Chapter VIII

Consideration of Possible Types of Actions To Achieve Increases in Transit Ridership and Decreases in Energy Consumption

Chapters VII and VIII present the relationship between transit and energy conditions. Chapter VII approached the relationship by analyzing the effect on transit of energy conditions. This chapter examines how energy can be saved through increased transit ridership resulting from various transit and auto restraint actions. Several transit incentives and auto restraint actions have been analyzed to determine their effect on ridership and energy consumption.

The following chapter incorporates the findings of the previous four chapters and compares the national impacts of the economic and energy futures as well as the transit incentive and autorestraint actions.

The next chapter examines the experience of metropolitan area during recessions and energy shortages, and the ability of the transit systems to respond to the changes in ridership induced by these conditions.

The final chapter presents policy issues and possible initiatives to deal with the points raised in the first 10 chapters.

INTRODUCTION

Up to this point the question of how best to achieve oil conservation in relation to transit has been largely ignored. In Chapter III it was shown that a pure transit-oriented strategy would be one of the least effective ways of conserving oil. Auto-oriented strategies are most effective. Yet it was noted that if substantial decreases in auto use result, then transit must be improved to provide at least a partial substitute for this travel demand.

It was also noted that although transit incentives alone may have only limited effectiveness on energy conservation, in combination with auto disincentives, they could have significant impacts.

In light of these conclusions subsequent analysis has shown that substantial cutbacks in oil consumption can have major effects on transit ridership. The levels of oil-consumption cutbacks that have been analyzed could be achieved through a variety of mechanisms or combinations of mechanisms that have been debated in public policy discussions over the last year: restrictions in oil imports, taxes on imports, rationing, taxes on wholesale or retail sales, and perhaps other means. The cutback levels might also result from future embargos. As noted previously it has not been the purpose of this study to analyze or evaluate any of these mechanisms. However, it does seem appropriate to evaluate the effectiveness of mechanisms that have a direct relationship to transit. These include actions that can be taken to attract riders to transit as well as actions that discourage auto use in areas where transit service can provide an alternative. Specifically excluded from this “evaluation are actions aimed at discouraging auto ownership, auto use in rural areas, truck use, and measures to increase fuel economy.

This chapter will categorize and summarize a variety of actions that can be taken and the present state of knowledge or experience in the application of these actions. These actions will be dealt with under the following headings:

- Transit Fare Reduction
- Tax Incentives
- Transit and Traffic Management
- Transit Service Improvements
- Transit Capital Improvements
- Auto Restraint
- Land Use Controls
- Marketing
- Staggering Work Hours
- New Technology

More detailed documentation is provided in Appendix D, Also in this chapter are rough estimates of the effect on transit ridership and automobile energy consumption of major transit incentive and auto restraint actions which can be implemented on a national scale. These estimates were made by first estimating changes in the time and cost of auto and transit travel for an action and then applying a forecasting technique based on empirical studies of the responses of travelers to such changes.

This technique and its applications are documented in Appendix A.

In the next chapter some alternative combinations of these actions will be evaluated, in approximate terms, as to their impacts on transit ridership, the transit industry, related industries and energy consumption~all in comparison with the effects of the alternative assumptions regarding future economic and energy conditions defined in Chapter IV and assessed in Chapter VII.

TRANSIT FARE REDUCTION

Reduced Fare

Fare reductions in numerous American and European cities have nearly always resulted in ridership increases, but to a lesser degree than would be anticipated with a free fare policy. The most conclusive data thus far presented is the Atlanta experience where reduction in fares from 40 cents to 15 cents increased ridership by roughly 28 percent. Experiences in other cities such as San Diego and Los Angeles where fares were reduced to a flat 25cents rate produced ridership increases of approximately 22 percent.

A pooling of experience from fare changes in a large number of cities has indicated that a fare change of 1 percent causes a ridership change of .33 percent. However, most of the experience used in developing this relationship consisted of small fare changes and would tend to underestimate the effect of large fare reductions. For example, applying the .33 percent figure would have underestimated the ridership increase due to the fare reduction in Atlanta.

It should be noted that holding fares at a constant current dollar level actually represents a fare decrease in real terms as the price of other goods and services increase relative to transit.

Assuming an 8-10 percent rate of inflation, holding fares at a constant level in current dollars could cause a ridership increase of 15-20 percent by 1980.

