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SHUTTLE VANS: THE OVERLOOKED TRANSIT ALTERNATIVE

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I.INTRODUCTION

Many urban areas are seeking to increase the extent to which individuals choose to make trips via transit rather than single-occupant vehicles (SOVs). In doing so they are seeking to address both traffic congestion and air quality. Getting more people to shift from SOVs to higher-occupancy vehicles such as carpools, taxis, vanpools, buses, and rail transit ought—other things being equal—to reduce the number of vehicles on the road system, thereby reducing congestion. And the reduction in sheer vehicle numbers ought to reduce the emissions generated by transportation (unless the higher-occupancy vehicles were dramatically dirtier than the SOVs they displace, which is unlikely to be the case).

In greater Los Angeles, the Regional Mobility Plan of the Southern California Association of Governments is premised on reducing auto emissions by shifting significant numbers of commuters out of SOVs and into transit. Specifically, it calls for 2.3 million of the 12 million home-to-work trips expected each day in the year 2010 to be made by transit. Yet recent projections indicate that the currently planned rail and bus transit system will actually attract only 0.7 million of those trips in 2010.

Conventional transit seems unable to attract large numbers of people from their cars. This is not because people have an irrational "love affair with their automobile." Rather, it is because conventional transit, while well-suited for the dense, centralized land-use patterns of 19th-century cities such as New York and Philadelphia, is poorly suited to the quite different geography of most 20th century cities, including Los Angeles. To be successful in this kind of environment, transit must be reinvented to offer more of the amenities that people get from automobile commuting. This paper explores how to accomplish that goal.

II.TRANSIT COST-EFFECTIVENESS

One of the problems with conventional transit is its high cost in relation to what people are willing to pay for the service it provides. In low-density metro areas like Los Angeles, conventional transit cannot generate sufficient revenues from users to cover even its operating costs, let alone capital costs. Indeed, the *1993 Transit Fact Book* from the American Public Transit Association reports that 1992 transit fares nationwide covered only 37.5 percent of *operating* costs, and not one cent of the billions of dollars in capital costs.

Consequently, programs to *expand* the use of transit depend critically on increased taxpayer subsidies. Yet the outlook even for maintaining current subsidy levels is poor. In its FY 1995 budget proposal, the Clinton administration proposed phasing out the current $800 million in annual transit operating subsidies, retaining only the federal capital-grants program. While this proposal may not be enacted by Congress, it is a sign that the *existing* level of federal transit subsidies is vulnerable; hence, increased subsidy levels should not be counted on for future years.

Several years ago the Congressional Budget Office addressed the question of transit cost-effectiveness. In a detailed 1988 report on federal public works expenditures, CBO assembled comparative data on the cost and performance of alternative modes of urban transit in 1985. Since these data are nine years old as of 1994, what is relevant is the relative costs rather than on the absolute magnitude of the numbers.

Figure 1 summarizes CBO's finding on cost-effectiveness. To arrive at these figures, CBO used the total annual cost (operating costs plus the annualized capital costs) of each transit mode and divided that cost by the total number of passenger miles for that year (using data from the federal Urban Mass Transportation Administration and the Transportation Research Board). The results show that rail transit is dramatically more costly per unit of service delivered than bus and van transit. Of the rail options, commuter rail is, on average, the least costly, since its capital costs are generally lower than those of the other two rail modes. (Commuter rail involves service provided over existing railroad rights of way.) Light rail is the most expensive by far, costing more than twice as much as heavy rail to deliver a passenger mile of service. The least costly of all transit modes is commuter van, here defined as vanpools (in which the driver is not paid a salary).

What accounts for these huge disparities in cost-effectiveness? Besides the very high capital costs of urban rail systems, one of the key factors is load factors. Figure 2 compares the load factors of these five transit modes, defined as the fraction of all passenger spaces offered during the day that are occupied by customers. Due to the heavy peaking of commuter traffic, heavy-rail systems have an overall daily load factor of just 12 percent, compared with 20 percent for buses and 28 percent for commuter rail. As CBO notes, the only mode that uses its fleet efficiently is vanpools, which generally operate only at peak hours, and hence end up with a 96-percent load factor.

Another factor in the relative cost-effectiveness of these transit modes is energy use. While the common perception is that rail transit is an energy-saver, Figure 3 indicates otherwise. CBO's data reveal that, except for commuter rail, the rail transit modes take as much or more energy to deliver a passenger mile of service than buses. And once again, the commuter van comes out the winner, requiring only 37.5 percent as much energy as a bus to deliver a passenger mile and only 30 percent as much energy as a light-rail system.

These findings suggest that vans may be a far more promising transit mode than has previously been recognized. Policies to expand transit mode share based on vans might require far less in the way of subsidies, given the apparently superior cost-effectiveness of vans, compared with bus and rail transit modes.

III.WHY MOST COMMUTERS DON'T USE TRANSIT

Another reason to look more closely at alternatives to conventional bus and rail transit modes is transit's unattractiveness to most commuters. As Peter Gordon and Harry Richardson pointed out in a 1993 paper, data from the 1980 and 1990 census revealed that public transit's share of all work trips continued its post-World War II decline during the 1980s, falling from 6.4 percent in 1980 to only 5.3

percent in 1990—despite billions in taxpayer subsidies. For Los Angeles, the already low 1980 transit mode share of 4.9 percent declined to 4.5 percent in 1990.

Transportation researchers have conducted numerous studies of people's transportation behavior. Most people choose the automobile (and generally the SOV) for rational reasons, despite rush-hour congestion. Autos offer speed, flexibility (as to time and destination), comfort, safety, and privacy. Conventional fixed-route transit, by contrast, is much slower door-to-door (because of both waiting times and the time needed to get to and from the transit stops), inflexible (it serves only a limited number of fixed routes), less comfortable than the private automobile, and less private and safe. Thus, transit's low fare (due to subsidies) is outweighed by its many other disadvantages.

By far, the most important attribute of a commuting mode is door-to-door travel time. Even beautiful, high-tech subway lines in such cities as Atlanta, Miami, San Francisco, and Washington, D.C. have failed to attract the projected levels of ridership because their high operating speed does not compensate for long waits at stations or the travel time to and from stations.

Research on commuter attitudes and behavior has found that "time spent in walking, waiting, looking for a parking space, or transferring modes is more onerous than time spent moving between one's origin and destination," notes UCLA researcher Martin Wachs. Indeed, Wachs points out that a number of studies have shown that "people psychologically weight `out-of-vehicle time' somewhere between two and three times as heavily as they weight `line-haul' time."

Besides higher door-to-door speed, a transit mode competitive with the SOV must provide greater flexibility. Researchers Gabriel Roth and George Wynne point out that "[S]uburban living cannot be efficiently served by fixed-route bus or rail lines: fast door-to-door service in low-density neighborhoods can only be provided by a transport mode flexible enough to arrive quickly, close to people's homes in response to their need."

