Feasibility of Employee Trip Reduction as a Regional Transportation Control Measure

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The passage of the Clean Air Act Amendments of 1990 resulted in the introduction of a number of transportation control measures (TCMs) that are designed to reduce the number of vehicle kilometers traveled in ozone nonattainment regions. Employee trip reduction (ETR) is one of those strategies. A policy analysis of ETR and a preliminary cost comparison of ETR among TCMs are presented. ETR is an evolving TCM and, as such, provides an arena for strategic planning using many tools, including direct political action, classical economics, technological implementation, pricing, and regional consensus building. Thus far ETR has not affected regional vehicle miles traveled, and yet it is premature to say that it has no effect on regional clean air goals. ETR strategies cannot successfully be separated from related mode split component strategies such as transit expansion, transit user subsidy, and parking fees; this synergistic quality complicates freestanding analysis of ETR. Finally, the positive and negative results of ETR indicate that pricing of some sort is the most direct means of securing behavioral change.

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REGULATORY OR MARKET-BASED APPROACH?

One of the most challenging problems surrounding the issue of the growing number of peak-hour regional VKT is the definition of the problem. Is the problem solo drivers, the growing incidence of suburb-to-suburb work trips, the number of nonwork peak-hour trips, or the number of automobiles making a "cold start" each peak period? Is it possible to associate urban sprawl with regional travel costs? How closely can geographical and meteorological attributes be associated with air quality? Each of these concerns plays a part in the ongoing debate on VKT reduction that is taking place in those regions required by the CAAA to reduce VKT. Can ETR reduce VKT? If it can, what are the costs associated with the reduction?

ETR is a regulatory means of reducing peak-hour travel. Vapor recovery at the commercial gasoline pump is an example of a technological approach to achieving clean air, although not through reducing regional miles of travel. The instigation of parking fees at work sites that previously had free parking is an example of a market-based approach. In the present stage of CAAA implementation, data are being gathered to estimate the success of each of these three types of strategies as well as the short- and long-range value of each.

Regulatory Approaches

Regulatory policies can be directed at the source of a problem or funnelled through an intermediary organization or institution. In the case of air quality regulations on stationary sites, the source of a problem is a polluting smokestack. A state or federal agency enforces the law that sets a limit on the quality of the smokestack waste emitted. The regulatory policy, then, is accurately directed at the source of the pollution.

Assuming in the case of automobile emissions that the single-occupancy driver is the problem, efficiency would dictate some type of control on solo drivers. Historically, however, controls of this kind are considered politically infeasible and are consistently rejected by policy makers. If the problem is seen as one related to VKT, whether driven by one or more than one driver, the imposition of limits on the number of kilometers (miles) traveled by private citizens or the assessing of a fee for those kilometers (miles) traveled is again not politically acceptable. An indirect approach such as ETR is followed instead. Indirect policies have three major shortcomings:

1. The placing of an administrative burden on the regulatory agency and the targets of the regulation;
2. Inefficiency, since action and not performance targets are mandated; and
3. Inequity, that is, discrimination can be made between employers in different locations and of different size, and between work and nonwork trips (*1*).

Important in this discussion is an estimate of the costs that ETR imposes on each regulated work site. Studies from southern California, where trip reduction results have been tracked since 1990, offer the most reliable figures on employer costs of trip reduction programs. The mean estimated annual expenditure on implement-

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ing Regulation XV, the southern California clean air regulations, was $31 per employee and the median was $20 per year per employee (*2*). Preliminary reports from the northeastern Illinois ozone nonattainment region show that the local ETR pilot program costs per employee ranged from a low of $5.46/year to a high of $181.65 (*3*). FHWA national averages for trip reduction were $118 per employee per year.

Examining costs may also be done from the standpoint of the cost of reducing single-occupant vehicle trips. According to a recent South Coast Air Quality Management District (SCAQMD) study involving 1,094 employers, the cost of reducing one commute vehicle trip has been approximated as between $2,000 and $3,000, assuming that the entire change in employee commute behavior is attributed to clean air regulation. Thus the community has spent approximately $11.76/day to remove each vehicle from a work commute (*4*).