A desirable feature of generating ridership increases through fare reductions is that proportionally larger increases occur in the off-peak period when there is substantial excess capacity. For example, a major fare reduction in Atlanta from 40cents to 15cents, along with service improvements, caused a 19 percent increase in system ridership from 6:00 a.m. to 9:00 a.m. on weekdays as compared with a 37 percent increase from 9:00 a.m. to 3:00 p.m. on weekdays and a 79 percent increase on Sundays. Thus, it is estimated that the size of the transit fleet could be increased by less than 10 percent to 1980 and still accommodate the 15-20 percent ridership increase without noticeable deterioration in the quality of transit service, However, despite the favorable impact on the "peak-to-base" ridership ratio, it should be noted that holding the transit fare constant in current dollars implies a significant increase in transit subsidies. In rough terms, holding the transit fare at a constant level while operating expenses increase at more than 10 percent/year (a very conservative assumption based on past experience) will require all of the UMTA Formula Grant Funds with 50 percent local matching, without allowing any funds for service improvements.

In considering the energy implications of holding transit fares at a constant dollar level, it should be noted that without complementary auto restraints less than 50 percent of the riders attracted to transit by fare reductions would have otherwise been automobile drivers.

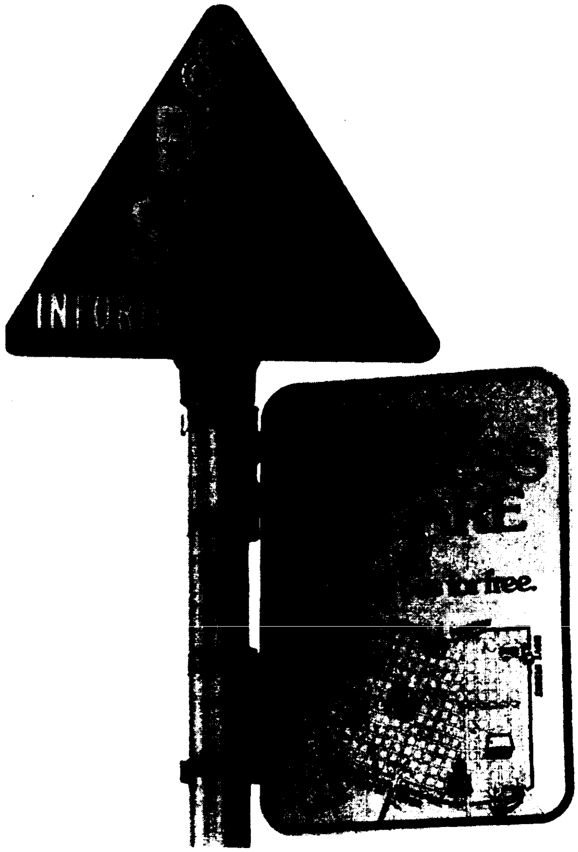
Auto driver diversion estimates range from 28 percent of new riders for a no-fare zone in Dayton, Ohio to 42 percent of the new riders in Atlanta,Ga.

No Fare Transit

As noted in the previous section, past experience has indicated that a 1 percent change in transit fare causes a .33 percent change in transit ridership. However, this relationship should be viewed as accurate only for small fare changes—it will underestimate the effect of large fare changes. The rough analysis presented in Appendix A suggests that 40-60 percent increases in transit ridership may be anticipated by eliminating the out-of-pocket cost of transit travel—rather than the 33 percent increase implied by past experience with small fare changes.

In addition to the effect of eliminating the out-of-pocket expense of a transit trip, system service to users would be further improved by eliminating the time and inconvenience associated with fare collection.

Man running coinage collection through counting equipment



Fareless Square sign

As with constant fare in current dollars, the effect of fare transit will be proportionally greater in the off-peak period. However, despite the larger growth in off-peak period, a significant expansion in the size of the transit fleet—roughly 30-50 percent—will be required to handle the increase in ridership associated with transit.

No fare transit would reduce per passenger operating costs and promote more efficient use of manpower and equipment, because: (I) a greater percentage of riders would be in the off-peak, and (2) riders would board buses faster.

As discussed in Appendix A. The increase in the fleet size will promote an additional ridership increase by improving the frequency of transit service. The net effect of no-fare transit and the related service improvements is estimated to be a 60-80 percent increase in transit ridership.

The number of auto driver trips eliminated per transit rider attracted with no-fare transit will be even lower than with smaller fare reductions. This is because no-fare transit would attract more short trips which would otherwise be walking trips,

Prepaid Pass and Discounts

Currently, no conclusive evidence exists as to the effect of prepaid fare. In the past, the implementation of prepaid fare programs has always been accompanied by fare reductions and service improvements and it is difficult to separate out the specific effect of prepayment. However, it is unlikely that the specific impact of prepayment would yield more than a 3 percent increase in ridership.