Surveys conducted in the Honolulu metropolitan area in 1987 made similar findings. Researchers for the Hawaii State Department of Transportation found that the reason suburban commuters used their cars instead of the public bus system were convenience, shorter travel time, a guaranteed seat, no walking required, and no transfer needed. Significant numbers of SOV commuters told researchers they would use a transit service that offered a guaranteed seat and door-to-door service, even at a premium price.

Overall, research on commuter preferences finds that commuters overwhelmingly prefer door-to-door direct commuting as opposed to rail transit with transfers. One study, attempting to quantify the difference in demand, concluded that "[W]hatever the number of car commuters that a rail system will attract, two to four times that number could be expected to use paratransit serving the same areas."

Assuming that door-to-door van services could be provided at lower net taxpayer cost than rail or bus service, their inherently greater appeal to consumers is especially promising, given the goal of attracting more commuters from SOVs to transit.

IV.AIRPORT SHUTTLES: A TRANSIT SUCCESS

To most transportation planners, the term "door-to-door van transit" means just one thing: heavily subsidized dial-a-ride "paratransit" service for elderly and handicapped persons. Because of its low utilization rate (low load factor), this kind of service is very expensive on a per-trip basis. It is hardly what one could consider a prototype for a large-scale commuter transit alternative.

Yet in a growing number of cities, a dramatically different type of van transit service has emerged in the past decade: airport shuttle vans. Competing private companies provide demand-responsive, shared-ride, door-to-door service to and from airports and train stations, at fares about half that of (exclusive-ride) taxi service.

The pioneer provider of airport van transit is SuperShuttle International, which first introduced this service at Los Angeles International Airport in 1985. As of 1992, the company operated some 500 vans and 75 sedans in the metro areas of Los Angeles, San Francisco, San Diego, Phoenix, Dallas, and Miami. To minimize total trip time, SuperShuttle's policy (emulated by some, but not all, of its competitors) is to limit pickup or delivery stops to a maximum of three per one-way trip. Inbound trips to the airport require an advance telephoned reservation; outbound trips may be either pre-scheduled or on-demand, depending in part on policies imposed by the airport in question.

In California, the shuttle van industry was made possible by liberalization of the Public Utility Commission's regulatory stance. In 1976 the PUC authorized on-call minibus service to airports; in 1980 it allowed competition between airport bus services. These two changes opened the way for SuperShuttle and its competitors, leading to major changes in the airport ground-transport industry. The former (monopoly) scheduled bus services generally lost riders and many went out of business.

As of 1992, California shuttle vans were carrying 8 million passengers per year and generating over $100 million in revenue. Over the years, the industry has become significantly more competitive. Between 1987 and 1991, for example, the number of firms providing service in both the Los Angeles and San Francisco markets doubled (see Figure 4). The entry of smaller operators has led to complaints by airports (battles over curb space and congestion), passengers (complaints over nonpickups and overcharging), and the larger firms (cream-skimming or violation of rules by new entrants). Both LAX and SFO have introduced new rules to deal with these problems, and the PUC has also increased its enforcement efforts. Despite the publicity given to these growing pains, the PUC reports that the total number of passengers who complain is less than one percent.

The emergence of the airport shuttle van industry has had a significant effect on the the travel patterns of those using the airports in question. Table 1 shows the percentage of departing passengers at LAX and SFO, respectively, using each of several modes of ground transportation to get to the airport. At LAX, the principal change has been the substitution of transit vehicle trips (primarily on-call shuttle vans) for automobile trips. At SFO, the airport shuttle vans have attracted nearly 10 percent of all trips (double the level of LAX), but in this case the vans' growth has been primarily at the expense of airport buses rather than private automobiles.

It is in auto-oriented Los Angeles that the success of airport shuttle vans in "getting people out of their cars" has been most dramatic. The decline in auto mode share from 76.3 percent of all airport trips in 1978 to 69.9 percent in 1993 (a 6.4 percentage-point decrease) is primarily due to the growth of shuttle van mode share from zero in 1978 to 5 percent in 1993.

How much of a difference has this made? In 1992 approximately 19.5 million passengers arrived at LAX via some form of ground transportation. Five percent of these people—973,588—arrived by shuttle van. The average number of passengers per arriving van, according to company sources, is 3.5. The latest ground access survey data show that the average private automobile driven to LAX carried 1.59 people. Thus, each van trip substituted for approximately 2.2 auto trips. From these figures, we can calculate that the 278,168 arriving-van trips displaced 611,970 arriving-car trips, reducing highway traffic by 333,802 vehicles.

This substitution of vans for cars had a corresponding impact on vehicle emissions. Although a typical van emits 22 grams per mile of pollutants (compared with 15.3 for the average automobile), and although the van trip has a somewhat longer distance due to several stops, the substitution of one van trip for 2.2 auto trips leads to a net reduction in emissions. As shown in Table 2, we can estimate that the net reduction in emissions from LAX-bound passenger trips was 65.84 tons.

That is only the beginning of the emission-reduction story. People using shuttle vans to get to LAX generally do not use an automobile for ground transport leaving the airport when they return by air. The 1993 LAX air passenger survey found that less than one-quarter of those who used a shuttle van to get to the airport used a private or rented car to get from the airport on their return. Nearly two-thirds used a shuttle van again, while the remainder used a taxi, bus, or hotel courtesy van (all generally multi-occupant vehicles). Overall, the 1993 survey found that 3.7 percent of all passengers arriving by air and leaving the airport by ground transport used shuttle vans. Assuming that this fraction would have used automobiles had the shuttle-van industry not existed, we can estimate another 28-tons per year reduction in emissions from these mode changes. That gives us a total, for LAX, of 65.84 tons.

The savings go further than that, since the shuttle vans also serve the other four commercial airports in the South Coast Air Basin: Burbank, Ontario, Long Beach, and John Wayne. Though specific figures on passengers using vans for these airports are not available, it is possible to make an estimate. Airport officials report that 34 van companies are registered to serve Burbank and 31 to serve John Wayne, nearly as many as the 37 registered at LAX. Assuming that shuttle vans have achieved only 75 percent as much mode share at these smaller and less-congested airports, we can use their relative numbers of passenger enplanements to estimate their relative number of van passengers. Table 3 presents these figures, estimating that use of vans at non-LAX airports leads to an additional reduction of 18.4 tons.

Hence, overall, the substitution of shuttle van trips for car trips at South Coast airports contributes to an annual reduction of 84.2 tons of vehicular emissions.

V.COMMUTER SHUTTLE ECONOMICS

To estimate the feasibility of providing door-to-door commuter service, we need to look more deeply into the possible service characteristics and costs of that specific service, in the context of supportive public policies.

For this purpose, we first examine airport shuttle van costs. According to SuperShuttle, the average passenger load to and from the airports is 3.25 (3.5 on trips to the airport; 3.0 on trips from the airport), and the total cost per vehicle-mile (including profit) is $1.40. Obviously, if this cost can be spread over more passengers, the cost per passenger will be less. If such a van carried eight passengers, the cost per passenger mile would be only 17.5 cents. Even at just six passengers, the cost would be 23.3 cents/passenger mile.

