

# Shifting gears, part 2:



## The economics of using natural gas in recycling trucks

**Market and government incentives are making switching to alternative fuel collection trucks a much easier choice.**

by James S. Cannon and  
Joanna D. Underwood



**T**he marketplace rarely pays businesses to do the environmentally preferable thing, but today, in the case of natural gas motor fuel, it is happening. And where the market is not doing enough, federal and state incentives are picking up the slack.

At the end of September 2005, the average price nationally for natural gas was \$2.36 per diesel gallon equivalent, compared to \$2.81 for diesel. Since then, the gap has grown as oil imports and the price they command – now close to \$80 per barrel – continue to soar in the face of new Mideast turmoil, increased competition for the world's dwindling oil supplies from the booming Chinese market and disruptions in the Alaskan oil supplies.

The cost advantage of natural gas has driven growing interest in a fuel that is cleaner and more secure than oil-derived fuels. These

advantages may produce more cost benefits compared to diesel in the period ahead as tough new U.S. Environmental Protection Agency (Washington) standards for particulates and nitrogen oxides go into effect in 2007 and 2010, and as public concerns about global warming result in regulations restricting greenhouse gas emissions.

Because natural gas contains no toxic chemicals and little carbon in its molecular structure, natural gas trucks emit fewer pollutants and less carbon dioxide than diesel-fueled trucks. Natural gas engines can already meet the 2007 and 2010 EPA heavy duty vehicle emission standards. By contrast, trucks burning diesel fuel, which commonly contains a stew of nearly 200 chemicals and whose molecular structure is more than one-third carbon, will require that many thousands of dollars be

James S. Cannon is president of Energy Futures, a Boulder, Colorado-based energy and environmental research organization that serves non-profit organizations, government agencies and private industry clients. He is the lead author of both *INFORM Greening Garbage Trucks* reports and is internationally recognized as a researcher, author, analyst and speaker on energy development, environmental protection and related public policy issues. He can be contacted at [jscannon@energy-futures.com](mailto:jscannon@energy-futures.com). Joanna D. Underwood, an independent environmental and energy advisor, was founder, and, for 31 years, President of *INFORM*, a national environmental research organization. She was program advisor to *INFORM's* transportation program and has written and spoken widely on alternative fuels issues. She can be contacted at [joannaunderwood@gmail.com](mailto:joannaunderwood@gmail.com).

spent on sophisticated new pollution control equipment just to meet EPA's standards.

Natural gas offers longer-term benefits in addition to the air quality and energy security benefits. As use of this fuel requires refinement of the vehicle systems and establishment of refueling infrastructure needed for use of a gaseous, rather than a liquid, fuel, using natural gas will facilitate a longer term transition to hydrogen, which is first made from natural gas but, ultimately, made from water using renewable energy.

### A growing global trend

While the average driver has been slow to react to the current price and environmental advantages of natural gas, refuse and recycling trucks have not. A 2006 study, *Greening Garbage Trucks: Trends in Alternative Fuels Use, 2002–2005*, published by INFORM (New York) found that the adoption of natural gas technology is expanding rapidly in the refuse and recycling truck industry.

By the end of 2005, the number of natural gas refuse trucks in the U.S. was close to 1,500, a five-fold growth in less than a decade. Other programs outside the U.S. – including Paris, Madrid and Yokohama, Japan – were underway as well. Refuse industry leaders were also projecting that more than 2,200 natural gas refuse trucks would be in service in the U.S. by 2010.

As discussed in *Greening Garbage Trucks*, the higher cost of switching from diesel presents a key obstacle to more widespread use of natural gas. Natural gas engines and fuel storage systems generally add about \$50,000 to the cost of buying a refuse truck. As a result, even though natural gas looks like a good economic bet for many fleet operators, as cheaper fuel costs gradually overcome the initial conversion costs, risks are involved and extra front-end capital costs must be invested, not an easy task for cash strapped fleets.