Tax Incentives

Several transit experts have suggested that transit fare deductions from Federal, State, and local income taxes, combined with the elimination of the standard deduction for gasoline taxes, could provide a positive inducement for increasing transit ridership. This deduction could be primarily aimed at middle-income taxpayers who currently use their automobile for work trips that could otherwise be made by transit. A direct transit fare rebate could be granted to the transit dependent and all income groups who do not itemize deductions or file income taxes. The upper limit for such a rebate might be based on existing fare levels in each locality. For example, assuming 260 work days per year at a 35-cent fare level, the maximum transit rebate might be $182.00. The effect of such a policy on transit ridership is difficult to determine without any empirical experience, but it seems reasonable to assume that it would have less effect than actual free-fare transit for those to whom it applied because the association between the actual transit trip and the tax rebate would be much less clear than a no-fare policy. It also has difficulties of enforceability. If the tax rebate policy were applied to about one half the working population, and if the policy had about one-half the effectiveness of a free-fare policy then it would have about one quarter as much effect on transit trips made for work purposes. Since work trips are about half of all transit trips, the overall effect would be about one-eighth as effective as free transit, i.e., it would result in a national transit ridership increase of about 4 to 9 percent.

TRANSIT AND TRAFFIC MANAGEMENT

Priority Transit Lanes

Granting transit vehicles priority over other vehicles on existing facilities covers a range of actions such as: (I) reserving an arterial street traffic lane for buses, (2) reserving one or more freeway lanes either in the normal direction of traffic flow or contra-flow, a reserved lane that would normally serve light traffic in the opposite direction, and (3) preferential treatment for transit vehicles at freeway access points. Over 200 bus priority treatments have been implemented or proposed in the United States and elsewhere during the past decade. The results of these experiments have generally shown that priority transit lanes have a high potential for increasing transit ridership and diverting auto users to transit at relatively low cost, but in order to realize this potential, careful planning, implementation, and operation must be conducted over a sustained period. Specifically, past experiments have demonstrated that priority treatments can:

- Create time savings to transit passengers equal to or in excess of those achieved by rail transit improvements, but sometimes at the expense of auto drivers.
- Substantially improve bus service reliability. For example, the Shirley Busway has reduced the fraction of buses arriving more than 6 minutes late in Washington from 67 percent to about 10 percent.
- Assist in the efficient utilization of existing facilities by providing substantial additional capacity. A single freeway lane can carry between 2,000 and 3,000 persons per hour in automobiles. This lane can carry at least 40,000 persons per hour in buses assuming no stops in the lane. Similarly, a lane on an arterial street can accommodate at most about 1,500 persons per hour by car, but can carry 3,50O more persons per hour by bus. However, in practical terms there are likely to be very few corridors in U.S. cities not already served by rail that would provide over 20,000 riders for more than 500 buses per hour.

In very rough terms the following assumptions and approximations provide an indication of an upper limit to what can practically be achieved nationally with a commuter-oriented bus priority traffic management program.

There are about 30 metropolitan areas in the country with “metropolitan populations of a million or more. With few exceptions it is only in these areas where traffic volumes and employment density are sufficient to warrant the reservation of lanes for buses, In these areas it is generally only feasible to do so on routes which have *6* lanes at present or 4-lane arterials which could be widened without great difficulty to provide a bus lane. Inspection of maps and traffic data for representative metropolitan areas indicates that roughly five routes of an average of 5 miles in length might be good candidates for reservation of **a** lane for buses-good candidates in that:

- they have the requisite widths
- have current traffic congestion levels high enough so that bus speeds could be substantially increased,
- are not already well served by rapid transit routes,
- have transit market areas sufficient to potentially generate bus volumes on the order of 100 buses per hour, and

Contra-Flow Bus Lane in Seattle, Washington

- overall bus passenger time savings could be significantly greater than overall auto-user time losses due to reservation of the lane for buses.

To the extent that these assumptions and judgments are reasonable, the conclusion can be reached that a maximum bus priority program could involve about 750 miles of busways nationally, serving perhaps 18,000 daily passengers on each of about 150 routes, or about 2.7 mtllion passengers total per day. An average travel time savings of about IS percent would be a moderate expectation—reducing a typical trip of 25-minutes duration by about 4 minutes; this could be expected to increase national transit ridership by about 2 percent using rough estimates of the impact of time savings on transit ridership as described in Appendix A.