Market-Based Approaches

One of the basic laws of economics is the relationship between the quantity demanded of any good and its price. When the price is lowered, the amount demanded will rise; when the price is raised, the demand will fall. An argument can be made that VKT (VMT) growth can be reduced by increasing the cost of driving. VKT (VMT) may be priced by using (*a*) gasoline prices, (*b*) parking fees, (*c*) toll collection, or (*d*) different tax treatment of automobile-related costs. Any of these strategies would shift the external costs of driving from society in general to the individual drivers.

Unlike the regulatory program sketched out above, which effectively keeps existing price structures in place but tells consumers to ignore them, a pricing-based strategy sends powerful signals to drivers without an expensive intervening bureaucracy. However, the CAAA allows the possibility of economic disincentives such as higher gasoline prices only after a nonattainment area has failed to meet a milestone.

Reliance on the private automobile is a rational decision in the framework of the existing set of incentives and disincentives to drive. Thus the potential success of any TCM, including ETR, can be assessed only on the basis of meaningful incentives for behavioral change. These meaningful incentives must change the relative cost or convenience of travel choice alternatives; they may be price based or time based. When commuters can save time, for instance, by carpooling and gaining access to a high-occupancy-vehicle (HOV) lane that may save 30 min, that savings is a meaningful incentive. Studies have shown that if new transit users are given a $15/month subsidy, as they were in a study in Los Angeles in 1989, there is no resulting increase in transit use. Apparently, $15 is not enough to offset the time and inconvenience of taking the bus. Meaningful incentives also must have public acceptance. Some strategies that could have a strong impact on traffic congestion, for instance, prohibition of private automobiles in the central business district or alternative driving days, face public resistance.

Flexibility and the offering of a wide range of choices to commuters best improve the acceptance and the viability of TCM programs, including ETR. Mandatory alternative work hours, for instance, are not popular or likely to be successful, but voluntary alternative work hours, based on the needs of both the employer and the employee, are more likely to meet with success.

Many of the positive and negative impacts of ETR are difficult to quantify. On the positive side are reduced congestion in the peak period, more efficient use of existing facilities, provision of an institutional structure for public- and private-sector cooperation in trip reduction, increased commuter pool from which to create rideshare matches, incremental conversion to vehicles that use cleaner fuels, positive community image for companies with active programs, and, perhaps most important, the provision of a valuable exercise in teaching employers and the public about the effects of their benefits packages (i.e., free parking) and location choices on regional congestion and pollution. The last-mentioned learning exercise, in part, led to substantial changes in the federal tax code regarding commute benefits and to California state legislation to equalize subsidies for parking and alternatives. Some negative impacts include inequity in transportation costs between high- and low-income workers, inequity in ETR-related expenses between large and small employers, and employee adjustment to alternative travel modes.

COSTS AND BENEFITS OF ETR

The Clean Air mandate is interesting because it calls into question the costs of the various air pollution abatement strategies, whether regulatory, technological, or market based. The law is concerned with NO_X (nitrogen oxides), SO_X (sulfur oxides), and PM-10 (particulate matter), as well as ozone. The photochemistry of ozone formation is well documented and will not be replicated in this report.

Discussion of conformity with air quality standards differs depending on the pollutant chosen. A look at the levels of atmospheric lead in the South Coast Air Basin (SOCAB) of California, for example, demonstrates the success that may be achieved when the source of a pollutant is easily defined. Because atmospheric lead is a mixture of chemical compounds of lead, the combustion of leaded gasoline accounts for nearly all the lead emitted into the atmosphere. Thus the sharp decline in both the use of leaded gasoline and the average lead content of gasoline accounts for the dramatic decrease in atmospheric lead concentration in the SOCAB and other regions. In the mid-1970s almost all the lead-testing stations in the SOCAB exceeded the federal lead standard. By 1983, all SOCAB stations met and have continued to meet both the federal and the more stringent state lead standards.

