), the trend towards lower densities and greater dispersion is likely to predominate. Under such a scenario, commuting distances will increase, and travel patterns will be even more difficult to serve by transit. This trend should thus favor ridesharing, and as long as commuting costs remain relatively high, the extent of ridesharing should increase.

Development trends will also influence ridesharing mode choice. With longer distances, vanpooling and buspooling will become increasingly attractive; within the context of growth of clustered development, buspooling could become an important commuting mode. Carpooling will probably remain the dominant ridesharing mode under any future scenario, simply because of the ready availability of autos and the greater difficulties inherent in forming higher occupancy arrangements. (The size of the potential market for different ridesharing modes is discussed at the end of this section, under FUTURE POTENTIAL OF RIDESHARING OPTIONS.)

In terms of public actions which impact development, certain land use planning/zoning actions can have a decided influence on ridesharing activities. Zoning restictions limiting the number of parking spaces allowable for new development (i.e., in high density areas), for example, will obviously be a strong incentive for affected employers to promote ridesharing (and/or transit use) and for commuters to rideshare. Limits on on-street parking (i.e., in denser locations) will have a similar impact where employees do not have reserved parking areas. Conversely, requirements for minimum numbers of parking spaces for new developments can also encourage employers to implement ridesharing programs.* Taxing employer parking spaces can have the

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* In the San Francisco Bay Area, for example, employers having or agreeing to implement an aggressive ridesharing program can receive exemptions from certain parking requirements in new construction. Assistance from RIDES has served as a "mitigation measure" for some employers seeking to reduce the number of parking spaces at new sites.

same general effect as applying zoning restrictions, and either type of action can significantly increase the extent of ridesharing, especially in areas in which there is no viable alternative (i.e., transit).

Barriers to and Incentives for Ridesharing Development

As discussed earlier, certain barriers may prevent significant commuter shifts to ridesharing. The "external" barriers appear to be most easily removed by federal and state government action. Excessive regulation, insurance and liability ambiguities, and tax treatment inequities are all problems which can be greatly reduced by appropriate legislative and executive branch action. These barriers can be serious enough to stop a well-motivated, employer-sponsored ride-sharing program; furthermore, they often provide adequate excuses for those managers who would like to avoid implementing a comprehensive ridesharing program. Regulatory and insurance problems could be solved in all states (as they have been in some) if legislation directing deregulation and appropriate insurance classification were passed. The elimination of these barriers will accelerate the impact of future ridesharing programs, while the lack of action should not radically affect future trends.

The "internal barriers" (discussed earlier) may not be removed quite as simply. A shortage of interested potential poolers, the cost and time of employer ridesharing program administration, and the frequent lack of upper management support for ridesharing initiatives may not disappear easily. The removal of these barriers will depend to a great extent on the other factors which will influence the future of ridesharing. Future energy availability and prices, as well as the nature of available ridesharing incentives, should be especially important in this regard.

The most important factor that will influence future ridesharing growth is convincing auto drivers that group-riding is to their individual advantage. While energy availability and prices will provide a large part of the argument, other ridesharing incentives (and disincentives to driving alone) can also have a significant impact in encouraging site-specific carpooling, vanpooling and buspooling. The importance of incentives should not be underestimated - only where comprehensive ridesharing programs have included incentive packages have results been particularly encouraging. (The TVA program is perhaps the best example of the importance of a comprehensive

incentive package.) Those educational and promotional ridesharing programs that have not been linked to real incentives have generally been unsuccessful in attracting even initial employee interest.

While it is reasonable to expect that employer action will be most important in determining the ultimate potential of ridesharing alternatives, government action will be uniquely instrumental in motivating future employer efforts and will influence the extent of such efforts. Left alone, one can expect modest increases in ridesharing; with appropriate employer and government efforts, these increases could be substantial.

Some specific barriers and incentives are discussed in the next section.

Changing Organizational Roles

An important issue in the future development of ridesharing modes is the changing nature of the roles of different actors in their organization and promotion. Ridesharing options and programs will probably be the least uniformly organized and developed of all transit and paratransit services, on both a local and national level. The multitude of current ridesharing arrangements and organizations is an indication of the growing acceptance of more efficient and cost-effective means of travel to work, although most commuters still retain a number of commuting options. The fact that the formation of a carpool (which is the dominant sub-mode) has historically been an individually-instigated action indicates that a variety of organizational structures and actors will continue to play important roles in ridesharing services. The likely future roles of the individual, the employer (or activity center), the third party, and the federal government are discussed below.

The Role of the Individual

The role of the individual in ridesharing has changed considerably over the past decade in line with the evolution of formal ridesharing programs. Initially, anyone wishing to organize a carpool was personnally responsible for all aspects of the arrangement: finding poolers, arranging the travel schedule, and arranging for the proper insurance coverage. Then, as areawide carpool matching programs were introduced, persons interested in pooling could be matched with others having similar origins/destinations and schedules. Finally, with the development of vanpool programs, interested persons could

join a vanpool, thereby eliminating the need to use their own autos and worry about insurance requirements. Thus, although many pools (both car and van) are still formed, the importance of the individual as a ridesharing initiator has diminished. As ridesharing programs become increasingly comprehensive, this role should continue to decline.