Signalization and Control Systems

Studies have shown that buses spend more time waiting at traffic signals than in picking up and discharging passengers. Similarly, buses operating in mixed traffic on arterials, freeways, and freeway access ramps often suffer substantial delays because of congestion and limited lane capacity. Bus actuated signals, and metering or monitoring traffic control devices are being used to improve the flow of high-occupancy vehicles in these situations, as well as to separate cars from buses in priority lane treatments. Although these devices offer only marginal benefits in terms of affecting transit ridership, they are important to the operational success, especially in terms of time savings, of most transit line haul improvements. They could also contribute substantially to maximizing the utilization of existing facilities. Such measures would be assumed to be used extensively in a program of the magnitude discussed above.

TRANSIT SERVICE IMPROVEMENTS

Fleet Expansion and Conventional Services

Unless transit systems have adequate vehicular capacity and can offer travel times, costs, and services that are attractive relative to the automobile, ridership increases and diversion of auto drivers is unlikely. Many existing systems are constrained from meeting current demand simply by the lack of sufficient rolling stock. For these systems, crowding conditions in the peak periods is a major deterrent to transit use. Good reliable equipment is also an essential component of successful transit development programs aimed at attracting new demand by increasing frequencies and extending routes to new areas. For example, the Seattle "Magic Carpet" program combined metropolitanwide fare reductions and a no-fare CBD zone with fleet expansion and exclusive bus lanes.

Recent EPA reports estimate that in order to achieve a 10 to 20 percent reduction in auto use, existing bus fleets would have to be expanded from 50 to 500 percent, depending on the city and other variables.

Increases in the number of transit vehicles operated can enable ridership increases by allowing more frequent service on existing lines and enabling the development of new lines. While opportunities do exist for increasing the average number of passengers/vehicle, at least in offpeak periods (as noted in the discussion of reduced fare), growth in transit ridership with a fixed supply of rolling stock is ultimately limited by the service deterioration associated with increased crowding in vehicles.

The rate at which the transit vehicle fleet can be increased can be an important determinant of the extent to which various levels of service improvements can be achieved.

The micro-analysis of key suppliers of rolling stock in chapter VI indicated that production could be increased to a rate of 10,000 new units per year during 1976 if the market warranted and if suppliers of key components can improve production as readily as the prime manufacturers. The production rate could continue to be increased in subsequent years. It is not unreasonable to estimate that new buses could be produced at an average rate of 12,000/year from 1975 to 1980 (say 5,000, 8,000, 12,000, 15,000, 16,000, and 16,000 per year for each of the 6 years). Buses currently in service might be retired at a rate of 4,t)()()/year-a reasonable assumption which would result in replacement of about one-twelfth of the current fleet per year. Thus the number of buses that could reasonably be expected to be in operation by ***1980*** would be about l00,000-double" the current fleet.

If the number of vehicles operating at any given time is doubled, the time riders spend waiting would be approximately cut in half. Based on empirical studies of travel behavior described in Appendix A, this could produce ridership increases of **10-25** percent in the peak period and 30-50 percent in the offpeak periods. The larger percentage in the offpeak period is due to the fact that offpeak wait times are considerably longer than peak wait times and thus the impact of halving wait times would be greater in the offpeak period.

The reduction in auto driver trips associated with a 1 percent increase in transit ridership generated through reduced wait times may exceed slightly the reduction in auto driver trips associated with a 1 percent increase in transit ridership generated through a fare reduction, This is because auto drivers are typically paying higher dollar costs per trip than transit users for the speed and convenience of the automobile and thus would be expected to be proportionally more responsive to travel time reductions than to transit fare reductions. Another way of looking at this is that the wait time reductions will tend to be more effective in attracting higher income travelers out of autos. The same number of persons attracted to transit by fare reductions will tend to be made up more from lower income groups on the whole and a slightly lower proportion of these would otherwise be auto drivers—more would have been walkers, auto passengers or would not have made the trip at higher transit fares.

Transit ridership can also be increased by the development of new lines. However, opportunities for realizing significant increases in ridership by expanding conventional service to new lines are limited by the current high density of coverage in most urban areas, Thus, rather than providing service to individuals currently not served by transit, the primary effect of developing new lines is to provide reductions in system access time. A preliminary analysis indicates that these reductions would not provide increases in transit ridership significantly in excess of those which might be generated by increasing the frequency of service on existing lines.

