OTA Report Brief

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Retiring Old Cars: Programs To Save Gasoline and Reduce Emissions

Because older vehicles tend to pollute more and are less fuel-efficient than newer vehicles, they use more gasoline and emit more air pollutants than their small share of total driving might imply. The Environmental Protection Agency estimates that cars of 1971 or earlier vintage made up about 3.4 percent of the auto fleet in 1990 and were driven less than 2 percent of the miles, yet created 6 percent of the hydrocarbon, 7.5 percent of the carbon monoxide, and 4.7 percent of the nitrogen oxide emissions. These values suggest a new strategy to help clean up urban air quality: get as many as possible of these older, high emission vehicles off the road by encouraging owners to voluntarily scrap their vehicles in exchange for a cash payment.

A successful program to demonstrate the benefits of accelerating the retirement of older cars, run by the Union Oil Company (Unocal) in the Los Angeles area, has spurred national interest in a broader program. Both the House and Senate have expressed interest in such a program, and recently the Administration proposed a program awarding pollution credits to companies that participate.

In the absence of nationwide experience with such programs, there are many unknowns in estimating likely costs and benefits, and any new program should be treated as experimental in nature and carefully monitored. (In particular, although the Unocal program appeared to be quite successful in attracting vehicles in active use and with significant remaining lifetimes, policymakers should remain wary of the potential for early retirement programs to attract vehicles with little useful life remaining.) However, new ways to reduce emissions have become more attractive as the costs of eliminating each additional ton of nitrogen oxide, hydrocarbon, and carbon monoxide emissions have escalated while air quality standards remain unmet. Even accounting for the unknowns, *it appears likely that carefully targeted early retirement programs can generate emissions benefits at costs that are below those of competing control measures.* Further, such programs will save gasoline and may yield safety benefits, making them still more attractive. Of course, retirement programs will have negatives —in particular, they may make it more difficult for low-income drivers to find low-cost vehicles. On the other hand, they should help drivers who *already* own old vehicles to move up to newer vehicles.

By "carefully targeted" programs we mean the following:

1. The programs would be aimed at fairly old vehicles, e.g., pre-1975. Although programs aimed at newer vehicles, e.g., pre-1980, may make sense in some circumstances, they are less assured of cost-effectiveness.
2. The programs would be restricted to areas either out of compliance with ozone and/or carbon monoxide standards or in areas that contribute to regional air quality problems through downwind transport. The dollar value of reducing emissions elsewhere is far less.
3. Administrative restrictions would be placed on the vehicles accepted into the programs; for example, vehicles should have been registered during the past 6 months or year (to avoid resurrecting already-junked vehicles) and should be operable.
4. The programs would *not* be repeated at frequent intervals, to prevent owners of old vehicles from waiting until the vehicles are ready to be retired anyway.
5. Any rewards to corporations participating in a retirement program, such as credits toward meeting fuel economy standards or emission credits, would recognize the time-limited nature of the program's emissions and fuel savings benefits—the benefits last only until the vehicles would have been retired anyway, generally after a few years. Some proposals for credits appear to ignore this important limitation.

A "typical" case involves a program that retires 1 million vehicles of pre-1971 vintage. It might cost about $750 million (a $700/vehicle bonus and $50/vehicle adminstrative cost), yield annual gasoline savings of 182 million gallons per year (12,000 barrels per day), and gain annual emissions reductions of about 60,000 tons of hydrocarbons, 448,000

Table 1—Benefits and Costs of Vehicle Scrappage Program Retiring 1 Million Vehicles (baseline scenarios)

Model years in program	Costs,[a] ($million/year)	Emission reduction (1,000 tons/year) HC	CO	NO_x	Gasoline savings (million gallons/year)	Emission benefits[b] ($million/year)	Cost/benefit[c] ratio
Method 1 (assumes all miles replaced by miles in new cars)							
Pre-1970	221 to 312	63	343	13.5	171	366	.60 to .85
Pre-1975	209 to 266	57	327	15.0	213	354	.59 to .75
Pre-1980	279 to 368	51	400	16.0	142	346	.81 to 1.06
Method 2 (assumes miles replaced by existing fleet (half) and new cars (half))							
Pre-1971	258	59.5	448	16.5	182	365	.71
Pre-1980	369	44.0	369	16.5	135	294	1.26

[a]Excludes administrative costs. Assumes 10 percent interest rate, $700/vehicle bonus for pre-1970/71 and pre-1975 cars, $1,000/vehicle bonus for pre-1980/81 cars.