SOCAB's success with lead is mirrored by other regions and states that have outlawed the sale of leaded gasoline. In 1989, the regions with atmospheric lead exceedances were in Montana, Alabama, and Missouri because of stationary sites involved in lead-related industry. Regions such as the Los Angeles and New York areas, where VMT was increasing, however, did not experience lead exceedances. Reducing the level of atmospheric lead from mobile sources, then, was a straightforward matter even when the number of automobile kilometers (miles) traveled in an affected region was growing (*5*).

A pollutant such as ozone, however, is a different matter. The difficulty in forming a clear and effective program for the reduction of ozone in affected regions is based on five points:

1. The complicated nature of the formation of ozone;
2. The fact that its precursor gases come from numerous sources, only one of which is the automobile;
3. The behavioral aspects of automobile trip making;
4. The divergent needs of solving traffic congestion versus solving automobile pollution problems; and
5. The controversy surrounding the point at which regulations on automobile emissions might be imposed. For instance, should they

be imposed on the manufacturers of automobiles or on the producers of gasoline? Should they be imposed on drivers at the gas pump, at the emissions testing station, or at the work site? Should drivers of grossly polluting vehicles be ticketed and fined on the streets themselves in the same way that speed limit violators are handled? Should employers be involved in any way in reducing trips to reduce automobile emissions in the ambient air?

The difficulty of arriving at an effective ozone reduction strategy results from the lack of cohesion among these five points. An additional difficulty is the need to address the issue of how to limit the production of ozone precursor emissions when all the hard strategies such as fuel-efficient automobiles, reformulated gasoline, vapor recovery systems ("Stage II controls"), and highway capacity are exhausted. When the point of diminishing returns with respect to these technical solutions occurs, the solution strategies may be limited to those that address the behavioral aspects of trip making.

This discussion will examine the costs of the various strategies involved on the basis of the amount of reactive organic gases (ROG) removed from the air per dollar spent; typically this costing is done in dollars per megagram (ton) of ROG per year removed. The choice of ROG as a measuring stick underlines the difficulty in analyzing the information. ROG is not a straightforward "smokestack" type pollutant on which legislators can set limits. It is formed by a complex set of chemical, photochemical, geographical, political, sociological, and behavioral actions. However, because lowering ROG is perceived as a direct step to lowering the probability of ozone noncompliance, ROG was chosen as the guide (*6*).

Relative Costs of ETR

Table 1 gives (*a*) 13 air quality strategies, (*b*) the pollutant chosen to measure the effectiveness of each, (*c*) the megagrams per year that would be removed from the ambient air by using the strategy, (*d*) the cost of the strategy in thousands of dollars, and (*e*) the proportional cost of each strategy in dollars per megagram per year. The table is based on a report by SCAQMD. The cost-effectiveness evaluations are calculated by taking the ROG as the primary emission benefit. The procedures developed to evaluate cost-effectiveness discount all costs to a common base year of 1987.

ETR was placed in mode split strategies with its related subcategories, including cash transit incentives, automobile use restrictions, merchant transportation incentives, parking management, HOV facilities, and transit additions/improvements.

Analysis of the Cost-Effectiveness of 13 TCMs

Measure 1 in Table 1, the most cost-effective, consists of paving unimproved roadways and parking lots to tamp down the fugitive dust. Quite predictably, this measure permanently eliminates a large amount of particulate matter (in this case, road dust). However, it has no effect on the level of ozone or any other pollutant in the region. Road paving may be compared with gasoline vapor recovery that has been implemented in southern California. Vapor recovery provides suction locks on consumer and commercial gasoline pumps so that gasoline vapors cannot leak into the air. This extremely cost-effective measure has a one-time effect. In this respect Measure 1 may be classed with Measures 3 (general aviation vapor recovery), 4 (replacement of high emitting aircraft), 8 (rail consolidation to reduce grades), 9 (railroad electrification), and 13 (centralized power system). A close look at the air quality improvements that these six strategies provide will not further this discussion; the more highly complex seven strategies remaining more clearly outline the difficulties and challenges of TCM planning.