Express and Feeder Bus Systems

Many cities are operating or plan to inaugurate express bus services such as the "Blue Streak" project in Seattle and the "Capital Flyer" in Washington, D.C. These services involve high speed buses between the CBD and outlying areas utilizing urban freeways for the line-haul portion of the trip and local streets for collection and distribution. The residential end of such services usually include park and ride facilities, and in rare cases, feeder bus lines. Most cities have reported significant ridership increases on express bus routes, and as in Portland, Oreg., many new lines are contemplated when additional equipment is available. Express service is a relatively low cost transit improvement which is very popular and can be implemented in the short term if only existing facilities are utilized. Current experience with this type of improvement is summarized below:

- Express bus services supplemented by free or low-cost ~ parking has attracted significant ridership in cities already committed to public transit usage. Ridership increases of from 10 to 30 percent have been reported on individual routes on which express service has been initiated, depending on the quality of the service, fares, and parking fees.
- Express services have also been successful in diverting auto travelers to transit, but the variables associated with reported diversion figures are numerous. Existing demonstrations support the conclusion that over 50 percent of new transit riders may be diverted from automobile on certain routes.
- It is apparent that any large-scale usage of express bus service will require either a good system of free or inexpensive fringe parking or feeder bus services to the express bus route. Feeder services could provide a desirable alternative to park -and-ride/kiss-and-ride facilities which require substantial space and often attract an undesirable amount of traffic. To the extent that feeder bus services can also be made to serve local public transportation needs, especially during the offpeak hours, the financial viability of line-haul access systems could be considerably enhanced.

Special Services

Special transit services include a number of traditional services and more recent innovations which are designed to fill the gap between conventional transit and the private automobile. Demand-actuated systems, referred to as dial-a-bus, are now fairly common, having been initiated in roughly 75 communities across the country. Other "para-transit" modes such as taxis, jitneys, "van-pools," and limousines are also included in this category. These services are primarily aimed at the offpeak, transit-dependent market and the mobility needs of particular user groups. It is now understood that the potential transit market for such services, including existing and latent demand, is quite large. Therefore, increases in transit patronage would be substantial if a nationwide special service program were initiated. In one metropolitan area it was estimated that a 15-percent increase in transit ridership would result from a carefully designed metropolitanwide program of this type.

TRANSIT CAPITAL IMPROVEMENTS

Rail and Fixed Guideways Systems

Three kinds of capital intensive transit improvements of existing technology fall within this category:

- conventional rail rapid transit lines,
- light rail transit, and
- people mover and personal rapid transit systems.

In the short-to-medium term only light rail transit, utilizing inexpensive or existing rights-of-way can be viewed as having a high potential impact on transit ridership because the implementation period of new, fully grade-separated rapid systems is 10 to 20 years. As indicated in a recent transit study of the Portland, Oreg. metropolitan area, in a medium capacity, light rail operation (6,000 to 9,000 one-way riders per hour) could compete successfully in terms of cost and time savings, with a busway system of comparable cost and extent. Light rail technology in both the United States and Europe is at a comparatively advanced stage and could be implemented with good probabilities for high ridership levels in selected situations within 3 to 5 years.

Exclusive Busways

This type of transit improvement requires the construction of a permanent, exclusive right-of-way for buses, which can be part of an existing

E us e Bus and Ca poo anes on Sa F a s o Oak and B dge

highway facility, or an entirely new, separate facility. Busways may involve long segments such as the 8,8-mile Shirley Highway Project, or short on-and-off exclusive bus ramps combined with a mainline bus priority treatment. Like their rapid rail transit counterparts, line-haul busways cannot be viewed as having significant potential short term impacts on ridership despite high capacity and excellent service characteristics. There are not more than a handful of corridors nationally which could generate the high volumes required to justify the high construction costs of new exclusive grade-separated busways. However, exclusive bus ramps on freeways offer good potential short term advantages in terms of both cost effectiveness and ridership impacts in combination with other transit service improvements,

Shelters, Stations, and Park-and-Ride Facilities

Because of their direct effect on the transit patron's perception of service quality and essential role in the efficient operation of all existing and proposed transit systems, these low-cost capital improvements have a high payoff in terms of attracting new riders per dollar of investment. Investments in facilities that will improve the interface between different transit modes such as occurs at airports and CBD terminals, can have significant short term impacts. Shelters at all major local transit stops provide a degree of comfort, an opportunity to provide transit system information and they provide a visual symbol of permanence otherwise lacking with bus transit service. The amount of transit ridership increase that could be attracted by a major program of this type is quite limited, however, by way of comparison with other actions—a 5 percent increase would probably be optimistic.