Nevertheless, individual commuters will continue to form carpools with fellow workers or friends living nearby. These individuals will do so out of economic self-interest in order to cut down on direct commuting expenses or to take advantage of various carpool incentives (such as preferential/reduced fee parking or special highway lanes) offered by an employer or a governmental agency. Most of these arrangements allow the poolers to share the operating expenses and, in some instances, to get along with one less household auto. In some cases, an individual entrepreneur will buy a van or lease a bus and charge daily passengers a regular fee in order to help cover the fixed (and operating) costs of his/her personal vehicle.

While the economics of vanpooling currently can work for an individual entrepreneur (i.e., he/she can set low enough fares to attract sufficient passengers to cover all costs), the recent vehicle price increases (van prices increased by almost 100% from 1977-1980), coupled with increases in other fixed costs such as sales taxes, excise taxes and insurance, have caused vanpool fares to increase more quickly than vehicle operating costs. (With gasoline selling at $1.20-$1.40 a gallon over the past few years, fixed vanpool costs have accounted for over 60% of the $300/month for a typical 25 mile one-way commute). If these trends continue, it will become increasingly difficult to recover the total costs of ownership or leasing of a van from direct passenger fares, especially in cases where potential vanpoolers must also assume similarly higher personal vehicle ownership costs for a vehicle used to rendezvous with the van. Thus, significant growth in the number of van owner/operators may require a significant increase in fuel costs, which will impact solo drivers more than vanpoolers and make vanpooling more attractive and/or government (or employer) action, including very low interest loans or improved "abort" programs to minimize owner risks (i.e., of not enlisting sufficient poolers) to spur interest in this mode.

The individual is often influenced by peer behavior in choosing a commuting mode. Wide differences in transit and ridesharing mode shares exist

among neighboring employers of approximately the same size. While longstanding habits are not easily changed, the response of many employees to new ridesharing initiatives seems to depend heavily on the initial reaction to the effort by employee leaders (union or otherwise) and their perception of top management support of the effort. The individual looks to familiar evidence first, and then to more impersonal facts and figures presented in ridesharing promotional literature. For example, the individual vanpool entrepreneur can become a celebrity as he/she relates how he/she purchased and maintains a new van, while paying all costs of ownership and operation out of the quite reasonable monthly fares which he/she charges his/her passengers. While ridesharing information and adequate organization are important in attracting individuals to ridesharing, it appears that the most important influence can come from the support of key peer employees.

The future role of the individual in organizing carpools, vanpools and buspools at the residential end of the work trip is probably important, but it may not account for a significant increase in commuter ridesharing. (Actually, it is very difficult to measure the extent of individually-organized pools, since the members may not be part of an overall matchlist, and thus cannot readily be surveyed or monitored.) Neighborhood friends who work nearby will always be part of a large proportion of carpools, but it is not clear that the initiative to form a carpool comes from the home end of the trip.* In most communities with single family housing, the opportunities for carpool matching among neighbors or acquaintances will probably be limited, since these people often work at different locations. However, with the increase in new higher density suburban development (apartments and condominiums), opportunities may increase, since individual auto commuters can more easily find others having similar destinations and work hours. Residential organization of subscription bus service (as in Reston) will probably continue to develop, but because of the limited number of locations having appropriate commuting travel patterns, the extent of such services may be limited. If anything, the future energy picture will tend to discourage the development of

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* The concept of neighborhood-based matching is being tested in several areas (Albany, NY, Lincoln, Nebraska, and San Antonio, Texas) through the FHWA's Ridesharing Discretionary Program. The projects include the recruitment of ridesharing coordinators to serve each participating neighborhood.

remote bedroom communities; most commuters will probably try to locate closer to their place of work.

One of the factors which limits the use of current ridesharing options is their lack of flexibility - poolers must be on time to catch the single morning and afternoon trip. While there are some actions which can be taken to minimize this problem, an alternative, more flexible form of ridesharing has been proposed. This type of ridesharing, termed "organized hitchhiking" or "shared ride auto transit" (SRAT) is a system in which privately-owned and operated vehicles provide rides to registered "hitchhikers" along designated routes. Access can be gained through street hailing, hailing at specified access points, or perhaps through a transportation broker who provides information on potential rides. SRAT is thus an informal ridesharing arrangement, differing from carpooling in that service is not prearranged on a regularly scheduled basis, and that the riders do not share in the driving.

SRAT has been tried in several U.S. locations, but has met with little success to-date. There were unsuccessful attempts to implement the concept in Eugene (OR) and Montpelier (VT), while experiments in Fort Collins (CO), Clear Creek County (CO), and Marin County (CA) produced disappointing results and have been discontinued.* The results of these efforts have revealed two major problems with the SRAT concept: poor reliability, due to lack of a critical mass of demand/supply; and concerns over safety and security, on the part of both drivers and passengers. These must be overcome if SRAT is to be a successful alternative.