Using these numbers, we can analyze a hypothetical commuter van service, as a starting point for estimating economic feasibility. Based on 1990 Census and National Passenger Transportation Survey data, the average commute trip in Los Angeles is 12.5 miles one-way, with an average trip time of 23.7 minutes. Using this as a starting point, we can depict a "baseline" SOV commute as consisting of 4 minutes spent on neighborhood streets, 15.7 minutes spent on the freeway, and 4 minutes on surface streets in the vicinity of the workplace (Figure 5).

For the hypothetical van service, we assume a van carrying six passengers that has access to an HOV lane for the freeway portion of the trip. This gives it a time saving for that portion of the trip, to make

up for the time spent in collecting and dropping off riders at either end of the trip. We will assume that the average passenger is the third one picked up at his door and must endure the time needed to pick up three more people at their doors; we assume each pickup requires traveling one-half mile (at 22 mph) and waiting one minute for the person to board. At the other end of the trip, because workplaces are more clustered than residences, we assume that instead of six stops the van only needs to make three, so that the average rider must endure 1.5 stops before getting off. Again, each stop requires one-half mile at 22 mph plus a one-minute waiting time. For this baseline case, we can see that despite having to take extra time for pickups and deliveries, the van's door-to-door time for the average rider is 28.5 minutes—just five minutes longer than the SOV—thanks to the time saving permitted by the HOV lane.

What about the comparative costs? Table 4 presents the daily round-trip costs for shuttle vans carrying between 4 and 8 passengers, for our baseline 12.5-mile (one-way) trip and for a longer, 20-mile trip. These costs must be compared with the costs of driving alone, as reviewed in Table 5. According to the Federal Highway Administration, the out-of-pocket costs of driving an intermediate-size car in 1991 averaged 13.7 cents/mile Because drivers consider only these costs in the decision to use or not use a car for their daily commute, this is the proper figure to use in comparing SOV commuting to other mode choices (as opposed to using the total ownership cost, which includes depreciation, insurance, and financing charges, and which totals 33.4 cents/mile). Adjusting upward for inflation, today's SOV operating cost is approximately 15 cents/mile. On that basis, the daily cost for the baseline SOV commute is $3.75 and for the longer commute is $6.00.

Since the baseline van only comes close to matching the SOV commute time, it is clear that it cannot compete with today's low out-of-pocket cost of driving alone, at least in our "average" case (although there may be market niches where it could be competitive). However, that is not the end of the story. Serious attention is being given by government agencies, including the Environmental Protection Agency, the California Air Resources Board, and the Southern California Association of Government to various market-based transportation control measures (TCMs) such as parking pricing and congestion (peak-hour) pricing on freeways. The purpose of these measures is to cause the cost of auto use to reflect more of the real costs associated with driving, such as the cost of parking and the costs imposed on others by congestion. Hence, future SOV costs may well include one or more of these additional charges.

Table 5 estimates the cost impact of several such market-based TCMs. The national average cost of workplace parking has been estimated at $1,000 per year. This works out to $4.29 per work day or about $90 per month. If drivers had to pay this cost directly, instead of having it paid for by their employers (and were given $90 in additional monthly pay, instead), the daily cost of our two commuter trips would increase to $8.04 and $10.29. Peak-hour congestion pricing on the freeways is estimated here to be at an average level of 15 cents/mile, which would further increase the daily out-of-pocket cost. More likely in the next decade than freeway-wide congestion pricing is the availability of one or more express lanes alongside the unpriced regular lanes, often dubbed High Occupancy/Toll (HOT) lanes. We assume these premium-priced lanes would charge 25 cents/mile, leading to even higher costs for the daily commute trips in Table 5.

Using the cost figures from Tables 4 and 5, and the assumptions on van pickup and dropoff times from Figure 4, we can analyze a number of variations on the baseline commuter van case. Table 6 shows how the costs and trip times of the van service vary with the number of passengers carried; adding more passengers adds to trip time but decreases the charge per passenger. The eight-passenger van would be less costly (by more than two dollars a day) than the SOV/priced-parking trip, but would take

nine minutes longer each way. And an SOV willing to pay the premium price on the HOT lane could save time compared to the fastest (four-passenger) van, but at $4 per day higher cost. For longer trips, Table 7 shows that the four-passenger van would save 2.5 minutes each way, but would cost more than the SOV even with parking pricing. However, the six-passenger van just about equals the SOV trip-time, and costs about $1/day less than the SOV with parking pricing—a potentially viable market niche.

Yet another variation is analyzed in Table 8. Suppose rush-hour freeway speeds do deteriorate in coming years, as many planners anticipate. If the freeway portion of our baseline trip decreased in speed from the previously assumed 36.3 mph to 25 mph, the competitiveness of the shuttle van increases dramatically. In particular, for the 12.5-mile trip both the four- and six-passenger vans beat the SOV trip time, and the latter van saves more than $2/day compared with the SOV with parking pricing. Savings increase to nearly $4/day for the eight-passenger van, which takes only slightly longer than the SOV. For the 20-mile commute, all three vans beat the SOV by a wide margin, with the six- and eight-passenger versions saving $1 to $3/day versus the SOV plus parking.

But suppose that instead of deteriorating, freeway speeds remain comparable to today's levels, as commuters continue to adjust their trip decisions, workplace locations, and housing locations to cope with congestion, as they have been doing for the past 20 years. In that case, commuter van transit of the kind sketched here may be only marginally competitive, even with such market-based TCMs as parking pricing and congestion pricing in place. Is there another form of assistance that could make it a viable competitor?

Transportation economists have long recommended that a more efficient form of transit subsidy would provide subsidies to the individual users of transit, rather than to the providers. A "user-side subsidy" would, by giving users a choice of provider, stimulate competition in the marketplace to discover forms of transit that best met the needs of many different users. It would also provide strong incentives, lacking with provider subsidies, to hold down costs, so as to offer the most attractive combination of price and service to users.

As of early 1994, Honolulu is seriously considering the enactment of a user-side subsidy program. Tour bus operators, minibus providers, vanpool providers, and taxi companies have all expressed interest in entering the commuter market in Honolulu if such a program is actually put into place. One commonly mentioned figure is $60/month, or about $3 per day. Table 9 shows the impact of a $3/day commute voucher on the relative competitiveness of the van trips reviewed in the previous tables. The passenger would use the $3 voucher to cover a portion of the van fare, leaving the amounts shown in the table to be paid out-of-pocket. Under these conditions, and assuming workplace parking pricing, all three vans would cost less than SOV plus parking, with the four-passenger van coming close to matching the SOV's trip time. For the longer commute, the six- and eight-passenger vans would be less costly than SOV plus parking, with the four- and six-passenger vans being competitive on trip time.