Those emissions reductions that are reduced by changes in vehicle use instead of changes at the tail pipe or gas pump are measured through change in travel indicators such as VKT, vehicle trips (VT), and vehicle hours of travel (VHT). Control measures that reduce these three indicators through better transportation demand management and system management have a direct impact on emissions. Land use controls (such as jobs-housing balance) also affect travel indicators and, as such, are effective at reducing emissions. In this category of strategies in Table 1 are Measures 2 (growth management), 5 (goods movement), 6 (capacity enhancements), 7 (traffic flow improvements), 10 (alternate work schedules and locations), 11 (solutions for nonrecurrent emergencies, such as emergency road services), and 12 (mode shift strategies).

Before a closer look is taken at these seven, it must be noted that projected emissions reductions are calculated according to specific groupings of measures that work in concert. The measures are divided and emissions reductions are calculated according to subgroups that work together synergistically. The costs and benefits of ETR are embedded in the mode split strategies. Quantification of reductions by group prevents double credits from being taken. Often, strategies on growth managements, housing, mobility, and air quality are coordinated to ensure consistency of approach and methodology. Although the synergistic approach is necessary, it prevents freestanding analysis of the ETR strategy.

Of the following seven measures, three (Measures 6, 7, and 11) are related to traffic flow.

Measure 6, capacity enhancement, relies on construction of additional capacity such as (*a*) widening roads, (*b*) double decking of freeways, and (*c*) construction of new freeways and corridors. Certain new road construction, however, can worsen traffic congestion and contribute to urban sprawl and thus is subject to review under the CAAA.

Measure 7, traffic flow improvements, increases flow by means of technological advances such as computerized interconnected traffic signals and freeway ramp metering.

Measure 11, solutions for nonrecurrent emergencies (for example, emergency road service), provides for emergency freeway turnouts as well as emergency tow trucks and related personnel.

There is a clear difference between these measures and the four measures discussed next. Flow-related improvements, although they may cost more or less than other improvements, are not perceived as interventions by drivers. Instead, they are viewed as helpful solutions. When added safety is provided by a measure such as emergency road services, drivers acknowledge the benefit from that protection as well as from the amplification of traffic flow. In addition, the results of these measures are quickly perceived and utilized by drivers. These two positive aspects of flow-related TCMs are not readily applicable to the final four measures that will be considered.

Measure 2, growth management, has as a principal goal obtaining reductions in VKT by (*a*) accelerating housing growth in job-rich areas and (*b*) promoting more employment development in areas where abundant housing already exists. The result given in Table 1 projects a reduction in ROG as a result of a drop in long-distance commutes, VKT, and VHT, which would result if jobs and housing growth, by subregion, were managed by policy compared with projected 2010 results attained without policy intervention.

TABLE 1 Ranking of Cost-Effectiveness for TCMs

STRATEGY	POLLUTANT	MG/YEAR in 2010	COST $1000	DOLLARS/MG/YEAR in 2010
1. Road paving	PM-10	41793	9142	219
2. Growth management	ROG	10093	3568	354
3. Gen aviation vapor recovery	ROG	84	78	930
4. Replacement of high emitting aircraft	ROG	2290	4292	1,874
5. Goods movement (Trucks)	ROG	639	5171	8,097
6. Capacity enhancements	ROG	3980	37721	9,479
7. Traffic flow improvements	ROG	1234	14248	11,548
8. Rail consolidation (to reduce grades)	ROG	103	2479	24,115
9. Railroad electrification	ROG	265	11748	44,282
10. Alternate work schedule/location	ROG	4832	415942	86,081
11. Non-recurrent congestion (emerg. serv.)	ROG	1	260	260,000
12. Mode shift strategies	ROG	2063	1149865	557,267
13. Centralized power system	ROG	5	7356	1,634,667

1 megagram = .907 ton

Measure 5, goods movement, specifies a range of actions to reduce truck-related emissions, including (*a*) shifting heavy-duty vehicles involved in goods movement to off-peak periods and (*b*) shifting port-related truck traffic to rail.