The key to developing reliability is registering sufficient numbers of interested drivers and hitchhikers, and operating only along major travel corridors, although there must be designated pick-up areas, which are sufficiently off the road to insure traffic safety, and to avoid disrupting traffic flow. Designated pick-up areas, coupled with an effective

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* Marin County's Commuter Connection, an UMTA demonstration during 1979 (with funding from Caltrans and the Metropolitan Transit Commission), was able to enlist 1400 registrants, but relatively few of the registrants actually used the service. A survey showed that 68% of the registrants actually tried to participate, but only 25% of these persons successfully obtained a ride (or rider). Interestingly, most of those attempting to use the service were drivers; apparently few users were willing to use the system as a rider due to its questionable reliability.

registration/screening process, can aid in overcoming security concerns, although, obviously, no screening process is perfect and both driver and hitchhiker are taking some risk. Feasibility studies of SRAT (33) have determined that, while the concept has certain potential, these problems, in addition to institutional and legal issues, pose significant constraints to the development of the concept on any widespread scale.

The studies and the results of past projects suggest that the future potential of SRAT may lie in introducting some type of prearrangement. Most users would likely prefer to know in advance that they will have a ride and with whom they will be riding. Of course, any prearrangement scheme moves SRAT towards carpooling and reduces the system's flexibility - which may be its major attraction to many. Perhaps the most promising SRAT-type alternative would be a more flexible carpool structure, i.e., one in which matches were made on a trip by trip basis at certain designated locations, rather than on the long-term basis distinguishing formal carpools.

In fact, existing ridesharing programs, particularly employer-based ones, may represent the most appropriate starting point for development of SRAT operations. Such programs may already have travel pattern data and potential match lists. By knowing the travel patterns of potential riders and drivers, it is possible to establish SRAT stops at convenient locations. Furthermore, users could be given lists of the approximate times at which drivers will pass the stops. By broadening a ridesharing program in this manner, some persons concerned with the lack of flexibility of carpooling may become willing to participate. Working through the workplace also offers the following advantages: 1) security and "fear of strangers" are less likely to be issues; 2) establishing stops for the return trip is no problem; 3) the employer can encourage ridesharing via other controls, e.g., parking restrictions; and 4) it may be possible for the employer to sponsor a "straggler" vehicle to pick-up persons who did not receive rides and thereby get them to work on time.

Alternatively, the "traditional" SRAT approach may have potential in certain types of settings; e.g., college towns, where registration can be better controlled and a low percentage of "residents" own autos. A demonstration of this approach, though not aimed at the work trip, is currently planned at Central Florida University (in Orlando). The University will establish fixed stops for pick-ups along area roads, and will set up

stops with corresponding numbers at the University, so that students and staff will know where to wait for the return trip (34).

Finally, SRAT would seem to have potential as an emergency measure to be implemented during transit strikes or other "emergency" situations. This approach was tried in Pittsburgh in 1975 in anticipation of a transit strike. Use of the program was low, however, apparently because of an insufficient lead time to make the public aware of it existence.

In summary, individuals will continue to play a significant role in the formation of ridesharing services. However, the main thrust of any significant future shift to ridesharing will have to come from employers and the public sector.

The Role of the Employer

The future role of employers (and transportation management associations) in the organization of ridesharing services is perhaps the key to ridesharing's development, since they have been quite successful in the past in encouraging large shifts in commuter mode choice. As commuting costs increase, employers' interest in how their employees travel to work should grow. Depending, to some extent, on government policies toward employers in this area, the trip to work could become increasingly a joint venture of the employer and the employee, with the employee retaining the final choice of mode, although not without some rather strict conditions.

The motivation for an employer to take on a greater role in employee transportation will come from a number of factors other than direct government intervention. For example, as a result of peer example and strong competitive pressures in the private sector, employers have slowly begun to realize that they can influence the work trip mode choice and have accepted greater responsibility in this area. In some cases, employee parking has become a nuisance and a drain on resources, and employers have realized that it is certainly in their interest, and often within their control, to reduce the demand for such a nonproductive use of company resources. Spurred on by a few groundbreakers (e.g., 3M, TVA and Prudential), employers have begun to offer real incentives to use the various ridesharing and transit modes for the trip to work. The future of ridesharing depends, to a great extent, on the continuation of this trend. Indeed, the extent to which employers adopt

ridesharing incentives as part of the regular employee fringe benefit package will probably be highly predictive of the future success of new programs to encourage ridesharing.

Another potential source of influence lies in the unions. In some companies which are unionized, management has shied away from sponsoring ridesharing programs, either because such programs would not impact all employees, or because of fears that it would become another element in the collective bargaining agreement. Strong support for employer involvement in ridesharing on behalf of the unions could have a significant impact on the role of the employer.