VI.VAN TRANSIT'S SPECTRUM OF SERVICES

A. Types of Commuter Van Service

The commuter-van concept analyzed in the previous section is but one of many possible types of van transit service. Broadly speaking, we can identify three major categories of commuter service, ranging from the lowest-cost and least exclusive to the highest-cost and most exclusive (i.e., most auto-like):

·*Jitney* service refers to regular line-haul service along major thoroughfares (but often with minor deviations), making a number of pickups and dropoffs along that route.

·*Subscription* service refers to pre-planned, regular door-to-door service from home to work (including vanpools), generally making use of freeways and (where available) HOV lanes.

·*Demand-response* service refers to door-to-door service that is summoned at random, with no advance notice, like a taxicab, but generally requires the sharing of the ride with others.

1. Jitneys

Jitneys are often (but need not be) targeted at lower-income users who do not have an automobile available. In both Miami and New York the jitney operators tend to be recent immigrants, entrepreneurs who are owner/drivers. A jitney industry can offer important entry-level job opportunities to people without higher education and with no need for advanced skills, beyond the ability to obtain a driver's license.

New York City has a thriving van-based jitney industry, despite these services having no legal authorization from the city. One major segment is commuter van service, typically using 12- or 14-passenger vans, operating on regular routes (similar to express buses). A 1984 survey by New York City identified over 500 such van trips entering the Manhattan central business district from 7 to 9 A.M. (not including several major river crossings such as the George Washington Bridge, which were not surveyed). It was estimated that over 5,000 passengers were using these vans each day. A Columbia University survey two years later found nearly double the number of commuter vans in service. Most of these vans belong to an owner/driver cooperative called Express Transit, which possesses an ICC certificate (since much of the service is interstate, from New Jersey to New York).

Miami has a jitney industry consisting of an estimated 400 vehicles, again mostly 12-passenger vans. It grew to its present size following a 1989 law exempting intercity transportation services from municipal regulation. Like Los Angeles, the greater Miami area has many incorporated cities besides Miami, so the jitney firms quickly launched services among these cities and Miami. After protests from Miami officials, the legislature amended the law the following year (to only deregulate inter-county services), but the jitneys, having proved quite popular, continued to operate illegally. As part of a federally funded study of these jitneys, KPMG Peat Marwick found that the jitneys carry between 43,000 and 49,000 passengers per day—about 20 percent as much as the public transit system. Moreover, only about 23 percent of the jitneys' ridership represents diversion from the bus system; the rest appears to be an expansion of total transit mode share. Indeed, the jitneys were considered such a vital part of Miami's transportation system that the Federal Emergency Management Agency contracted with up to 350 jitneys to provide emergency transportation services following Hurricane Andrew in 1992.

The ability of apparently unsophisticated jitney operators to discover and fill market niches is illustrated by a federally funded study of the black-market jitney services in Pittsburgh. Researchers Otto Davis and Norman Johnson discovered four distinct markets being served, each by a different set of specialized operators. First, Pittsburgh's black lower-income neighborhoods were served by 44 jitney stations, to which residents could go to begin a trip on a "station car." Second, there were line-haul services, generally parallel to bus routes. Third, jitneys provided service to the airport and bus station. And fourth, jitneys offered specialized service to supermarkets.

One important submarket for jitney service, as in Pittsburgh, is providing access to transportation terminals. This feeder service is of the "many-to-one" type. New York's outer boroughs, especially Queens, have extensive service of this type, bringing people from residential neighborhoods to both transit stations and community centers. Once again, these services are unlicensed by the city and are frequently harassed, but they survive and thrive because they apparently meet a market need. One of the largest and most sophisticated, the 45-van Queens Van Plan, holds a certificate from the state Department of Transportation, operates a radio dispatch system, and supervises its members. A large cooperative, the Jamaica Association of Van Owner/Operators (JAVO) was organized in 1989, representing 11 companies and over 100 vehicles. Extensive lobbying led to official recognition by the city government (though the transit agency, the MTA, is still bitterly opposed and refuses to cooperate with JAVO, e.g. in assigning it curb space adjacent to transit stations).

Los Angeles could learn from New York's example. A significant number of rail transit miles already exist, and a larger number will be completed and put into service by the end of this decade, even if the MTA's longer-term rail plans do not materialize. Jitney-type feeder service to the Metrorail and Metrolink stations would reduce the extent of parking that needs to be provided at those stations. For each auto trip that such service eliminated, it would also eliminate a polluting cold start. A 10-passenger van could potentially eliminate up to 10 cold starts per trip, while substituting the running emissions of a single van for the running emissions of 10 automobiles.

Another important submarket for jitney vans is "reverse commuting." This is an approach to providing jobs for inner-city residents by providing transit that takes them to suburban job sites, rather than attempting to attract worksites to locate in the inner city. Milwaukee's Job-Ride Program was developed by the Wisconsin Department of Transportation for this purpose. WDOT provides several hundred thousand dollars per year to a set of grantees (such as the Milwaukee Urban League and Goodwill Industries) who operate small fleets of vans for reverse commutes. Riders are charged $1–2 per trip, and employers often contribute to the fare; WDOT covers the remainder of the costs. Similar reverse-commute programs are operational in Baltimore, Chicago and Philadelphia, and the federal government now offers funds to start similar programs via the Mobility for Work measure authored by Sen. Bill Bradley (D., N.J.).

In addition, the Clinton administration's Empowerment Zones/Enterprise Communities Initiative encourages small-scale neighborhood transportation initiatives to enhance the mobility of residents and stimulate commercial redevelopment and neighborhood revitalization. Federal agencies, such as the Federal Transit Administration, have been directed to make available funds from existing programs to implement such services. The start-up of neighborhood jitney services and reverse-commute programs would be an obvious candidate, offering both increased mobility and new job opportunities.

Most existing jitney service, unlike the new reverse-commute programs, is unsubsidized. A market exists for entrepreneurial owner/drivers to provide useful mass transit to lower-income communities, if public policy permits and encourages such market entry. Jitney service could be an important component of the spectrum of van-based transit alternatives for Los Angeles.

2. Subscription Services

The scheduled commuter van service described in Section V is essentially a commercial vanpool. Because it would utilize a paid driver, its operating costs would be somewhat higher than the traditional employer-based vanpool, in which the driver is one of the commuters, and is allowed personal use of the van in exchange for taking on the driving duties. Employer-based vanpools play an important role, but their use is limited to large firms and office parks, for which there are large enough

clusters of employees in various residential areas to make it feasible to establish pickup routes of reasonable times and distances.

For commuter van service to be available to the large majority of employees who work for small and medium-size firms, it must move beyond the corporate-vanpool model. With economic incentives for SOV drivers to seek alternatives (due to parking pricing and later, congestion pricing) and the ability of vans to save significantly on line-haul time via access to HOV or HOT lanes, a commercial commuter-van market would emerge. By pooling employees from several nearby firms who live in the same neighborhood, the commercial van service would be able to optimize pickup and delivery routes so that they do not take up excessive trip time.