Measure 10, alternate work schedules and locations, works by reducing emissions from vehicles traveling to and from work. Examples are 4-day/40-hr week, 9-day/80-hr bimonth, flexible hours, and telecommuting.

Measure 12, mode shift strategies, includes employer rideshare and transit incentives, parking management, merchant transportation incentives, automobile use restrictions, HOV facilities, and transit improvement. This category is made up of six distinct strategies, none of which works alone and two of which (HOV facilities and transit improvement) involve large capital outlays. Getting realistic data on the costs of individual mode shift strategies may not be possible. Preliminary cost reports that include the relatively high capital expenses mentioned earlier in a grouping would make ETR appear more expensive than it actually is.

Cost-effectiveness may not be as important as which TCM selections are mandated by law, which serve more than one objective, which complement or conflict with one another, which may be more likely to serve long-term change, and which may be more likely to succeed.

EVALUATING ETR AS AN EFFECTIVE TCM

Table 2 evaluates 19 TCMs according to four criteria:

1. Relieves traffic congestion,
2. Relieves ROG,
3. Maintains personal privacy and autonomy, and
4. Is market based from the perspective of the private consumer.

These four decision criteria were chosen to address four critical planning concerns that are strongly related to all TCMs. This table is presented mainly as a discussion guide; depending on the

TABLE 2 Effectiveness of Air Quality Strategies

Measure	Relieves traffic congestion	Relieves ROG	Maintains privacy and autonomy	Market-based VKT (VMT) pricing possibilities
Road paving	no	no	yes	no
Growth management	yes	yes	no	yes
Aviation vapor	no	yes	yes	no
Aviation replacement	no	yes	yes	no
Goods movement	yes	yes	yes	yes
Traffic flow improvements	yes	yes	yes	yes
Capacity enhancements	yes	yes	yes	yes
Rail consolidation	yes	yes	yes	no
Railroad electrification	yes	yes	yes	no
Alternate work schedules/locations	yes	yes	no	yes
Emergency services	yes	yes	yes	no
Mode shift				
employer rideshare	yes	yes	no	yes
parking management	yes	yes	no	yes
merchant transportation incentives	yes	yes	no	yes
auto use restrictions	yes	yes	no	yes
HOV	yes	yes	no	yes
transit improvements	yes	yes	yes	yes
Centralized power system	no	yes	yes	no

approach that is taken toward a strategy, that strategy could tend toward being regulatory or market based.

Relief from Traffic Congestion

Traffic congestion is undesirable to drivers because it is wasteful and frustrating. From the viewpoint of society, congestion misallocates scarce resources and causes economic inefficiency. Costs are high. In 39 large urbanized areas of the United States the cost of congestion in 1988 alone exceeded $34 billion, or $290 per resident (*7*).

Traffic congestion may be relieved using "hard" measures (supply-side remedies), such as traffic flow improvements, or "soft" measures (demand-side remedies) such as employee rideshare programs. Hard measures typically have a one-time effect and do not change human behavior. Nevertheless, each of the supply-side remedies that assists in solving the congestion problem is important. The type of TCM most likely to be successful in relieving traffic congestion—pricing—does not appear in Table 2. Peak-hour road and parking pricing are powerful measures to address congestion. ETR has a very small impact on traffic congestion.