Another factor which may have an impact is the high cost of commuting. If travel costs continue to rise, some companies may feel that is is necessary to, in some way, aid employees, simply to be able to attract a sufficient-size work force. One can draw a parallel with health insurance, which, as medical costs have risen dramatically over the past decade, has become a standard benefit. Again, peer pressure plays a role; if one company introduces such a program, competitors may feel they have to follow suit.

Interestingly, an indication of the employer's growing interest in employee transportation is in the insurance area; several major employers (albeit including insurance companies, such as Aetna and Prudential) have instituted company-sponsored group automobile insurance plans (35). (It should be noted that both Aetna and Prudential also have strong ridesharing programs.)

Most companies already subsidize employee transportation in the form of free (or low cost) parking. Obviously, this practice tends to discourage ridesharing. An alternative which would have a dramatically different effect would be for companies to offer a single "transportation allowance" benefit, which employees can use in any way they desire, including buying a parking space at real cost (or opportunity cost in the case of employers who do not actually pay for parking). Whether this would prove more or less expensive than current practices to employers will depend on a number of factors, including the number of workers currently parking, the number who would shift, and the opportunity cost of parking. Certainly from a global perspective, encouraging ridesharing can only decrease the costs of commuting. Even

without adopting this total change in corporate practice, employers could provide direct or indirect subsidies to ridesharers. Note that some companies, including TVA, already do just that.

The problem with such subsidies at this time - at least if they are direct - is that, under IRS law, they must be treated as employee income. This problem has discouraged some companies from introducing company-paid auto insurance plans as well as transit pass subsidy programs. Several bills have been introduced which would change the tax treatment of such benefits, but none have been adopted to-date.

Short of ridesharing subsidies, which are likely to have the most significant impact, employers can still do much to encourage ridesharing. First and foremost is the initiation of a ridesharing program. Once that is accomplished, the employer must be willing to provide certain incentives, such as preferential parking, which many have done. Employers can also take actions to minimize the problems related to ridesharing's inflexibility. For example, a company can eliminate or minimize evening meetings. Alternatively, a company could provide ridesharing employees who must attend an evening meeting with a company car for the ride home. A company could also provide a company car or special shuttle-type service for midday shopping trips for poolers.*

The concept of utilizing company cars for ridesharing purposes has been advanced often as a method of reducing the "fixed" cost of ridesharing, but has not been well received by many employers, who fear insurance, maintenance, and other difficulties.** Nevertheless, the concept has been implemented in several locations, and may have widespread potential.* Alternatively, a

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* This arrangement is being tried at San Diego Gas and Electric Co., for example.

** In general, ridesharers can be expected to take better care of their own cars than one provided by the company.

*** For example, G.D. Searle, Inc. of Chicago and the California Department of Transportation have made fleet vehicles available to employees for ridesharing. An interesting variation on this arrangement takes place at Sperry Flight Systems of Phoenix, Arizona (among other locations), where the company regularly uses vanpool vehicles for corporate transportation purposes. Sperry pays only for mileage-related costs, thus not reducing the costs to commuters. However, it is conceivable that companies could contribute some of the fixed costs as well, thus lowering commuting costs.

company which turns over its vehicle fleet every few years might be able to make such vehicles available to prospective poolers at low cost. Such an approach could be akin to a company-sponsored vanpool program, if the company provides used (or new) automobiles to employees for ridesharing. Typically, vanpooling is a more visible alternative, and may provide public relations benefits to a company. However, the market for vanpooling is much more limited that that for carpooling, and if companies wish to have the maximum effect, they will have to take a more active role in promoting carpooling.

The concept of a "sedan pool," in which employers acquire the vehicles used for carpooling (as opposed to using existing company vehicles), is being seriously considered by a number of companies. Sedan pools make sense in cases where commute distances and commuter densities do not allow for the formation of vanpools. Carpools are, of course, more easily formed than vanpools; the advantage of the sedan pool over traditional carpools is that it provides a vehicle for the driver without his/her having to purchase it. Thus, if auto acquistion and operating costs continue to skyrocket, this concept could become a significant commuting alternative. (Such a development would certainly aid in the promotion of energy conservation, since a fuel-efficient car with four occupants is probably the most energy-efficient mode of transportation.)

It has been found that ridesharing programs are generally most effective in firms employing more than 500 persons. However, only 20% of all employees work for organizations of that size. Thus, there will be increased potential for ridesharing for persons in smaller organizations through the development of multi-employer programs (i.e., TMA's). Along this line, perhaps the greatest potential exists in the case of new office/industrial park developments, where the developer sponsors ridesharing as an incentive to attracting businesses. There are already examples of this happening, including those in Houston. At one site (Gateway Plaza), the developer installed a central fueling station, providing ridesharers with priority access. This could be a particularly effective incentive in the event of future gas shortages. As described earlier, the developers of a second Houston shopping center (Greenway Plaza) have established a comprehensive ridesharing program for employees of the tenant businesses; a similar program has been implemented in the Tyson's Corner (Virginia) area.

It appears that employers are increasingly accepting a greater role in work trip decisions. This acceptance implies a significant shift to higher occupancy modes, since it appears that it will be to the benefit of all concerned parties to encourage such a shift. The degree to which ridesharing increases depends heavily on the degree to which employers initiate comprehensive incentive programs.