The potential viability of such service is illustrated by the willingness of the second-largest airport shuttle company in Los Angeles to experiment with this market. Robert Cervero reports that Prime Time in 1991 operated an unsubsidized commuter van service from Pasadena to downtown Los Angeles. Company officials told Cervero that the service came close to breaking even—and this without any new policy incentives such as parking pricing or HOV lanes. Prime Time also had negotiated with the downtown Los Angeles Transportation Management Association to operate a subscription van service from the San Fernando Valley to downtown Los Angeles, on a contractual basis, but this plan was aborted by the dissolution of the TMA in 1992. Prime Time has also held discussions with the Warner Center TMA in the Valley about similar services. And the Burbank Media District TMA is exploring a commuter shuttle service to be contracted to taxicab firms, with costs covered one-third by fares, one-third by the employer, and one-third by the TMA from grant funds.

Serving large employment centers like Warner Center, Westwood, and the Burbank Media District helps to improve the economics of a commuter-van service, by reducing it from a many-to-many operation to a many-to-one type of service. Another way to do this is by making use of transfer hubs. Just as airlines can offer significantly more service to low-traffic points by creating a hub-and-spoke system, so could commuter van companies increase the likelihood of matching groups of people living near one another with groups of workplaces that are close to one another by making use of transfer hubs. By making it possible to carry more passengers on each trip, but without unduly lengthening the time or distance needed on the pickup or dropoff portion, hubbing could lower the cost of van service that still offered reasonably competitive trip times.

A potential problem for commuter van companies is what to do with the vans and drivers in between the morning and afternoon rush hours. While airport shuttle services also have peak periods, they are less pronounced than commuter peaks, and airports also have significant mid-day traffic. Hence, more airport vans can be used throughout the day.

This dilemma may actually help to solve some of an urban area's other trip-reduction goals. Once commuter-van services exist, with an investment in vans and drivers, they will have strong incentives to develop other transportation markets in which to use those resources during non-commute periods. Employees using a van to commute will lack a car for lunch-time travel: for meals, shopping, etc. Dial-a-ride and/or scheduled shuttle services from work sites to retail locations would be one such niche market. In addition, many of these vans and drivers could be used to provide expanded dial-a-ride services for people not requiring wheelchair compatible vans. Indeed, it may be that firms now operating dial-a-ride services would be more plausible candidates to launch commuter van services than existing airport shuttle firms, since the latter's vehicles are already most heavily in demand during rush hours, while the former's are not.

Another approach, used today by many airport shuttle firms, is for the van company to make use of owner/drivers rather than employees. Under this approach, the owner/driver typically works both peak periods and then uses the van for personal purposes during the in-between hours. Currently this approach is not legally sanctioned by the PUC, but is reportedly widespread among the smaller van companies, because it lowers their cost of operation. It would probably help significantly to improve the economic prospects for commercial commuter-van service.

3. On-demand Service

The high end of the van transit industry will be on-demand service, an evolution of today's dial-a-ride business. The original "paratransit" concept was that of a diverse industry of private providers serving many markets, from subsidized service for the elderly and handicapped to premium service for executives and everything in between. Over time, both "paratransit" and "dial-a-ride" have come to mean simply the subsidized services, but there is no reason why that need remain the case.

It seems likely that most providers of scheduled, subscription commuter van service would make use of: 1) high-tech vehicle tracking and navigation systems, mostly satellite-based such as GPS, as these continue to decline in price and increase in availability; and 2) computerized dispatching systems, to optimize pickup and dropoff routing. These technologies hold the potential of converting the many-to-many problem to a few-to-few situation, by identifying groups of riders who both live near each other and work reasonably close together.

Given these technological capabilities, the firms would already have in place the ability to offer on-demand service, both during rush hours (as a higher-priced service) and to make productive use of vans and drivers during non-peak hours by serving various niche markets. Firms that have already made the investment in equipment to serve the scheduled commuter market may find that pricing off-peak services to cover their marginal costs (driver plus direct van operating costs) is better than not making use of that equipment during those hours.

B.The Smart Shuttle Transit Proposal

In August 1993 UCLA's Urban Innovations Group (UIG), as part of a study for the Southern California Association of Governments, developed the concept of Smart Shuttle Transit. Beginning with the requirement to achieve 19 percent transit mode share by 2010 in the greater Los Angeles area, UIG concluded that current rail and bus transit plans would fall significantly short. Specifically, currently planned transit systems would likely attract only 0.7 million daily home-to-work trips in 2010, compared with the needed 2.3 million trips. The remaining 1.6 million trips would require a more ubiquitous and demand-responsive (i.e., more auto-like) form of transit.

This need led UIG to propose a system of 30,000 to 60,000 Smart Shuttles as a third tier of transit, complementing rail and bus. The SST vehicles would have capacities of four to eight passengers, and UIG calculated that an average vehicle occupancy of three would achieve the required transit ridership levels. Two key factors were identified by UIG as necessary to make the SST approach work: a large-scale HOV-lane network to give the shuttles a speed advantage and advanced, high-tech tracking and dispatch systems to optimize the routing of each vehicle.

UIG's report makes several assumptions that deserve further study. For one thing, it envisions shuttle-type vehicles eventually displacing route buses, but assumes that rail transit will continue to be developed as the transit system's backbone (along with express buses). In view of the much higher capital and operating costs of rail (necessitating 100 percent subsidized construction and heavily subsidized operations), this continued reliance on rail appears misplaced. Express buses on freeway

HOV lanes can provide more flexible high-capacity line-haul transit at much lower cost than rail; such service is the basis of successful transit systems in Houston and Ottawa.

Secondly, UIG always refers to the shuttles as demand-responsive, which implies real-time dispatching and ride-matching on an ongoing basis. There will certainly be some demand for this type of commuter (and non-commuter) shuttle service, but this will inevitably be the most costly form of shuttle. A company offering many-to-many on-demand service must cope with the challenge of matching enough riders whose origins are close together *and* whose destinations are also close together, and doing this at a moment's notice, every hour of the day. It would be less costly to market commuter service on a subscription basis, so that each company could plan its trips and ride-matching in advance, making only marginal changes from day to day as new subscribers are added and others drop or alter their planned schedules.

In its latest (February 1994) report, UIG defines three separate types of Smart Shuttle service. The Transit Feeder is a many-to-one service, analogous to New York's feeder van jitney services. UIG estimates a market size of 500 to 1,500 vehicles for this application. The second service is called Center Feeder, a few-to-one service bringing commuters to large worksites such as Warner Center. Between 5,000 and 15,000 vans are estimated for this type of shuttle service. The largest category is dubbed High Occupancy Taxi, a many-to-many service requiring 25,000 to 50,000 vans.

