



GREENING YOUR COMMUNITY? GET ON BOARD WITH NATURAL GAS REFUSE TRUCKS...

DIESEL REFUSE TRUCKS: THE TRADITIONAL MAINSTAY OF COMMUNITIES: Every day – day in and day out – in rain and in snow, more than 139,000 garbage trucks provide one of the most important services to every city and community across America – picking up the mountains of solid waste that citizens and businesses throw out. However, it has become clear that these trucks are old –on average 8 to 10 years – and are one of the most concentrated sources of urban air pollution. Their loud engine noise disrupts the quality of life of communities, and their strong diesel fumes and high decibel levels damage the health of truck operators.

THE GOOD NEWS: A NEW OPTION! Diesel trucks – a fixture of the 20th century – can now be replaced with trucks powered by natural gas making them much cleaner and quieter than even the latest diesel models. Two reports on the refuse industry’s alternative fuel options, *Greening Garbage Trucks*, have found natural gas to be the best choice when communities or fleets buy new trucks.¹ More than 56 communities are using this new technology. About 1,500 natural gas trucks now travel US roadways. More than 600 serve Paris and Madrid, and the trend is accelerating.

YOUR COMMUNITY CAN BE NEXT: Virtually every community that has natural gas service deserves to explore this option, to protect the health of their families and children, to safeguard the wellbeing of their sanitation workers, and also to end their reliance on foreign oil and the soaring prices charged by suppliers.

NATURAL GAS FUEL: WHAT IS IT?

It is the cleanest of all available fuels today. All fossil fuels are made up of carbon and hydrogen. Coal is almost 100% carbon, and petroleum is more than one-third carbon. Natural gas is composed of four hydrogen atoms and just one carbon atom. Since natural gas contains much less carbon than any other organic fuel, it addresses growing concerns about climate change. Natural gas is cleaner than other fossil fuels and has fewer environmental impacts than ethanol or biodiesel.

It causes fewer toxics threats. It contains no toxic chemicals compared to petroleum which contains a stew of more than 200 toxic chemicals.

It is a safe fuel. Because it is lighter than air, should accidents or tank ruptures occur, this gas rises and dissipates instead of pooling. In accidents and tank ruptures involving diesel or gasoline-powered vehicles, however, these liquid fuels pool on the ground and can cause a fire.² A leaking fuel storage tank of petroleum-derived fuels can also contaminate waterways.

¹ *Greening Garbage Trucks*: Vol. 1 (2002) and Vol. 2 (2006) available from Energy Vision contain the most in-depth analysis of refuse truck fuel options published to date. EV will release a third edition at the end of 2007. EV found biodiesel (a blend of petroleum-based diesel and 5% to 20% biodiesel (B20) made from soy or from waste oils) to be a cleaner fuel option for diesel trucks already operating and with many more years of use. However, it found natural gas models the best new vehicle choice. EV found hybrid electric propulsion systems, powered by two or more energy sources, one of which is electricity, to be an option being explored that promises more fuel efficient trucks, but unless hybrid technology is combined with natural gas fuel, these trucks will still depend on more polluting oil-derived diesel fuel.

² In 2006, there were 278,000 fires in all kinds of vehicles whose ignition occur most often with fuel tank ruptures, causing 445 deaths. See the National Fire Protection Association's report *U.S. Fire Loss in 2006*, <http://www.nfpa.org/publicJournalDetail.asp?categoryID=1487&itemID=35832&src=NFPJournal>

It is a more plentiful, secure, domestic fuel than petroleum. 97 percent of the natural gas consumed in the US is produced in North America (85 percent in the US and most of the rest in Canada). More than 62 percent of the oil consumed must be imported, almost 30 percent coming from the turbulent Middle East.³

It is the source of most hydrogen produced today! (including the hydrogen produced for the US Space Program) Using a commercial process called steam reforming, the four hydrogen atoms are separated from the one carbon atom and is then compressed for use as a transportation fuel. Natural gas stands to be the main source of hydrogen for transportation until hydrogen can be produced affordably from water using renewable energy sources which would create a sustainable fuel cycle.

WHY SHOULD COMMUNITIES/FLEETS CONSIDER NG TRUCKS?

-Natural gas trucks are high performers: They are reliable and have sufficient power and range to meet refuse fleet needs. Their fuel can be used in two forms: stored on-board in tanks as compressed natural gas (CNG) or cryogenically cooled to a liquid state, forming liquefied natural gas (LNG) and transported by tanker truck.

- Natural gas trucks best protect the health of residents and families in the communities they serve. While all new refuse trucks purchased in 2007 must meet the standards set by the US Environmental Protection Agency for Particulates (soot) and Nitrogen Oxides (a major component of smog)⁴, natural gas trucks do even better. The 2007 natural gas engine meets not only the 2007 standards but also meets the more stringent Nitrogen Oxides standard that will go into effect in 2010.