Relief from ROG

Elimination or reduction of ROG and the associated reduction in other air pollutants would provide both short- and long-term benefits in health, the environment, and energy conservation. ETR provides very little relief from ROG, and even that change is very costly. The "hard" measures such as gas pump vapor recovery are much more useful and cost-effective. Coming to terms with the basic inefficiency of ETR is important, though, in the scheme of things. Only then can feedback from employees and employers adjust the course of VKT reduction strategies away from ETR while beginning the process of identifying and utilizing the positive aspects of the program.

Personal Privacy and Autonomy

Many commuters are willing to travel long distances or tolerate time wasted in traffic so they can live and work where they choose. Most Americans also prefer to travel in private vehicles, usually alone, because such travel provides convenience, comfort, privacy, and speed far superior to public transit or carpool. TCMs must address these powerful desires or they will not succeed. ETR fails on this point since the independence of both employees and employers is threatened.

Market Based

Driving alone to work in the current-day United States is a rational act. What would make it irrational? What would make it irrational at the margin? The most effective course of action to decrease drive-alone trips is to decrease the net benefits of driving alone, mainly by raising the costs. The powerful force of the market in shaping policy is not at the moment used in shaping policy on traffic congestion or mobile pollution mitigation.

IS ETR A SOLUTION?

Even though California's Regulation XV is an extremely ambitious effort to change the travel behavior of Los Angeles region commuters and the first-year results are positive with respect to changes in carpooling employees per job site, the results do not suggest that the VKT reduction targets will be reached or that indirect control strategies such as ETR are efficient or popular. More research is required on the indirect effects of Regulation XV on commuters and employers to assess its overall effectiveness.

There is a growing school of thought that trip reduction is an insignificant part of air quality planning. More transit use, ridesharing, and telecommuting may not be needed to achieve clean air objectives in the southern California region. The increase in the average vehicle ridership (AVR) during the first year under Regulation XV was small, the trend is uncertain, and there is a strong possibility that most of the ridesharing opportunities will be mopped up in the first year or two, with little change thereafter (*8*). A high regional target for AVR discourages compliance among employers, especially if it imposes a standard beyond that met by any U.S. region but New York.

Difficulties abound in the quantification of TCMs, including ETR. One example is provided by examining the TCM strategy of growth management or the balance of jobs and housing. The points argued here may be applied equally to the ETR strategy. Comparison of data on the basis of the travel patterns before and after a land use change is not feasible for the following reasons:

1. The lack of calibration in getting beginning figures with which to evaluate the land use strategy renders any result inaccurate.
2. Exogenous factors, such as the growth of unemployed persons in proportion to the total population in a region, can effectively "solve" problems like VKT reduction requirements without changing anything.
3. Land use concerns are extremely sensitive to (*a*) initial conditions, such as types of infrastructure already existing, land use restrictions, zoning regulations, and building permit process time; (*b*) intermediate interferences; and (*c*) the number of years of commitment to an idea or strategy. Thus, they are not readily quantifiable.
4. Cost-effectiveness ratings on TCMs may not be feasible processes.
5. The desire to run costing per unit of ROG per year in a short time frame is a severe case of front-loading costs while discounting benefits. After all, when subway systems, for instance, are built in a city such as Washington, D.C., a transportation network, not just an anti-ROG machine, is built.
6. Air quality is a technical issue, whereas mobility is a decidedly social issue. After technical solutions have been found to replace the internal combustion engine, cities will still be looking at the questions of access, the human desire for hands-on experience, the need for social relationships, and the desire for livable cities.

Transportation planners, policy analysts, and local government officials are involved in the current debate over the usefulness of ETR as well as other TCMs that CAAA has brought into the foreground as VKT reduction strategies. ETR suggests the need for compromise and continued analysis to recognize what ETR can change and what it will never change.