The Role of the Third Party

The role of the "third party" in developing ridesharing programs has expanded considerably over the past several years with the growth of ridesharing agencies. Expansion of these activities is expected to continue, dependent on the perceived exigencies of the energy situation, coupled with the availability of public funding for their initiation and administration. Due to uncertainties surrounding the latter, private sector (or joint public-private) efforts may experience the greatest growth.

Ridesharing agencies have been shown to play an important role in encouraging employers to initiate programs and helping to administer them. Furthermore, as brokers, ridesharing agencies can help achieve overall transportation system integration, and also serve as a local focal point for dissemination of information on funding programs, regulatory changes, new demonstrations, etc. Such agencies also provide an opportunity for commuters who do not work for a company with a ridesharing program to rideshare. Thus, the growth of ridesharing agencies should be encouraged.

One of the keys to this growth is the availability of funding. Experience has indicated that underfunded agencies cannot be expected to have significant impacts. (The issue of federal funding is discussed further below, under The Role of the Federal Government.) Private funding of ridesharing agencies has a number of precedents, as discussed earlier. The major question in that regard is whether more companies can be encouraged to provide funding on an on-going basis, particularly once the "public relations" value of funding is spent. Another possible funding source for ridesharing agencies is to introduce "user fees" for their services.* Individuals may be willing to pay a few dollars for matching service (particularly if they are successfully

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* The user fee concept is currently being tested in Knoxville, as part of the FHWA Rideshring Discretionary Program.

matched). Employers may be willing to pay for certain forms of technical assistance which are currently provided free of charge. While user fees cannot be expected to cover the full cost of a ridesharing agency, they may allow for the expansion of certain activities by the agency.

The other element necessary for the growth of ridesharing agencies is improved coordination on the local level of agencies involved in ridesharing. The local metropolitan planning organization and transit agency, as well as the state DOT and regional UMTA and FHWA representatives, all have an interest in ridesharing, regardless of which body serves as the primary "ridesharing agency." It is important that these agencies be able to work together in support of the lead agency. This may require better coordination of funding programs on the national level.

The role of the transit authority may be pivotal, whether or not it serves as the lead ridesharing agency. Some transit authorities have recognized that ridesharing efforts can expand their constituency base to suburbanites and others who utilize private vehicles rather than transit. This is particularly important in an era of growing transit budgets and limited resources. Some transit authorities also view ridesharing as an extension of their power base and an opportunity to tap additional sources of funding. Whatever their reason, the expansion of transit authorities into the ridesharing arena is an encouraging development, as long as the transit authority is, in fact, committed to ridesharing options (other than transit) as legitimate modes. The danger in the transit authority being the lead agency is that it may tend to favor the form of transportation with which it is traditionally preoccupied - conventional transit - at the expense of other modes, even in cases where transit may not be the most effective approach. Of course, the alternative of having transit authorities opposed to ridesharing programs is much less desirable.

As the number of ridesharing programs expands and lists of potential participants grow, more and more transit operators are realizing benefits, including better service planning data to identify those trips which can easily be served by transit, introduction of employer monthly pass subsidies for their employees, and effective mechanisms to distribute marketing information. A few properties (including the Orange County Transit District) have suggested that, if employers can demonstrate a large enough "rider"

market for direct bus service by soliciting interest from existing carpoolers and vanpoolers, they would be willing to serve this "proven" market. For the few properties which are actually sponsoring vanpool programs at the current time, the shift to buspools and eventually to a more frequent express bus service should be a natural progression, if the demand warrants such a shift.

However, it is unclear whether more transit properties will choose to take an active role in promoting ridesharing in the future. The objections of transit labor groups and the 13(c) issue may stall any significant change in the status, as the industry may not want to introduce another issue which must be resolved regularly through long negotiations. It does appear, though, that further cooperation between conventional transit properties and agencies responsible for ridesharing in metropolitan areas would be beneficial and help turn more drivers into riders, regardless of specific mode. If transit properties are convinced that it is to their benefit to sponsor ridesharing programs, the legitimacy conferred on ridesharing through sponsorship by a permanent transportation operating agency should add to the momentum currently being generated by the other factors now encouraging increased use of ridesharing services.

The activities of local ridesharing agencies in the future should not change dramatically from current efforts. An exception to this might be increased emphasis on neighborhood-based ridesharing, if initial experiments with the concept prove promising.

The future role of the private vehicle supplier in the operation of third-party vanpool programs is unclear. On their own, such companies are not likely to have a significant role in expanding ride sharing, primarily because of the extensive marketing necessary. However, as the market grows, vehicle suppliers will undoubtedly begin to compete for it.