[b]HC valued at $3,050/ton, NO_x at $2,750/ton, and CO at $300/ton.

[c]Includes emissions benefits only.

NOTES: This table presents the results of two sets of estimates of the effects of a vehicle retirement program affecting 1 million vehicles. The first method uses a spreadsheet model developed by OTA using a variety of data sources. We assumed in this analysis that all of the replacement miles (that is, miles driven to substitute for the travel that would otherwise have taken place using the vehicles retired by the program) would be driven by new cars. Since new cars are driven more intensively than old cars, on average, we assume that considerably fewer additional new cars will be purchased than the number of vehicles scrapped. The second method uses a spreadsheet developed by William Schroeer of the Environmental Protection Agency (EPA) and is based on the EPA emissions model MOBILE4. In the baseline scenario shown, we assume that half of the "replacement" miles are driven by new cars, and half are driven by the existing fleet; that is, existing vehicles are driven more. The mileage is distributed to different model years by assuming that the percentages of total mileage driven by each model year does not change; that is, if 1983 cars currently account for a given percentage of all miles driven, they are allocated that same percentage of the replacement miles driven by the existing fleet. Note that the second method implies that the replacement miles will be driven by cars that are, on the average, less clean than new cars. This in part accounts for the lower emissions benefits in the second case. Gasoline savings are calculated using a different methodology in each case, with the first method accounting for the likelihood that many replacement vehicles will be light trucks rather than cars, with poorer fuel economy.

SOURCE: Office of Technology Assessment.

tons of carbon monoxide, and 17,000 tons of nitrogen oxides—"worth" in nonattainment areas about $1 billion over the approximately 3-year period during which the average retired vehicle would otherwise have been operating. The above values are dependent on a series of assumptions about the nature of the vehicles that would replace those retired, the value of the emissions reductions, the degree to which vehicles being retired are representative of their model years (or, instead, are the worst clunkers), and so forth. *The general conclusion that a program can be cost-effective if well-targeted is, however, quite robust.*

Table 1 presents the projected annual costs, emissions benefits, and gasoline savings of a vehicle scrappage program retiring 1 million vehicles, focusing on different groups of model years, with baseline assumptions. The OTA report examines the sensitivity of these results to changed assumptions.

Policymakers should also recognize that most of the candidate areas for retirement programs already have a mechanism that could remove the worst polluting vehicles from the fleet—inspection and maintenance (I/M) programs. The reason I/M programs don't accomplish this removal is that they all exempt vehicles on which more than a set amount—often less than $100—has been spent to gain compliance. The Clean Air Act Amendments of 1990 raise these limits to $450 by 1992 in the worst polluted areas, and this should cause more high-emission vehicles in the fleet to retire or be repaired. However, lawmakers may be reluctant to support wider application of such measures, or the elimination of repair cost ceilings altogether, given constituent resistance and the burden that would be placed on the lower income owners of many of the older vehicles. On the other hand, a "hybrid" retirement program, between forcible retirement and random offers of bonuses, might be to use I/M programs or other means (such as remote sensing of vehicle emissions) to identify the vehicles that should be offered a bonus to be retired.

As a final and important point, policymakers should note that implementation of stronger I/M programs, which might take place in a few years, may reduce the net benefits of vehicle retirement programs by skimming off some of the higher emission vehicles from the fleet and forcing repairs of others. Similarly, the Clean Air Act Amendments will require the introduction of reformulated gasoline into nonattainment areas in 1995, and the resulting reductions in emissions from all vehicles will also reduce the net benefits of retirement programs. Consequently, the cost-effectiveness of retirement programs may be highest during the next few years.

Copies of the report for congressional use are available by calling 4-9241.

Copies of the report for non-congressional use can be ordered from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-9325 (202) 783-3238. The GPO stock number for the OTA report, "Retiring Old Cars: Programs To Save Gasoline and Reduce Emissions" is 052-003-01288-0. The price is $2.50.