RECOMMENDATIONS AND CONCLUSIONS

1. Provide for research on TCMs. The result of some of the California TCM efforts suggests that ROG cost-benefit analysis is not the route to take in assessing ETR.
2. Work with the "critical mass" theory. All TCMs are in some sense marginal. Those strategies with great power like tail pipe and gasoline regulations have a one-time effect, whereas many strategies with the possibility of long-term usefulness, such as mode shift alternatives or land use planning, have small but continuing impacts on air quality. Many strategies, including technological fixes, behavioral shifts, and pricing, working in concert, may provide the beginning of feasible air quality management programs.
3. Investigate the efficiency of the ETR strategy. Admit that ETR has an extremely marginal effect on both traffic congestion and air pollution abatement. As CAAA matures, "reality check" may force marginally successful and counter-market-intuitive strategies such as ETR out of the TCM mix. Perhaps the "soft" benefits of ETR, such as positive community image for companies with active programs and stronger regional profiles, will be the primary good that will result from ETR.
4. Investigate the equity of the ETR strategy. Equity concerns cover workers, employers, and political entities in the nonattainment area. Trip reduction strategy may target certain groups for unfair treatment. Which TCMs, including the pricing-based ones that will begin to appear in the future, are equitable? How can they be made equitable if they are not? As an example, Southern California's affluent Orange County has begun negotiations to allow solo drivers to purchase the right to drive on an underused HOV lane into downtown Los Angeles. Are such strategies located at the intersection of efficiency and equity?
5. Investigate the economics of ETR zones. The Los Angeles region has a three-zone target average passenger occupancy (APO) map for employee trip arrivals. The closer to the central business district a work site is, the higher the APO of the automobiles arriving at that site must be. Employers seeking prospective sites may choose a zone with the lowest APO. Would it be feasible to design industrial parks with extremely low APOs in southern California and thus attract dense industrial settlement and lower regional travel costs? If ETR is not eliminated as inefficient, is it possible that APO zonal strategy could become a land use tool? How many businesses are locating or relocating out of regions with air quality concerns because they do not want to pay the price of complying with trip reduction programs?
6. Use pricing tools. How can pricing and taxing be combined with ETR goals to effect change? Emphasizing straightforward, market-based measures such as market rate parking fees, VKT fees, and pollution fees is important here. A lesson from California may very well be to avoid the strong emphasis on cost-effectiveness and concentrate instead on designing for other regions a customized regional program for traffic congestion and air pollution mitigation that is based on the political, social, geographic, meteorological, and economic realities of the region.
7. Continue technological improvement on automobiles and enforce its adoption. High-emissions vehicles cause more than their share of mobile source pollution. Clean-running automobiles such as the "California car" must be available in all states with a timetable

for the year in which only they are sold. Cash programs that buy back high-polluting, usually older vehicles have been very successful. Traffic patrol programs that locate, stop, and ticket high-polluting vehicles on arterial streets in the same way speeders are treated is a possible strategy. Improved vehicle inspection is another. The link between these four strategies is that they go directly to one source of ROG and other emissions violations, the high-polluting vehicle.

8. Foster local and regional political feedback. In regions where regional planning occurred around the question of ETR, there is an enhanced commitment to the decisions eventually made. In Northeastern Illinois, for instance, 1992 and 1993 were the years for organizations, employers, and employees to contribute to the discussion on regional air quality management. The Chicago Lung Association and the Sierra Club, among others, were and are active in the ETR process by standing firm for clean air concerns, no matter how marginal and costly they might be. The coalition building that occurred around the content of the ETR section of the state implementation plan in Illinois demonstrated the desire that retail employers had to take part in an important political decision whose outcome would directly affect them (Illinois Retail Merchant's Association, Unpublished data, 1992; *9*).

9. Build regional profiles. Regions that have experience in operating collectively (for example, Minneapolis–St. Paul), call on a history of cooperation, including regional tax strategies that affect land use, housing and industrial growth, and retention. Thus when traffic congestion or air pollution concerns became important in these regions, the framework was in place to address these new concerns. How can other regions profit from this knowledge?

10. Emphasize education. Start with education programs as early as high school driver's education. Is this trip really necessary?

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