AUTO RESTRAINT

Pricing Mechanisms

The application of pricing mechanisms such as road-user charges and parking taxes have been widely advocated as a powerful means of restraining the automobile and shifting auto travel to transit modes.

Road-user charges, as considered here, are primarily designed to restrict access to either the CBD or to congested roadways by means of tolls at key entry points, special stickers or licenses, or scanning or metering devices. While all of these systems appear to be sound in theory, no full-scale road pricing demonstration has yet been implemented for the purposes of rationing CBD entry or encouraging transit use. The necessary technology is available, but serious problems remain in the collection of charges, administration, and enforcement. Almost all data concerning the effects of user charges has come from tolls on bridges and tunnels which were implemented to raise revenues, not to control traffic. This data indicates that in areas where alternatives to the automobile are poor, extremely heavy charges would be required to make any impact on auto use. However, if road charges or congestion tolls are accompanied by the expansion of competitive transit services, relatively light charges could result in substantial diversion of auto traffic. Although there is virtually no empirical evidence as to the effectiveness of road-user changes in the form of tolls or other direct charges on CBD entry, the concept is essentially similar to the use of selectively applied gasoline taxes or parking charges, which are dealt with more quantitatively below.

Fuel ***taxes,*** a particular type of road-user charge, can be used as a method of restraining automobile use or conserving fuel as well as a major means for raising revenue to support transit improvements. There has been a great deal of resistance to the use of substantial fuel taxes on the order of 20cents to 40cents per gallon, based largely ***on*** the burden it would cause low and moderate income households who are dependent on automobile transportation for essential travel. This burden could be alleviated by selective tax rebates, as has been seriously proposed in draft legislation. What may not have been clearly recognized, however, is the direct substitutability of transit, particularly if transit is substantially improved, within metropolitan areas. Full rebates of new fuel taxes could be provided within rural areas and small, nonmetropolitan communities where public transit could not be provided at substantial savings in cost and energy consumption, as is the case in metropolitan areas.

In analyzing the effects of gasoline prices on consumption, there are three effects that should be distinguished:

- The short terms effect on the number and length of automobile trips made.
- The long term effect which takes into account the effect of such items as changes in the fuel economy of automobiles and shifts in housing or job location.
- The effect of a shortage of fuel available at a given price—which some have ignored and consequently overestimated the price effect.

Efforts to estimate the effect of price changes on the amount of gasoline consumed suggested short term (3 month) price elasticities of –.07 to –.14 and long term (30 month) price elasticities of –.26 to –,30, Thus, the response to a 10 percent increase in the price of gasoline would be less than a 1.5 percent decrease in gasoline consumption in the first 3 months. However, after 30 months have elapsed, declines of twice that size may be expected. The long term effect is due primarily to the purchase of more fuel-efficient automobiles.

As a result of gasoline prices becoming stabilized at levels considerably higher than those experienced prior to 1973, it is estimated that the average fuel efficiency of the passenger car fIeet will increase from 13.3 mpg in 1974 to 16.5 mpg in 1980.

The annual growth in passenger car vehicle miles of travel will be about 4 percent, which is 1 percent less than the rate observed in the 1969-72 time period, However, despite the 4 percent annual growth in VMT, gasoline consumption wilI increase by less than 1 percent/year, with the increase in VMT aImost compensated for by increased fuel efficiency.

Based on the relationship between VMT and transit ridership developed in the short run regression analysis described in chapter V, at a 4 percent annual growth in VMT, transit ridership will remain roughly constant.

If gasoline prices increase by 50 percent in 1975 and remain constant in real terms thereafter, further increases in fuel efficiency will occur (to more than 18 mpg by 1980) and annual growth in VMT will decline to about 3 percent/year. With this action, transit ridership will increase by 3-5 percent from 1974 to 1980.

***Parking* taxes** in particular have been advocated as a specific means for controlling motor vehicle use. They are relatively easy to administer and require little or no investment.

In considering parking taxes, a distinction must be made between short term and long term parking. Opposition to increases in short term rates by downtown merchants is quite understandable since they compete with suburban merchants who are not affected by proposals to raise CBD parking charges. It is practically infeasible for many reasons to place parking taxes on all suburban parking spaces used for shopping and related purposes. Therefore, serious harm might be done to downtown merchants if substantial short term parking taxes were levied.

On the other hand long term parking taxes in the CBD and in other areas where good quality transit service is available to the commuter would not have the same negative effects, but could have a substantial direct effect on choice of mode for work trips.

