



Greening Garbage Trucks: Trends in Alternative Fuel Use, 2002 - 2005

Findings and Recommendations

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INFORM's Findings and Recommendations

The growing interest in alternative fuels among the fleet operators that INFORM interviewed reflects a changing perspective of the best refuse or recycling trucks for urban use. Local municipalities are increasingly expressing concerns about worsening urban air quality and the rising price of diesel fuel and diesel trucks. At the same time, national concerns are growing about greenhouse gas emissions and the US's still expanding reliance on foreign oil, especially in transportation sector.

As a result, refuse and recycling truck operators have recognized that not only must their fleets provide their essential services reliably, but they must also do more. The more they diversify the fuels they use (which can reduce, if not eliminate, their reliance on foreign oil), the more they may protect themselves from fuel price spikes or supply disruptions that may occur as political tensions increase in oil-rich countries and as the demand for oil increases in industrializing Asia.

The efforts to capture and re-use landfill gas, as described in this report, suggest that natural gas trucks may soon be able to use gases generated from landfills and wastewater treatment plants. Gas from these sources offers a renewable resource, which currently escapes into the atmosphere as pollutants, providing a win-win situation for the environment and the natural gas vehicle fleets.

Putting the Refuse Truck Sector on the Path to Hydrogen

INFORM's research of alternative fuels and the refuse truck sector has identified an additional, and perhaps the most significant, benefit of natural gas use—the role that using natural gas as a fuel may play in accelerating the transition of the transportation sector to the use of hydrogen. Refuse truck fleets that use natural gas (possibly combined with bio-gas) are ahead of their peers in making the long-term transition to hydrogen for two reasons. First, the current generation of market-tested natural gas vehicles and storage and fueling technologies gives them experience with a gas fuel technology and the systems needed to handle gas under pressure. Second, investments in natural gas fueling infrastructure

are investments in gaseous fuel facilities that, with added equipment, will be able to extract hydrogen from natural gas and provide it to the first generation of fuel cell trucks.

Hydrogen produced from natural gas may be the best way to power hydrogen fuel cell vehicles until a transition can be made to a truly sustainable fuel—hydrogen produced from water using renewable energy. Vehicles running on hydrogen will not rely on any fossil fuel, and they will not produce harmful emissions.

Accelerating the Pace of Progress

Given the combination of near- and long-term benefits made possible through the use of natural gas refuse trucks, the question becomes how to accelerate the use of natural gas and other alternative fuel vehicles in the refuse truck sector in the period ahead.

Government action is clearly warranted because, even though the pace of innovation in the use of natural gas trucks is rapid, it is not equivalent in scale to the environmental, health, and energy security challenges facing the US. INFORM's research documented that the shift to alternative fuel refuse trucks has affected less than 1 percent of the 136,000 truck sector. Although it is growing, the natural gas sector in the refuse truck industry is not yet self-sustaining.

Government incentives, mandates, or both are needed to address the major obstacles to change that fleet operators discussed. These obstacles include the economic uncertainty associated with switching to a new fuel and the technological challenges that this shift may entail. Fleet mandates for cleaner, petroleum-free fuels combined with economic incentives, such as those provided in California, proved to be the types of powerful drivers needed.

Fuel switching mandates, such as those implemented in California, have resulted in energy and economic development progress. In addition to reducing fleet reliance on foreign oil, these mandates have assured

manufacturers that a market for their vehicles would exist, giving them incentive to improve the technology and compete for that market.

California's programs have had some visible effects. For example, Cummins Westport, a major manufacturer of natural gas heavy-duty engines, not only increased sales of heavy-duty natural gas engines in the California marketplace, but with increasingly sophisticated technology to offer, it expanded its heavy-duty natural gas engine business in China and India, where demand is growing. Enabling China and India to use these engines has helped these countries reduce their air pollution while lessening international competition for oil and, in turn, helping the US achieve its energy security objectives.