More help, however, is on the way. Congress passed new energy and transportation bills in August 2005, which will provide close to a billion dollars in incentives aimed at covering the higher costs of buying and refueling alternative fuel vehicles, as well as keep the price of natural gas motor fuel low relative to diesel. The new federal incentives, including federal grants programs, are coupled with even more generous incentives in several states that will further minimize the risks, and provide a lower cost way to meet future obligations in a more secure and environmentally responsible manner.

### Federal incentives

The two federal laws enacted in August 2005 now provide tax credits to the users of alter-

native fuel vehicles. The Energy Policy Act (EPAAct) of 2005 created a tax credit for purchasers of new, dedicated alternative fuel vehicles, including natural gas vehicles (NGVs). The tax credit equals 50 percent of the incremental cost of the vehicle, plus an additional 30 percent of the incremental cost for vehicles with near zero emissions.

For heavy-duty vehicles weighing more than 26,000 pounds, including most refuse trucks, the tax credit limit is \$40,000 per vehicle. The tax credit applies to purchases made after December 31, 2005 and does not expire until the end of 2010. EPAAct of 2005 also provides a tax credit equal to 30 percent of the cost of alternative refueling property, up to \$30,000 per fueling station.

A comprehensive highway bill also enacted in August 2005 created an excise tax credit to sellers of alternative fuels, including natural gas. The credit is \$0.50 per gasoline gallon equivalent (gge) for compressed natural gas (CNG) and \$0.50 per liquid gallon for liquefied natural gas (LNG). The new credits begin on October 1, 2006 and expire on September 30, 2009.

Partially offsetting the excise tax credits, however, is an increase in the motor fuels excise tax rate. The CNG rate will increase from \$0.043 per gge to \$0.183. The LNG rate will increase from \$0.119 to \$0.243 on an LNG gallon basis. When combined, the new tax structure will lower natural gas motor fuel costs significantly – by roughly \$0.40 per gge.

In addition to the tax credits, two federal grant programs are also available. The Congestion Mitigation and Air Quality Improvement Program (CMAQ) is authorized at a funding level of \$10.3 billion for the years 2003 through 2009 to fund projects and programs that reduce transportation-related emissions.

Even though natural gas looks like a good economic bet for many fleet operators, as cheaper fuel costs gradually overcome the initial conversion costs, extra front-end capital costs must be invested.

Additionally, the state energy grant program directed by the Department of Energy (Washington) has for many years funded alternative fuel projects recommended by state government energy offices.

### State programs

Over the past decade, more than 30 states have

## Web resources

### Energy Policy Act (EPAAct) of 2005

<http://www.ferc.gov/legal/maj-ord-reg/fed-sta/ene-pol-act.asp>

### Congestion Mitigation and Air Quality (CMAQ) Improvement Program

<http://www.fhwa.dot.gov/environment/cmaqpgs/>

### Department of Energy's Clean Cities program

<http://www.eere.energy.gov/cleancities/>

### Department of Energy's State Energy Grant program

[http://www.eere.energy.gov/state\\_energy\\_program/grant\\_guidance.cfm](http://www.eere.energy.gov/state_energy_program/grant_guidance.cfm)

### Carl Moyer Memorial Air Quality Standards Attainment program

<http://www.arb.ca.gov/msprog/moyer/moyer.htm>

### Texas Emission Reduction Program

[http://www.tceq.state.tx.us/comm\\_exec/forms\\_pubs/pubs/rg/rg-388.html](http://www.tceq.state.tx.us/comm_exec/forms_pubs/pubs/rg/rg-388.html)

enacted some sort of mandate or incentive program to promote alternative fuels use within their borders. Three of the leaders are California, Texas and New York, all home to natural gas refuse truck projects.

California has been the most progressive state in the U.S. as far as its willingness to implement alternative fuel use mandates and to offer economic incentives to alternative fuel, including natural gas, vehicles. As a result, the state leads the country in the total number of alternative fuel vehicles on its roads.

*Greening Garbage Trucks* found that 27 of the 31 fleets operating natural gas trucks are located in California.

