

**Workgroup Recommendations and Other Potential Control Measures**  
**Diesel Initiatives Workgroup**

**DI009 – Early Retirement Program for Heavy Duty Diesel Vehicles**

**DESCRIPTION**

A “vehicle retirement program” or “vehicle modernization program” typically refers to an incentive program where owners of old, high emitting vehicles turn in or upgrade these vehicles earlier than normal. The intent of these programs is to improve overall air quality because the owners will use the funds to buy lower emitting vehicles. Thus a net emissions reduction will be realized. Historically, states that have implemented these programs have focused on light-duty, gasoline vehicles in order to reduce their contribution of NO<sub>x</sub> to the air. The program proposed here would focus on commercial, medium to heavy-duty diesel vehicles (HDDVs) and their contribution to PM<sub>2.5</sub> emissions. As described below, vehicle retirement programs are not necessarily cost-effective for PM<sub>2.5</sub> alone, but are cost-effective for NO<sub>x</sub> or combined NO<sub>x</sub> and PM<sub>2.5</sub> reductions. In addition, a vehicle retirement program targeted at heavy-emitting diesel vehicles at the Ports of Newark, Elizabeth, or Camden might be an effective tool to achieving emission reductions in the heavily industrialized area around these Ports, particularly if the Port operators can encourage participation in a vehicle retirement program. Port operators have identified drayage (short haul) vehicles as good candidates for a vehicle retirement program because they are typically old and are independently owned and operated.

One example of a vehicle retirement program is the Sacramento Emergency Clean Air & Transportation (SECAT) Program, operated by the Sacramento Metropolitan Air Quality Management District, which funds replacement, retrofitting or repowering of on-road, heavy-duty diesel vehicles. Funding for SECAT was provided by the California legislature and federal Congestion Mitigation and Air Quality (CMAQ) funds were also used, but this funding has now been suspended due to budget constraints. For year 2003, the SECAT program boasts reductions of 477 tons per year of NO<sub>x</sub> and 55 tons per year of particulate matter achieved by the retirement of approximately 300 diesel vehicles. The most popular option for fleet owners has been Fleet Modernization where the older vehicles (1994 or older) are destroyed and replaced with newer, less-polluting ones.

**IMPLEMENTATION**

Assuming that 50% of diesel vehicles greater than 8,501 pounds and model year 1988 through 1993 participated in a vehicle retirement program, we estimate a reduction of 54 tons per year of PM<sub>2.5</sub>. Using actual NO<sub>x</sub> reductions achieved by the SECAT program, this would result in approximately 450 tons of NO<sub>x</sub> reductions. Retiring 50% of the pre-1988 vehicles would result in a PM<sub>2.5</sub> reduction of 12 tons per year. This is an overall reduction of 66 tons for year 2005. However, these reductions would not carry forward to the next year since there will be fewer cars retiring each year until no more are left.

It is important to note that these estimates are dependent on the safeguards built into the program as well as sufficient participation by vehicle owners. For example, we are assuming that 50% of the population will be retired through the program and not replaced. However, since these are commercial vehicles currently being used then they will most likely be replaced and the net emission reduction will be less than calculated.

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Other factors to consider are incentives, cost effectiveness, voluntary versus mandatory, environmental benefits beyond PM<sub>2.5</sub>, and economic impact. Since the program being proposed is focusing on HDDVs and not passenger vehicles, it is unclear if such a program would be cost effective for PM<sub>2.5</sub> reductions alone when compared to other control alternatives. For example, the cost of used HDDVs can vary widely from \$10,000 to \$100,000 so we would need to identify an appropriate reimbursement value for the new engines. In order to make the program a success, the incentive needs to offset the value of a newer vehicle. As a comparison, installing tailpipe controls to reduce PM<sub>2.5</sub> would cost anywhere from \$2000 to \$5000 for the pre-1994 vehicles. Despite these high costs for PM<sub>2.5</sub> reductions, a vehicle retirement program would be cost-effective when considering the NOx reductions.

**COST**

The cost of a vehicle retirement program will depend on the number of vehicles targeted for retirement and the amount of emissions reductions desired. To retire half of the diesel vehicles (1988-1993) in New Jersey, it would cost between \$76 million and \$2.6 billion for 66 tons of PM<sub>2.5</sub> reduction. California's Carl Moyer program has provided \$154 million over the last 6 years to clean up approximately 7,000 diesel engines. Recent legislative changes will provide up to \$141 million annually to continue to meet the air pollution challenges facing California. Compared with diesel grant programs for technology retrofits, the cost of a vehicle retirement program can be quite high. There are administrative requirements to ensure that engines being replaced are actually destroyed, and some data is needed to ensure that newer vehicles remain in the geographic area targeted for emission reductions. The successful vehicle retirement programs like those in California and Texas cost millions of dollars but are cost-effective from a NOx reduction perspective.

The Bay Area Air Quality Management District (California) has had an automotive retirement program since 1996 and estimates the cost-effectiveness of the program to be approximately \$6,000 - \$7,000 per ton reduced (primarily NOx). Car registration fees were increased by \$4 to fund this program. The flat rate fee for retiring a vehicle is currently \$650 for any vehicle of model year 1985 or older. The Carl Moyer program estimates \$3,000 to \$4,000 per ton reduced (primarily NOx). A higher retirement payment would be required for HDDV.

**EFFECTIVENESS**

Restrictions must be established to ensure that a vehicle being retired is a viable vehicle with many years of use remaining and that it is replaced with a more efficient vehicle or its engine is replaced with a much cleaner engine.

If sufficient funding were provided to replace half of the pre-1994 HDDV engines, a reduction of up to 65.7 tons per year is possible. Vehicles operated in N.J. with model years ranging from 1988 through 1993 would result in a reduction of 53.6 tons per year. Replacement of vehicles with model years prior to 1988 would result in a PM<sub>2.5</sub> reduction of 12.1 tons per year. These estimates do not include emissions from vehicles that would likely replace the older vehicles.

May 12, 2006

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The Port of Long Beach reports that their vehicle retirement program has been successful and that they have numerous vehicle owners volunteering for funding. A vehicle retirement program initiated in Boston yielded no volunteers for vehicle replacement.

**SOURCES**

1. [www.arb.ca.gov/msprog/moyer](http://www.arb.ca.gov/msprog/moyer)