INFORM's Four Recommendations

INFORM's research has generated the following four recommendations:

1. The types of programs California has developed can provide excellent guidance for states that want to encourage the use of natural gas, bio-methane generated by landfills and wastewater treatment plants, and other alternative fuels and innovative technologies. Important elements of California's programs include:

- ◆ ***Economic incentives to offset the capital cost of natural gas vehicle and fueling technology.***

In California, refuse truck fleet operators have relied on market-specific economic incentives such as the Carl Moyer Memorial Air Quality Standards Attainment Program to offset the front-end capital costs of natural gas engines. Such incentives allow fleet operators to recover fuel savings from using natural gas and to better manage other fuel switching costs, such as training technicians how to maintain natural gas engines.

- ◆ *Fuel use and engine mandates for fleets that have high air pollution emissions associated with burning diesel fuel.* Because of SCAQMD’s Rule 1193, many refuse truck fleet operators were required to buy natural gas vehicles. Although the US Supreme Court has prohibited the application of this rule to private sector fleets, it still applies to municipal fleets, and SCAQMD is working with CARB to ensure that a modified program remains intact.

- ◆ *Public education programs.* To garner the support and cooperation of the public and private sectors, California’s leadership has emphasized the state’s goals of pollution reduction, reduced reliance on foreign oil, and the environmental and energy security benefits of switching to cleaner non-petroleum-based alternative fuels.

- ◆ **Educational workshops for refuse fleet operators.** During the past few years, a series of workshops for fleet operators in California provided a forum for objectively defining the pros and cons of the various available fueling and technology strategies. They also provided an opportunity for fleet operators to meet the partners they need to establish successful clean fuels initiatives: fuel providers, fuel infrastructure builders, vehicle manufacturers, and government officials who can explain what economic incentives are available to make projects affordable. State and local government agencies and local chapters of DOE’s Clean Cities program have sponsored such workshops in other states, including New York and Texas.

2. A national entity—be it government, trade association, or independent—is needed for tracking and publically reporting trends in the truck fleet sector. Such an entity could be created within an existing natural gas vehicle trade association or within another organization such as SWANA. It would accomplish the following:

- ◆ Quantify the number and age of trucks operating in the US and their fuel use
- ◆ Quantify the extent to which the industry is reducing its dependence on oil-derived fuels and shifting to natural gas or other renewable sources

- ◆ Assess the expanded use (i.e., the success) of various fuel options and new technologies
- ◆ Encourage local municipal officials and community health and environmental organizations to monitor and evaluate the practices of local refuse fleet operators so they could distinguish innovative programs for planning purposes
- ◆ Enable players in the alternative fuel vehicle industry to track their own progress

3. The US Department of Energy can encourage multi-sector government/industry/nonprofit partnerships that can help refuse truck fleet operators overcome the obstacles to innovation and make the most of their new truck investments.

- ◆ Local Clean Cities programs can play an especially valuable role in explaining the expanded economic incentives now available to fleet operators under the Energy Policy Act of 2005 and SAFETEA and in providing linkages to vehicle, fuel, infrastructure, and grant providers.
- ◆ The National Renewable Energy Laboratory's evaluations and performance comparisons of alternative fuel and advanced technology vehicles can be increasingly important in helping refuse truck and other heavy-duty vehicle sectors focus their investments most effectively.

4. National government-industry joint efforts should include an integrated energy and technology export program to support the export of natural gas technology and other beneficial refuse truck fuel and technology options that emerge.

- ◆ Many technology export programs already exist in the government, but alternative fuel technologies receive minimal attention. Although companies such as Cummins Westport have already begun manufacturing heavy-duty natural gas engines in China and India, alternative fuel technology exports could play a much broader role in US energy and environmental protection policies. Their profile in the portfolio of technology export efforts deserves to be raised considerably.

- ◆ British Columbia, Canada, is a good example of a province that has worked hard to establish itself as an exporter of advanced transportation technology, and the large number of advanced transportation companies located in the province attests to its success.
- ◆ Business tax incentives have long been used to attract businesses to different states, but they have generally not been applied to support the operations of companies that specialize in natural gas vehicle technology for sale in global markets.