C.Potential Providers in Los Angeles

Los Angeles already possesses a sizeable private transit industry, though few policymakers have focused much attention on it. The industry includes airport shuttles, taxi fleets, dial-a-ride services, and vanpools. In addition, were local entry regulations lifted, numerous cars and vans owned by individuals could be pressed into service as for-hire transit vehicles.

1. Airport Shuttles

The airport shuttle business in Los Angeles is highly competitive. As noted earlier, as of 1991 there were 38 van companies in the market, with most of them serving most of the major airports. As more firms enter the market, the pioneer and still market leader, SuperShuttle, has gradually lost market share. From a peak of 200 vans in Los Angeles in 1989, by 1993 the company had cut back to 150 vans. Second-ranked PrimeTime has increased its fleet each year, to the 1993 level of 130. Altogether, LAX lists 799 commercial shuttle vans in service as of 1994. Since LAX represents 73 percent of the region's airline passengers, the total airport van industry is likely to be in excess of 1,000 vehicles.

2. Taxicabs

Nine taxicab firms are licensed to do business in the city of Los Angeles. As of 1993, they operated 1,294 vehicles, most of which are autos and station wagons, though a small number are minivans. City regulations restrict these firms to operate within city limits; i.e., they may not cross city boundary lines. Moreover, they may not pick up passengers outside their individual service area, based on one or more council districts, except by telephone order. Thus, the ability of taxi firms to offer commuter service is limited.

No central source of figures on taxicabs licensed elsewhere in Los Angeles County exists, but it is conceivable that the rest of the taxi fleet constitutes at least 50 percent of that licensed to serve the city. That would put the total taxi fleet in excess of 1,900 vehicles.

3. Dial-a-Ride/Paratransit Services

Some 187 public and nonprofit agencies in Los Angeles County currently provide some 3,673 paratransit vehicles, principally to serve the elderly and handicapped. Of these services, 103 are private, nonprofit and 84 are public agencies. The large majority of public agencies contract with commercial operators to provide the vehicles and operators, usually specialized transit firms or taxicab companies. Nonprofit organizations also use contractors for the majority of service. Overall, contractors provide 2,806 of the autos, vans, and buses used for these services.

4. Vanpools

One type of commuter shuttle service already exists in Los Angeles: vanpools. Several public agencies sponsor Commuter Transportation Services, a nonprofit corporation that provides ride-matching services to individuals, companies, and transportation management associations (TMAs) on a regional basis throughout the five-county region. As of the end of 1993, CTS monitored over 2,000 vanpools in the region. In FY 1992, it helped to form 594 vanpools; the corresponding figure for FY 1993 was 327. Because vanpools frequently form and dissolve, and CTS does not publish annual vanpool totals, it is difficult to discern overall trends in vanpool usage.

While some large companies purchase and operate their own vans, it is more typical for employers and TMAs to contract with a commercial vanpool service firm, which provides the van, insurance, maintenance, and assistance with vanpool formation and operation. The largest of these firms is VPSI, which operates 980 vans in the LAMTA service area. Among VPSI's largest customers are the TMAs in Warner Center and Irvine Spectrum, two large office parks.

Vanpools offer many-to-one service, bringing commuters from a number of residences to a single employment location. Because they make use of a volunteer driver, their operating costs per vehicle-mile are lower than airport shuttle services. However, because the van is used only during commute hours, and only for one daily round-trip, the capital costs of the van must be spread over a much smaller number of trips than in commercial van services. Also, because vanpools attempt to fill all the seats in 8- or 15-passenger vans, they must make many more stops at the residential ends of their trips, which lengthens the door-to-door trip time.

VII.BENEFITS OF VAN-BASED TRANSIT

The benefits of having a large and diverse van-transit industry in Los Angeles would be many: improved air quality, new jobs, and new markets for high-tech vehicles and systems.

A.Meeting Air Quality Goals

The need to comply with Clean Air Act requirements has led to a Regional Mobility Plan for greater Los Angeles that is premised on achieving a 19 percent share of the home-to-work commuter market for transit by 2010. It has become obvious to most transportation planners that this goal is simply not achievable via the current rail- and bus-oriented transportation plans. In a metro area with the low densities and spacial dispersion of employment sites characteristic of Los Angeles (and most other metro areas which evolved after the development of the automobile), fixed-route transit is suitable for only a small share of all commute trips.

Door-to-door commuter service provided by a variety of van-based alternatives—jitney, scheduled, and on-demand—is a highly cost-effective alternative for increasing transit's mode share. Vans offer more of the service features that commuters want, features which today lead most of them to choose to drive alone: speed, a guaranteed seat, minimal waiting time, no mode changes.

And most commuter van services appear to be commercially attractive, if transportation policy is supportive (see Section VIII). Thus, large taxpayer outlays should not be required to realize this new form of commuter service.

The airport shuttle industry is already responsible for reducing 84 tons of auto emissions per year, by substituting higher-occupancy van trips for lower-occupancy auto trips. A large-scale commuter van industry would dramatically increase these benefits.

B.Job Creation

The UIG study calculated that up to 66,500 shuttle vans would be needed to achieve the transit mode-share requirement by 2010. If each van required only one driver, that alone would mean the creation of 66,500 jobs in the region. But a van service also requires dispatchers, administrative and management staff, and mechanics. UIG estimated the total job creation at 1.1 persons per vehicle, leading to a maximum estimate of 73,150.

Data from SuperShuttle and Prime Time indicate that the employment effect might be larger than this. The former, with 200 vans in the region, has about 650 employees serving the South Coast. That works out to 3.25 employees per van. Prime Time's 290 employees and 130 vans works out to 2.23 employees per van. Both firms operate seven days per week, with two shifts per day most of the week. Commuter van service would be principally five days per week, with either overtime or part-time drivers used to cover the longer-than-eight-hour time from the beginning of the morning peak to the end of the afternoon peak. Thus, the total number of employees per van would be significantly lower than for the airport shuttles. Nonetheless, these comparisons suggest that UIG's 1.1/van estimate is probably on the low end. If a 66,500 commuter van industry does emerge, it is likely to have upwards of 100,000 employees.

C.Market for Alternative-Fuel Vehicles

If a 66,500-vehicle van transit industry comes into being in Southern California, it will create a potential market for alternative fuel vehicles (AFVs). While the California Air Resources Board vehicle emission regulations set forth percentage sales requirements for low, ultra-low, and zero-emission vehicles beginning with 1997, barriers to customer acceptance make it difficult to predict how many such vehicles will actually be purchased by consumers. One of the most significant barriers is the supporting infrastructure requirements (e.g., to refuel with LNG, CNG, ethanol, etc. or to recharge electric vehicle batteries).

Fleet operators can more readily transition to such vehicles (assuming that their basic economics make sense), because such operators typically maintain centralized servicing facilities where the required alternative infrastructure can be located. Federal Express and UPS are already testing AFVs in their Southern California fleets. Again, assuming that the economics of such vehicles are attractive, transit shuttle fleet operators could be among the early quantity purchasers of AFVs, thereby helping to achieve CARB's quantitative goals.