The involvement of automobile rental companies, such as Hertz, in vanpool leasing offers some intriguing possibilities. As an incentive for employees to participate in ridesharing, as well as an inducement to eliminate second (or third) car ownership, rental companies could offer ridesharers a package deal which guarantees availability of a rental car for weekends at a reduced rate. The under-utilization of auto rental cars on weekends makes this possible. The ability to select from a range of different types of cars for weekend use might prove to be a particular incentive for ridesharers. (The

involvement of rental car companies in commuter ridesharing could open the door to greater involvement on their part in general community paratransit, as well.)

Finally, the future may see other types of private operators entering the ridesharing market. One potential avenue involves the concept of "taxi pooling." This concept generally involves taxi companies providing commuter trips on a subscription basis.* Thus, instead of one of the commuters doing the driving (and a car or van is then left in the company parking lot during working hours), a taxi driver chauffeurs the subscribers to work and then resumes normal taxi service; these commuters are then picked up and driven home in the evening (by the same, or a different, driver). The potential of this arrangement, which resembles contract subscription bus service (on a smaller scale), remains to be determined.

In summary, third party ridesharing agencies have an important role to play in expanding ridesharing and are likely to see rapid expansion themselves if additional funding can be made available. Beyond providing matching and vanpool leasing services, these agencies serve as the major advocates of ridesharing, an important function in expanding the constituency and support of ridesharing modes as viable commuting options. This role of third party agencies can be expected to increase substantially as the push for energy conservation, and easing congestion, intensifies.

The Role of the Federal Government

As indicated earlier, the major role of the federal government regarding ridesharing has involved funding, promotional efforts (including the introduction of incentives and sponsorship of marketing and advisory activities), information dissemination, and the removal of legislative/ regulatory constraints. The role in the future will likely retain these same elements, although they can be strengthened.

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* "Taxi pooling" has also been used to describe two other arrangements. Ohio Bell (located in Cleveland), for instance, arranges for employees who have missed their regular rides home (i.e., via carpool, vanpool, or transit) due to working late to be transported home by taxi; such persons are grouped for the ride home whenever possible. Shared-ride taxi arrangements (i.e., based at airports) have also been referred to as "taxi pooling" on occasion.

Funding is obviously an important aspect of the federal role. Despite growing recognition of ridesharing's importance as an energy conservation (and environmental control) measure, greater levels of funding may or may not be made available for use in state and local ridesharing programs. In either case, federal funds will be limited; thus, an important area of federal activity should be to promote greater interest and levels of participation within the private sector. Endeavors such as the Greater Hartford Ridesharing Corporation - fusing federal, state, and private efforts and contributions - should be encouraged. Future federal funds could take the form of either discretionary or categorical grants, although the latter present certain problems; because they are single purpose in nature, the flexibility with which they can be applied may be very limited, causing some resentment at the local level.

A crucial element in the promotion of both private sector and individual participation in ridesharing is obviously the introduction of improved incentives. Toward this end, measures like those included in S. 3030 - the proposed Commuter Transportation Energy Efficiency Act of 1980 - could prove very significant. This Act, which was never passed by Congress, contained a number of key provisions, including: exclusion from taxable income of any employer subsidy of transit or ridesharing costs (including administrative costs of ridesharing programs); restoration of the tax deduction for fuel used by ridesharing vehicles, which was ended in 1979; provision of a business tax credit for costs related to the administration and operation of a ridesharing program (credit would be given only if 15% or more of a company's employees participated in the ridesharing program, and would increase as ridesharing increases); and revision of the business energy investment credit to add 10% (raising it to 20%) credit for the purchase of vans, and to allow for vans owned by a third party and leased to an employer to qualify for the tax credit.

It must be recognized, however, that tax incentive measures such as those mentioned above are, in effect, funding measures, and significant ones at that. This is particularly true in the cases where tax measures are oriented to individual ridesharers and hence impact existing ridesharers as well as new ones. For example, it is estimated that there are 16 million carpools on the road. If deductions for motor fuel taxes were reinstituted, it would reduce federal tax revenues by an estimated $200 - $260 million per year. A very reasonable question to ask is whether the federal government should be

providing such significant funding to "subsidize" ridesharing if, indeed, ridesharing is in the direct interests of both commuters and employers. Instead, perhaps, the federal government's role should better be focussed on promoting ridesharing - utilizing funding in that direction rather than as a subsidy.

The funding of ridesharing agencies may be an appropriate and effective method of promoting ridesharing but, even here, the government should emphasize seed subsidies, and encourage ridesharing agencies to seek additional funding from the private sector. Employers have demonstrated a willingness to initiate and promote ridesharing services; should other employers be provided such services free of charge? As with other government programs, the most effective use of government funds may be as a tool for leveraging additional funding from the private sector. This approach is consistent with general federal policies of encouraging greater participation in transportation by the private sector.

In any event, a logical and important government role is the removal of legal and regulatory barriers to ridesharing development.* U.S. DOT's model legislation is a significant step in this direction; the federal government must now urge the states (i.e., those still having regulatory restrictions on vanpooing and buspooling) to adopt the legislation. Also in the regulatory area, the federal government itself could promote the expansion of ridesharing through measures such as the exemption of vans from fuel economy and emission control standards; this would encourage their production and thereby ensure an adequate supply for vanpooling purposes.