The state has shown the greatest commitment of public funds to support natural gas vehicle purchases in the heavy-duty sector. The Carl Moyer Memorial Air Quality Standards Attainment Program, initiated in 1998, is one of the few state programs in the U.S. to provide funds specifically to cover the incremental costs of purchasing heavy-duty engines with reduced emissions of nitrogen oxides. In addition,

many air quality management districts, including the South Coast Air Quality Management District (SCAQMD) covering the Los Angeles region, the Bay Area AQMD covering the San Francisco Bay area and the Sacramento AQMD covering the state capital, offer a wide range of cash payments per vehicle for the purchase of alternative fuel vehicles.

Texas also runs an innovative alternative fuel purchase incentive program in 2001 that goes far beyond the efforts in most other states. The Texas Emission Reduction Program (TERP) provides grants for clean air projects in 41 heavily polluted counties, with a focus on reducing nitrogen oxides. Over the past decade, more than \$9 million in grants have been distributed through the TERP program to reduce air pollution from transportation and other sources in Texas.

New York became the most recent state to enact legislation broadly promoting alternative fuels when it passed a sweeping revision to its motor fuel tax structure in Senate Bill 8471 earlier this year. The bill places a cap on the sales tax for gasoline and diesel fuel, but it goes much farther to support fuel alternatives by eliminating a variety of motor fuel taxes that apply to CNG, ethanol, biodiesel and hydrogen. The new law will reduce the tax burden for CNG by \$0.44 per gge when it goes into effect on September 1, 2006. The tax exemptions under SB 8471 expire on September 1, 2011.

According to NGV America (Washington), a national trade association, the new tax advantages for CNG in New York will reduce the gge price of CNG from \$2.51 to \$2.07, which is more than \$1.00 cheaper than a gallon of oil-derived gasoline. If the customer also takes the \$0.50 per gge federal excise tax fuel credit, the customer's cost of a gge of CNG will be \$1.57, or \$1.73 less than a gallon of gasoline.

Swayed in part by the new law, the Town of Smithtown on Long Island signed a seven-year, fixed-price contract in July 2006 with Clean Energy (Seal Beach, California), the nation's largest natural gas vehicle fuel provider, to supply CNG to all 30 of Smithtown's collection trucks beginning January 1, 2007. Clean Energy will also provide a multi-year fixed fuel price for the town's growing fleet of natural gas vehicles.

Furthermore, the town can choose other sites for refueling if natural gas is less expensive there, and, should the price of diesel ever drop below the fixed natural gas price, Clean Energy will lower its rates as well. Smithtown officials are enthusiastic about cleaner air for their families, the projected economic savings and the displacement of 2.5 million gallons of petroleum over the life of this agreement.

The Department of Sanitation in New York City was the first major user of natural gas refuse trucks in New York; however, Smithtown now stands out as the first community on the East Coast to require 100-percent natural gas refuse truck use. Perhaps Smithtown will set the pace for other towns and cities up and down the eastern corridor. **RR**

*Reprinted with permission from Resource Recycling, P.O. Box 42270, Portland, OR 97242-0270; (503) 233-1305, (503) 233-1356 (fax); www.resource-recycling.com.*