D.Market for High-Tech Systems

A number of aerospace/defense/electronics firms in California are seeking new markets in the surface transportation field. A 66,500-vehicle van-transit industry would create a market for several types of systems which these firms are producing or plan to produce. As noted earlier, most commuter shuttle services would rely on real-time vehicle tracking, so as to be able to assign the closest vehicle to each pickup. This requires both a system such as GPS, with transceivers in each vehicle, and a computerized

dispatching system for each firm. In addition, implementation of HOT lanes on freeways would require the use of automatic vehicle identification/electronic toll collection (AVI/ETC) systems. These include computers to maintain account balances and valid account numbers, two-way communications systems between roadside (or overhead) transceivers and vehicles, and vehicle-mounted tags or smart-card readers.

E.Speed of Implementation

Another advantage of a van-based transit system is that it can be implemented rather quickly. Unlike buses and rail cars, vans are mass-produced vehicles that can be ordered off-the-shelf with very short lead times. GPS tracking systems, computerized dispatch systems, and AVI/ETC systems are all on the market today, and do not require years of development and testing. To be sure, the technologies in these areas continues to evolve, and what is available in 1998 will most likely be superior to what is on the market in 1994. But the point is that it is not necessary to wait for technological developments in order to begin creating a van-transit industry.

What is not yet in place are the public policies that will permit commuter vans to be competitive with driving alone. But once such policies are in place, especially the HOV network, thousands of vans could be in service within the first year. This is in marked contrast to major expansions of bus service or especially major rail projects.

VIII.POLICIES NEEDED FOR SUCCESS

Four public policies are critical for the creation of a large commuter shuttle industry. First, entry into the van transportation business must be deregulated, so that entrepreneurs are encouraged to try new ways of meeting transportation needs. Second, the regionwide network of HOV lanes must be completed as soon as possible, so that commuter vans can offer a speed and time advantage. Third, market pricing must be applied to work-site parking, and later to freeway use, to level the playing field between driving alone and choosing other modes. And fourth, a commute voucher program should also be created, preferably for all transit services in the region.

A.Deregulation

As transportation analyst Robert Cervero has noted, "there is no compelling reason why market entry, price, and vehicle-occupancy restrictions should be placed on taxi, paratransit, and private bus operators." Cervero itemizes the local, state, and federal regulatory barriers to opening up the market to diverse transportation providers, such as those envisioned in this paper and in the UIG study.

1. Local Deregulation

All 88 cities in Los Angeles County have their own separate taxi regulations, which creates a costly, fragmented system ill-suited to countywide provision of commuter transportation. Many, like Los Angeles, limit both the number of vehicles and the territories in which they may operate. Shared-ride taxi services are illegal everywhere in both Los Angeles and Orange Counties, except in downtown Los Angeles and Burbank. Jitneys and flexible-route paratransit are flatly outlawed (except for dial-a-ride vans, which are licensed by the PUC), and most cities require that all fares be distance-metered, rather than permitting flat-rate fares for certain routes (as used by the airport van companies).

Individual cities are unlikely to repeal the bulk of these regulations on entry, pricing, and service in a timely and coordinated fashion. Consequently, a more forceful and coordinated approach is needed. The Southern California Association of Governments (SCAG), fulfilling its federal and state

congestion-management responsibilities, could: 1) create a model jitney ordinance, opening local markets to jitney-type service, and urge member governments to enact it; and 2) press for state legislation to create a new category of regional commuter van service not subject to local taxi/jitney regulations.

2. State Deregulation

Ten years ago the airport van industry did not exist, and the barriers to its creation appeared formidable. Local taxi/jitney regulations and restrictive state PUC regulation appeared to be nearly insuperable barriers. However, an enlightened PUC relaxed its standards for newcomers to have to prove the "need" for a new service, in the particular case of airport ground access. By making it relatively easy to get a state PUC certificate, this agency made the airport shuttle van industry possible.

The PUC appears to possess the discretionary power to repeat this achievement in bringing a commuter van industry into existence. Had airport shuttle firms sought to define themselves as a new type of shared-ride taxi, they would have run afoul of the 88 local taxicab laws within Los Angeles County. But by defining themselves as something entirely new, and receiving the blessing of the PUC, they, in effect, made an end-run around the local ordinances.

Scheduled commuter van services are not taxis; they are a new category of transportation that does not currently exist. If the PUC recognized them as such, and created relatively open licensing provisions, this new industry could essentially bypass the local taxicab regulations (as has occurred with airport van services). *On-demand* commuter (and other) vans are essentially an expansion of the dial-a-ride services already in existence and licensed by the PUC. If such a regulatory policy were strongly argued for by SCAG, and supported by the South Coast's state legislators, the odds of favorable PUC action would be increased.

If the PUC takes this kind of deregulatory approach, it should seriously consider permitting the use of owner/drivers in the new commuter-van industry, for the reasons outlined in Section VI.

3. Federal Deregulation

There do not appear to be any significant federal barriers to the creation of a commuter van industry. Cervero cites the labor protection provision of the Urban Mass Transportation Act, Section 13(c) as a possible barrier. But that provision is intended to protect current jobs of public transit employees from being eliminated by any programs that involve federal grant funds.

First, simply permitting private firms to open up a brand-new transit market, aiming to triple or quadruple total transit mode share, does not threaten the jobs of existing MTA employees. Second, federal transit funds would not be needed to bring this new industry into being. Creation of the needed HOV lanes is being carried out in any case, and those lanes will be available for use by all qualifying vehicles. If a commute voucher program is created, it could be funded from a number of possible sources, including local transportation sales tax revenues, revenues from congestion pricing, or revenues from other proposed market-based transportation control measures, rather than from federal transit funds.

B.HOV Lanes

As of 1993, the greater Los Angeles area had some 173 miles of high-occupancy vehicle lanes in operation on its freeway system. Though Los Angeles County has been slower than some of its neighbors in implementing HOV lanes, as of early 1994 the MTA reports it had 29 miles in place, 85

miles under construction, and another 68 miles in the design phase. Caltrans' goal is to provide HOV lanes on every freeway in the region within the next decade, and its plans call for adding 222 additional miles, much of this elevated. If all of these plans are funded and implemented, Los Angeles County alone would have 404 miles of HOV lane in place.

However, the projected cost of $6.2 billion and funding uncertainties threaten the plan's timely completion. The principal source of funding is the local transportation sales tax revenues from Proposition C. However, a major share of these funds is planned for use on continuing to expand the LAMTA rail transit system.

In their paper proposing a modification to the HOV concept, economists Gordon Fielding and Daniel Klein demonstrate that the surface-level HOV lanes would be financially feasible for the private sector to develop and operate using the revenues from congestion tolls. If policymakers were willing to shift from the conventional HOV concept to the high occupancy/toll (HOT) approach, paying vehicles with one or two occupants would be permitted to use these express lanes, while vehicles with three or more occupants (including shuttle vans) would have access at no charge.