An alternative - though politically less popular - approach to promulgating ridesharing is the introduction of mandatory requirements along the lines of the EPA Transportation Control Plans. Such requirements, specifying reductions in single occupant auto commuting, would be hard to enforce, however, and may be appropriate only during periods of significant energy shortfall.

In terms of promotional activities, the federal government can play an important role through the expansion of demonstrations of innovative practices

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* One might argue that an equally important role is the removal of economic barriers, which include the inequitable tax treatment of employer expenditures in parking and ridesharing programs.

and documentation of the most effective marketing techniques and institutional/organizational arrangements, as demonstrated in various locations. Particular arrangements/concepts which should be further demonstrated include: neighborhood-based programs; use of corporate vehicles for ridesharing (and vice versa); third party carpool arrangements, or "sedan pools;" and innovative options such as taxi pools and variations on organized hitchhiking. In conjunction with demonstrations, information dissemination is a vital function. It is nearly as important to inform localities about the results and innovations of efforts elsewhere as it is to sponsor the demonstrations. Keeping the various actors involved in ridesharing abreadst of new developments requires a concentrated effort, and federal agencies will likely bear the brunt of the responsibility for this. The National Ridesharing Information Center and the two series of ridesharing workshops are important moves in this direction.

Finally, an important step toward improving the impact of the federal role in promoting ridesharing would be the coordination of responsibilities within the government itself. Toward this end the National Task Force on Ridesharing recommended that the President "... assign primary responsibility for ridesharing to DOT, and clarify the responsibilities of federal agencies such as DOE, General Services Administration, Department of Commerce, and Environmental Protection Agency for these activities."(26) Although the DOT, and FHWA in particular, has been given the lead ridesharing role by Congress, fragmentation of funding, regulatory powers, and objectives still exists, leading to some confusion and unnecessary competition between agencies. Federal efforts to promulgate ridesharing would likely prove more effective if coordinated through a single central agency.

In conclusion, the responsibility for the actual initiation and operation of ridesharing programs should continue to rest with employers and local ridesharing agencies. However, the federal government can play a pivotal role in supporting current efforts and encouraging the development of others, primarily through providing greater incentives, removing existing constraints, providing information and technical assistance, and targeting funding in the most effective way. Given the growing cost of commuting and auto ownership, the continuing need to conserve energy, and the rising costs of building and operating transit facilities, interest in ridesharing will undoubtedly expand; the federal government can do much to encourage a similar expansion of participation.

Future Potential of Ridesharing Options

Ridesharing options have been shown to be viable commuting modes, which, over the past decade, have been increasingly accepted by individuals, private employers, and government agencies. Ridesharing can provide a low cost travel alternative for commuters, can produce tangible benefits for employers, and can help achieve national goals such as reduced energy consumption.

Overall, the extent of ridesharing is significant: approximately 22% of the over 73 million commuters (as of 1975) used carpools, vanpools, or buspools, and recent ridesharing initiatives have had some impact on increasing this percentage. While areawide programs have achieved only limited changes in the percentage of persons ridesharing, it should be kept in mind that even small percentage changes can have significant impacts on an absolute level. For example, a 1% shift to ridesharing (from the ranks of solo commutes) in a region with 1,000,000 commuters can save up to 80 million miles traveled per year, which translates into a savings of roughly 4 million gallons of fuel. On the other hand, while a program sponsored by a single employer will have only small impacts on an absolute level, the company-level impact can be substantial. Some companies with active ridesharing programs report shifts of 50% or more of employees to ridesharing modes. Of course, if a substantial number of major employers achieve shifts of that order, the national impact would be very great.

Considering that over 52 million commuters drive alone to work, the potential market for ridesharing is very large. The extent to which ridesharing modes penetrate this market depends predominantly on the factors discussed earlier in this chapter. The energy and economic situation, land use and development patterns, and the efforts of the major actors will exert varying degrees of pressure on commuters; the combined effect of all these factors will dictate the size of the future market share. Carpooling is, and will doubtless continue to be, the dominant ridesharing mode. While carpooling's inherent inflexibilities will limit the total market, there is obviously still room for significant growth. Estimates of future carpooling levels are difficult to make; however, with carpooling increasing at an annual rate of 2-5% in areas with active ridesharing programs, it would certainly not be unrealistic to suggest that a 50% increase in the amount of carpooling is possible over the next decade, depending on the rise in the cost of gasoline

and the extent to which employers and the government increase the level of ridesharing initiatives. Given a total of approximately 16 million carpoolers (as of 1975), that would mean a 1990 total of nearly 25 million carpoolers.

Vanpooling is the next most common form of ridesharing. The future level of vanpooling will depend to a large extent on the economics of van operation and trends in settlement patterns (and resulting commuting distances), as well as the role employers accept in vanpool provision. Significant increases in vanpooling are certainly possible. With over 4 million persons in the U.S. commuting over 25 miles to work as of 1975, the potential market for vanpoolers is clearly considerably larger than the approximately 120,000 persons who currently utilize this mode. Considering that this total has grown by 250% just over the last 2 years, a similar percentage increase is certainly within reason over the next decade.