## Fleets operating natural gas refuse trucks

| Location                 | Operator   | 2002 | 2005 |
|--------------------------|--|------|------|
| Anaheim, CA              | Taormina Industries                                | 50   | 50   |
| Anaheim, CA              | Anaheim Disposal (Republic Services)               | -    | 40   |
| Bakersfield, CA          | City of Bakersfield                                | 5    | NA   |
| Berkeley, CA             | City of Berkeley                                   | 4    | 7    |
| Boston, MA               | McGeoghan  | -    | 2    |
| Burbank, CA              | Waste Management of San Diego                      | -    | 20   |
| Burlington, NJ           | Waste Management                                   | -    | 2    |
| Carson, CA               | American Waste Systems                             | -    | NA   |
| City of Industry, CA     | Athens Disposal                                    | -    | NA   |
| Corona, CA               | Waste Management of the Inland Empire              | 27   | NA   |
| Culver, CA               | City of Culver City                                | -    | 7    |
| El Cajon (San Diego), CA | Waste Management of San Diego                      | 122  | 126  |
| Fairfield, CA            | Solano Garbage (Republic Services)                 | 34   | 37   |
| Fontana, CA              | Waste Management                                   | 25   | NA   |
| Fremont, CA              | BFI  | -    | NA   |
| Fresno, CA               | USA Waste of California (Waste Management)         | 9    | NA   |
| Fresno, CA               | City of Fresno                                     | -    | 69   |
| Gardena, CA              | American Waste Transfer (Republic Services)        | -    | 21   |
| Hawthorne, CA            | H&C Disposal                                       | -    | NA   |
| Hemet, CA                | City of Hemet                                      | -    | NA   |
| Huntington Beach, CA     | Rainbow Disposal                                   | -    | NA   |
| Irvine, CA               | Waste Management of Orange County                  | 29   | NA   |
| Lake Jackson, TX         | City of Lake Jackson                               | -    | 7    |
| Livermore, CA            | Livermore Dublin Disposal (WM)                     | -    | NA   |
| Long Beach, CA           | City of Long Beach                                 | -    | 35   |
| Long Beach, CA           | Republic Services                                  | -    | 12   |
| Los Angeles, CA          | City of Los Angeles                                | 10   | 252  |
| Mojave Desert, CA        | Waste Management                                   | -    | 8    |
| Moreno Valley, CA        | Waste Management of the Inland Empire              | 27   | NA   |
| Napa, CA                 | Napa Garbage (Waste Management of American Canyon) | 6    | NA   |
| New York, NY             | Department of Sanitation, City of New York         | 36   | 26   |
| Oakland, CA              | Waste Management-Alameda County                    | 22   | 32   |
| Ontario, CA              | City of Ontario                                    | -    | NA   |
| Orange County, CA        | Waste Management                                   | -    | NA   |
| Palm Desert, CA          | Waste Management of the Desert                     | 60   | NA   |
| Palmdale, CA             | Waste Management of Antelope Valley                | 9    | 13   |
| Palm Springs, CA         | Palm Springs Disposal Services                     | -    | 15   |
| Redlands, CA             | City of Redlands                                   | -    | NA   |
| Redondo Beach, CA        | Consolidated Disposal (Republic)                   | -    | NA   |
| Ripon, CA                | City of Ripon                                      | -    | 3    |
| Riverside, CA            | City of Riverside                                  | -    | 6    |
| Sacramento, CA           | City of Sacramento                                 | -    | 105  |
| San Diego, CA            | Environmental Services Department                  | 77   | 77   |
| San Francisco, CA        | Norcal Waste Systems                               | 15   | NA   |
| San Gabriel, CA          | Waste Management                                   | 31   | NA   |
| Santa Clarita, CA        | Santa Clarita Disposal (Bluebarrel/WM)             | -    | NA   |
| Santa Monica, CA         | City of Santa Monica                               | 20   | 19   |
| Santa Rosa, CA           | Empire Waste Management                            | 4    | 0    |
| Saugus, CA               | Bluebarrel (WM)                                    | -    | NA   |
| Simi Valley, CA          | GI Industries (Waste Management)                   | 32   | 34   |
| Sunnyvale, CA            | Specialty Solid Waste and Recycling                | 24   | 31   |
| Tulare, CA               | City of Tulare                                     | -    | 13   |
| Washington, DC           | National Parks Service                             | 1    | NA   |
| Washington, DC           | Department of Public Works                         | -    | 2    |
| Washington, PA           | Washington Hauling (Waste Management)              | 7    | 0    |
| West Hollywood, CA       | Athens Disposal                                    | -    | NA   |
| Yucca Valley, CA         | Waste Management of the Desert                     | 6    | NA   |