The analysis in Section V of this paper shows that the emergence of a large-scale commuter van industry depends critically on the availability of express lanes on freeways, to provide the line-haul time savings needed to offset pickup and dropoff times. Accelerating the HOV/HOT lane program should be a top priority.

C.Parking and Congestion Pricing

A level playing field for commuter van transit also requires that automobile drivers realize and pay the full cost of their chosen mode. Considerable evidence exists that if employers no longer offered parking as a tax-free fringe benefit, and if freeways charged directly for access during rush hours, fewer people would drive alone to work; these commuters would eagerly seek out alternatives that offered lower costs and reasonable trip times, such as commuter van services.

1. Parking Pricing

The impact of parking pricing at workplaces has been studied extensively by UCLA researcher Donald Shoup. In a series of case studies in Los Angeles and Ottawa, Shoup and Willson found that, on average, when the employer paid for parking, 66 percent of employees drove alone, compared with only 39 percent driving alone if employees themselves had to pay.

Because mandating that all employers charge for parking would be akin to imposing a new tax, and would face strong political opposition, Shoup has proposed a more palatable approach: simply require that any employer that offers parking as a paid fringe benefit also offer the employee the cash value. Shoup and Willson estimate that this kind of parking "cash-out" would reduce the number of SOV commuters in Los Angeles by 20 percent, while reducing commuter vehicle miles traveled in Los Angeles by 59 million per year.

The California Legislature passed a modest version of parking cash-out in 1992, AB 2109. It applies only to firms in nonattainment areas, with 50 or more employees, which lease parking spaces from a third party, and which offer these spaces to employees either for free or at less than their lease cost. As of 1993, such firms have been required to offer employees the cash equivalent of their parking subsidy.

Larger-scale parking cash-out appears to be on the horizon. The Clinton administration's "Climate Change Action Plan" includes a parking cash-out provision (although that plan has not yet been

approved by Congress). Furthermore, the EPA's proposed Federal Implementation Plan for air-quality in the Los Angeles region, announced in February 1994, includes parking cash-out for employers of 25 or more people. Under the terms of a federal court order, the final provisions of this plan must be adopted within one year. Parking pricing/cash-out is also among the measures endorsed by SCAG's Market Incentives Task Force, a group of elected officials charged with proposing market-based measures for addressing regional mobility and air quality.

2.Congestion Pricing

The large-scale benefits of congestion pricing on the South Coast's freeway system were first systematically estimated by the Environmental Defense Fund in its 1991 study. That study estimated that regionwide rush-hour pricing (at an average charge of 15 cents/mile) would reduce total VMT by 5 percent and ROG emissions by 8 percent. A subsequent study by economist Ken Small estimated that such a pricing scheme would generate some $3 billion in annual revenues, and proposed a revenue-neutral scheme for using these revenues: 1) to replace a portion of existing transportation taxes; 2) to upgrade transportation facilities; and 3) to offer monthly travel vouchers to all employees.

Congestion pricing has been endorsed by SCAG's Market Incentives Task Force, and has been the subject of a year-long study by the California Air Resources Board (which also examined parking pricing, emission-based registration fees, and increased fuel taxes). The CARB study's computer modeling confirmed EDF's earlier findings about the effectiveness of both congestion and parking pricing. In addition, focus groups conducted as part of the study found that congestion pricing made sense to many people.

Despite these positive signs, actually introducing congestion pricing is considered politically risky; it was not included in the EPA's agenda of policy measures, for example, although parking cash-out was included. For this reason, some transportation analysts have proposed introducing congestion pricing on a gradual, optional basis, on one or more express lanes. This was the genesis of the HOT lane concept. The CARB study found support for this approach in its focus groups, with many people wanting to have the option of paying for a higher-speed trip on certain occasions (e.g., if they are rushing to get to a day-care center before closing time, to avoid paying per-minute late fees). Thus, the HOT lane concept may be the most promising way to introduce congestion pricing in the Los Angeles area.

D.Commute Vouchers

The final policy measure that would make shuttle van services more competitive with SOVs is commute vouchers. This would be a form of subsidy, but unlike conventional transit subsidies, it would be provided directly to the user, not to the producer, of transit services. A van company or other provider would only receive the subsidy if it succeeded in attracting a given user to its service.

Certain commuter van markets appear to be commercially viable without subsidy, as long as express-lanes (HOV or HOT) are available and employees are able to receive the cash value of their workplace parking space. Commute vouchers should be considered a stand-by policy, held in reserve if the commuter van market does not develop beyond a few niche markets once these other policies are in place.

How costly would this user-side subsidy be? The $3/day level proposed in Section V compares favorably with other current LAMTA subsidies. The Blue Line requires a subsidy of $11.34 per passenger per day (of which $8.27 is for capital costs and $3.07 is for operating costs); Red Line subsidies are expected to be slightly higher. The Metrolink commuter rail subsidy exceeded $20 per

passenger per day, at least prior to the (possibly temporary) post-earthquake uptick in ridership; even if the long-term effect is to double Metrolink ridership, the daily subsidy would still exceed $10.

The $3/day commute voucher would cost about $280 million per year if it were used by commuters riding six to a van, making use of approximately 65,000 vans, as estimated by UIG ($60/rider/month x 6 riders/van x 65,000 vans). That is an extremely modest sum to facilitate an expansion of transit mode share from its current 4.5 percent to the 19 percent forecast by UIG.

As this report went to press, Honolulu planners were drafting a measure to provide for a $25/month commute voucher in that city.

IX.CONCLUSION

Reducing today's (and tomorrow's) high traffic congestion and complying with stringent air quality requirements requires that we improve the efficiency of our urban transportation systems, especially in the nation's most severe nonattainment areas, such as greater Los Angeles. Conventional transit is not cost-effective for this purpose, for two reasons. First, the polycentric nature of Southern California and many other urban areas means that the majority of all work trips go from one suburb to another. The extremely high cost of rail makes it impossible to build enough rail lines to be attractive to more than a few percent of the work force. That means that for the vast majority of people, a transit trip would require multiple modes and waiting times, which extensive research has found to be unacceptable to most commuters.

Door-to-door service can be provided on a commercial basis in a variety of ways, at different prices and with an array of levels of service and speed, by making use of van-type vehicles. Several public policies are critical to the development of what could be a large market, capturing between 10 and 20 percent of all worktrips by the first decade of the next century. Providing high-speed express lanes on all the freeways, requiring employers to offer the cash value of workplace parking, and introducing congestion pricing on the freeways would dramatically improve the prospects for a commuter-van industry to emerge. A modest user-side subsidy program would further improve the economic attractiveness of commuter van transit.

Public policies aimed at creating a large shuttle van industry would cost far less and produce far greater use of transit than continuation of large-scale rail programs.

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