Experience has shown that, unless parking taxes are extended to cover those employees who currently park for free in Central Business Districts, the reduction in auto travel to the CBD and corresponding transit ridership increases will be minimal. This is because, in most major metropolitan areas, more than 40 percent of employees currently park for free and it is this group which would be most affected by increased parking charges.

A very rough analysis presented in appendix A was carried out to determine the effect of a $1.50/day increase in the cost of commuter parking in employment areas currently well served by transit.

For a typical SMSA, 20 percent of the total employment might be located in these areas.

Despite the fact that this parking charge would bear upon less than 5 percent of the total SMSA automobile trips, it would have a significant effect on transit ridership-the rough analysis suggests a 15-20 percent increase in total transit ridership.

A disadvantage of this action is that the increase in transit ridership would be concentrated in the peak period, necessitating a 20-30 percent increase in the size of the transit fleet. However, in terms of energy conservation, this action represents a very efficient use of public transit--since more than 80 percent of the new transit riders would otherwise have been automobile drivers.

Regulatory Mechanisms

The concept of regulating parking supply and the use of private automobiles in selected auto-free zones is being experimented with on a worldwide basis. These relatively new auto restraint tools can be effective in promoting transit ridership, depending on their application in specific urban situation.

Parking regulations or regulations that control the supply of available parking capacity can be used to influence the mode of travel to selected parts of a city, if they are aimed at that portion of the parking market which has a reasonable transit alternative, namely commuters. Most metropolitan areas have three types of parking which could be regulated:

- on-street metered parking,
- off-street municipal facilities, and
- off-street private facilities.

Limiting the supply of CBD off-street parking in combination with incentives such as low cost peripheral parking at suburban transit stations might significantly increase transit usage by commuters. However, the most common parking regulations thus far implemented have been to reduce the number of CBD on-street (short term) parking which may have little or no positive effect on transit ridership in most cities. Many practical and political constraints work against the effective, widespread application of parking supply regulations to achieve transit and energy conservation objectives.

Auto-Free Zones can be used to influence the mode of travel to an area, as well as restrict vehicular access, when planned as part of a comprehensive traffic management/transit improvement program. Experience to date indicates that the extent of auto-to-transit diversion depends on many variables such as the size of the zone, transit alternatives, parking facilities and enforcement policies, most of which are peculiar to each auto-free zone application. Almost all existing zones have been implemented either to preserve the environment or eliminate traffic congestion, not as an impetus to public transit. Current data indicates that total tripmaking to such areas does not decrease, and in the case of shopping malls, may result in significant increases.

Land Use Controls

While land use controls, such as zoning to achieve higher densities or to encourage mixed-use cluster development, can have a profound effect on both traffic generation and potential transit ridership, these measures require an extended period of years to achieve results. The potential long term effects of major changes in land use controls are discussed in Chapter XL In the short term, however, municipal standards such as building codes, could be effective immediately to reduce the supply of off-street parking in all new construction in CBD'S and other areas where the alternative of good public transportation service is available.

Marketing

Transit marketing is usually perceived in terms of informational and promotional programs which are designed to attract new riders or increase the frequency of use by existing riders. There is currently little evidence to support the hypothesis that greater marketing efforts alone will result in significantly increased ridership. However, marketing programs are undoubtedly a major factor in favorable public perception of transit systems and might be instrumental in attracting new ridership when used with the introduction of new services and facilities. Under fairly typical current metropolitan circumstances it is doubtful that a major marketing effort could produce transit ridership increases of more than 2 to 4 percent.

Staggered Work Hours

Staggered or flexible work hours is a low cost method for reducing peak hour traffic congestion that could also have marginal benefits for transit ridership. Recent data collected in Ottawa indicates that staggered work hours can slightly alter auto/bus modal split, and can improve the balance between peak hour transit demand and capacity, thus enhancing service quality. Nonetheless, unless staggering of work hours is carefuIly planned in conjunction with transit service adjustments there is a danger that transit ridership will decrease as a result of decreased street and highway congestion. In any event, transit ridership increases due to staggering would probably be limited to no more than about 5 percent.

New Technology

In the short term the application of new technology, as distinct from its development, is the im - portant consideration in relation to transit ridership. Computerized monitoring, routing, scheduling, and dispatching are promising innovations which may greatly increase transit reliability and service.

Summary Assessment of Actions

In this chapter, a variety of transit incentive and auto-restraint actions were described and their effectiveness in increasing transit ridership and decreasing energy consumption was assessed.