Buspooling is likely to remain the least intensively used form of ridesharing, because of the inherently difficult task of grouping together large numbers of passengers. Nevertheless, this option remains a very cost-effective form of commuting in situations where it is feasible.

Of all of the factors which will influence the future of ridesharing, two stand out as potentially having the most significant impacts. The first is the price and availability of fuel. If gasoline becomes scarce, or prices rise substantially (i.e., at a faster rate than the level of disposable income), there is likely to be a substantial shift to ridesharing modes. The second factor is the role of the employer. All of the evidence to-date indicates that the role of the employer is key in encouraging ridesharing participation. If employers accept a greater responsibility for employee transportation, as they may if energy prices soar or energy becomes more scarce, than ridesharing participation is likely to increase substantially. Government policies and actions must continue to recognize the key role of employers, and continue to focus on generating employer activity in the ridesharing area.

Public sector (or, in some cases, joint public/private) ridesharing initiatives which have flourished in recent years will undoubtedly have an impact as well. Whether a ridesharing agency serves as an advocate for ridesharing - providing ridesharing with the constituency it often lacks - or as a more impartial broker, such an organization clearly helps legitimize the

concepts, and makes ridesharing options available to many persons who may not otherwise have such an option.

Finally, governmental actions, on the local, state and federal levels can be important in encouraging both individuals and employers to support and participate in ridesharing activities. It is clear that ridesharing has been established as a legitimate form of public transportation. Under the right conditions, its future growth could be significant.

Glossary

areawide ridesharing program:

This is a program which is targeted at the general public within a designated area. The program basically involves the development and updating of ridesharing matchlists and the promotion of ridesharing options.

brokerage:

The concept of "brokerage" involves a central party/agency which attempts to match travel demands with the most appropriate available mode and promotes the most efficient provision of these modes. In the ridesharing area, brokerage involves assistance in organizing carpools, vanpools, and buspools, as well as provision of transit information.

buspool (also, subscription bus or commuter bus):

The buspool is a service in which routes are established (typically serving a single major destination) in response to commuter demands which cannot be adequately served by regular transit. The buses may be owned and operated by charter bus companies, transit agencies, or employees. Passengers typically pay a fixed monthly fare for express, door-to-door service. A buspool focussing on relatively short trips and involving multiple routes is called employment center bus service (ECBS) or bus express employee program (BEEP).

carpool:

A carpool represents the sharing of an automobile (and the costs of operation) by two or more individuals on a regular basis. Many carpools are "spontaneous;" others are the result of an employer-based or regional carpooling program. While in many cases only a single vehicle and driver are used, in other cases the poolers take turns driving.

employer-sponsored ridesharing program:

This is a program operated by an individual employer to provide commuter ridesharing options for his/her own employees. Some programs involve vanpooling only, while others offer assistance in the formation of carpools and, possibly, buspools, as well. For the vanpooling element, the employer typically purchases (or leases) vans, and assists in the formation of pools; much of the capital and operating expenses are then recovered through rider fares.

ridesharing:

In general terms, ridesharing is the simultaneous use of a vehicle by two or more persons. Within the context of the commuter trip, ridesharing entails two or more persons traveling to and/or from work together on a prearranged basis. Ridesharing modes include carpooling, vanpooling, and buspooling.

ridesharing agency (also called "third party ridesharing agency"):

This is a body which promotes multiple occupancy vehicle use among the general public, and assists employers in developing their own programs. These agencies may provide vans in connection with promoting the development of vanpools. Ridesharing agencies have been initiated and operated by non-profit organizations, for-profit companies, transit operators, community groups, regional planning organizations, and governmental agencies.

shared ride auto transit (SRAT):

This option typically involves a formalized "hail-a-ride" (or "legalized hitchhiking") service, in which (licensed) cars follow fixed route corridors on which (licensed) riders are able to hail them.

taxi pool:

This concept involves taxi companies providing group commuter trips on a subscription basis. A taxi picks up the members of the "pool" and delivers them to their place of employment; at the end of the work day - at a prearranged time - a taxi drives them home.

third party vanpool program:

This is a program through which vans are made available to employers and/or the general public on a lease basis by a "third-party" organization. Such a program may be operated by a ridesharing agency or by a private vendor.

transportation system management (TSM):

TSM represents a set of federal efforts to promote low-cost, non-capital-intensive ways of achieving traditional public transportation goals (e.g., reducing VMT, increasing highway capacity, and improving traffic flow). The emphasis is placed on optimal use of existing facilities.

vanpool:

A situation in which a group of commuters share a van, generally with one person responsible for all the driving. Vans may be owned or leased by the driver, the employer, a private vendor, or by a ridesharing agency. Vanpool user charges are usually set so as to recover all operating costs (including depreciation). Drivers are not paid, but may receive such benefits as exemption from paying the user charge and free use of the vehicle on evenings and weekends.

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