Particular actions which could have a major effect on either transit ridership or energy consumption or both include:

- transit fare reductions or no fare transit
- increases in the size of the transit vehicle fleet
- gasoline price increases or reductions in gasoline availability
- increased commuter parking charges.

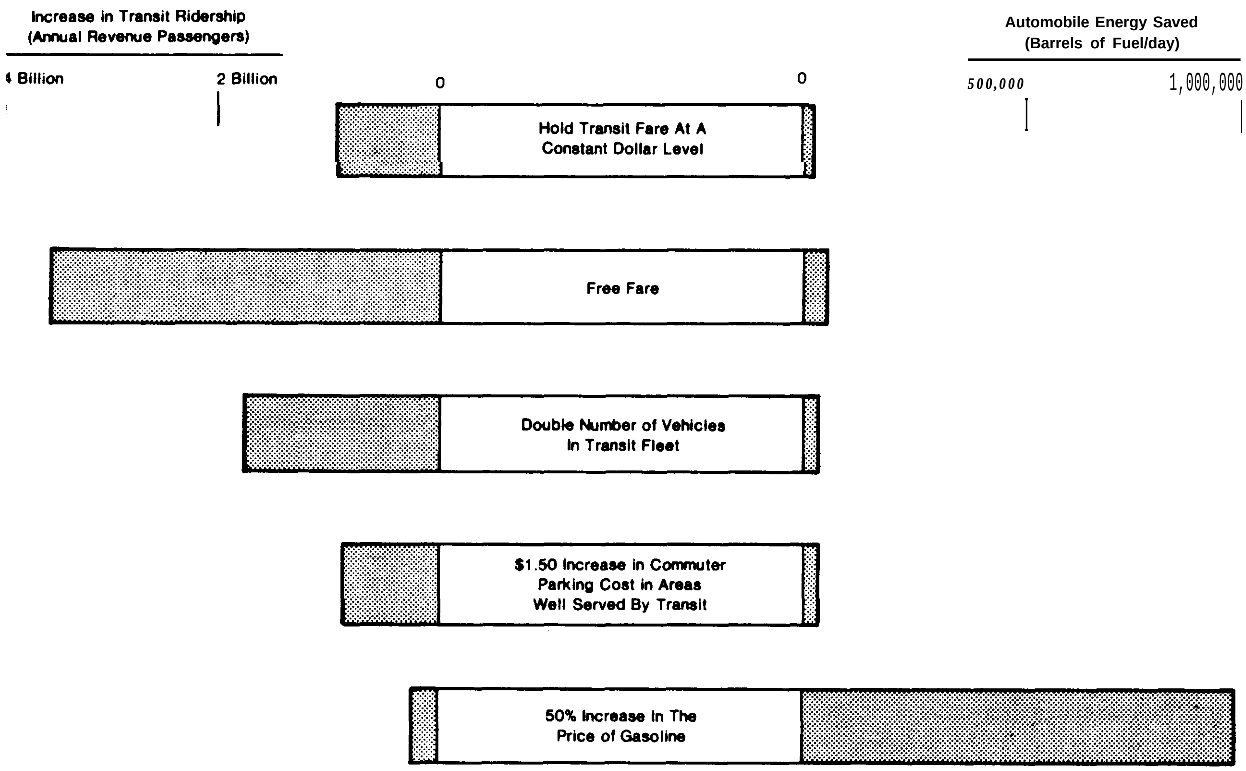
Exclusion of particular actions from this list should not be taken to imply that programs pursuing their implementations are not worthwhile—rather, it implies that, in and of themselves, these actions do not have the potential to significantly affect national transit ridership or energy consumption. A good example of this is the implementation of bus priority lanes. Bus priority lanes provide improved transit service and attract additional riders with very little capital cost. However, rough analysis indicates that an extensive nationwide program of bus priority lanes would increase total transit ridership by less than 5 percent.

For these actions which can significantly affect ridership or energy consumption, assumptions were made regarding levels at which these programs might be implemented on a national basis and rough estimates of their effects were developed. These assumptions and the methods used to make the estimates are described in Appendix A. The results of these analyses are shown in Figure 13,

The energy savings shown in Figure 13 include only motor gasoline saved through a reduction in automobile travel or through increases in the fuel efficiency of automobile engines. To assess the net effect—including energy consumed by transit—it is necessary to form packages of actions in which changes in transit operations associated with transit demand changes can be taken into account. This is done in Chapter IX.

FIGURE 13

EFFECTIVENESS OF TRANSIT INCENTIVE AND AUTO RESTRAINT ACTIONS



source: System Design Concepts, Inc.