-Natural gas trucks are likely to remain cleaner over time. With cleaner fuel, they do not use the complex after-treatment pollution controls that diesel trucks must use to meet the 2007 standards, devices that may work less well over time.

-Natural gas refuse trucks are the quietest trucks available: They are more than 50 percent quieter than diesel trucks – improving the quality of life for the communities they serve, especially for those whose trucks operate at night.

-Natural gas trucks protect the health of truck operators. These operators are spared having to breathe toxic diesel fumes and are at lower risk for suffering hearing loss from the loud engine noise.⁵

³ The Energy Information Administration maintains a monthly register on petroleum and natural gas imports and consumption. See the annual averages for oil imports by country of origin here, http://tonto.eia.doe.gov/dnav/pet/pet_move_impcus_a2_nus_ep00_im0_mbb1_a.htm, and total US consumption by type of fuel here, http://tonto.eia.doe.gov/dnav/pet/pet_cons_prim_dcu_nus_a.htm. See the annual averages for natural gas imports by country of origin here, http://tonto.eia.doe.gov/dnav/ng/ng_move_imp_c_s1_a.htm, and the total US consumption by end use here, http://tonto.eia.doe.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm.

⁴ Clean Diesel Truck/Bus and Low-Sulfur Diesel Rules. The US EPA's standards apply to model year 2007 engines and vehicles: the particulate matter standard will take full effect in 2007 and the standards for nitrogen oxide (NOx) and nonmethane hydrocarbon (NMHC) combined emissions will be phased in for diesel engines between 2007 and 2010. The standards call for a 95% reduction in NOx and NMHCs and an 80% to 90% reduction in particulate emissions.

⁵ A test of noise hazards in The Netherlands, World at work: Refuse collectors by P. P. F. M. Kuijter and M. H. W. Frings-Dresen, *Occupational and Environmental Medicine*, 2004; **61**:282-286, determined there was:

- Over 90% noise reduction inside truck cabs (from 82.8 to 71.3 decibels).
- 98% noise reduction alongside trucks (from 79.5 to 69.3 decibels).
- Over 50% behind trucks (from 72.2 to 66.9 decibels).

-Natural gas trucks are safer than diesel trucks, since they use a gas fuel that would rise and dissipate in case of an accidental tank rupture. (as mentioned above.)

-Natural gas trucks are free of reliance on foreign oil. They are not affected by the rapidly rising costs of diesel fuel that have occurred in the last few years and are not at risk for actual supply disruptions that may occur as competition from China and other parts of industrializing Asia increases for the world's dwindling oil supplies.

AREN'T NATURAL GAS TRUCKS MORE EXPENSIVE? HOW CAN COMMUNITIES AND FLEETS AFFORD THEM?

Natural Gas Trucks are affordable today. A typical diesel refuse truck costs between \$200,000 and \$250,000 and natural gas trucks, with more expensive engine and fuel storage system, are about \$50,000 to \$70,000 more to purchase. However, the economics are changing:

1) **because** the tax credits and financial incentives contained in the energy and transportation bills passed in 2005 (as well as additional incentives in some states) now cover most of the higher costs of purchasing new natural gas trucks and building refueling stations, In addition, an excise tax credit in the transportation bill creates a price advantage for natural gas fuel compared to diesel.

2) **because** the expensive pollution control equipment diesel trucks will need to meet the new US EPA standards is rapidly making them more costly. By 2010, spending on these controls may eliminate any price advantage diesel trucks had.

HOW CAN COMMUNITIES/FLEETS EXPLORE USE OF NG TRUCKS?

Natural gas truck initiatives are now easy to explore. There are many sources of advice today on all aspects of planning for the use of these new trucks:

-Clean Cities: A local Department of Energy-sponsored Clean Cities Organization with 95 coalitions nationwide

- Refueling Companies: There are a number of companies competing for the business of installing and operating natural gas refueling facilities. Many offer financing to build stations through fuel sales or station lease payments. (This can reduce or even totally eliminate the up-front costs of infrastructure development.) Clean Energy, in California, the largest provider, not only sites and builds natural gas refueling stations but also offer fleets and communities project planning guidance, advice on government funding, and support in applying for such funding.

-Truck and engine manufacturers: They can provide advice regarding the natural gas vehicles available today. CNG and LNG refuse trucks are currently offered in the US by Amrep (roll-off trucks), Autocar, Crane Carrier, Kenworth and Peterbilt. Cummins Westport is the leading maker of natural gas engines.

- Energy Vision: EV is one of the few non-profit independent sources of expertise that advises municipal officials and local communities on planning and organizes forums for community education.

IS THERE INFORMATION ON OTHER NATURAL GAS FLEETS?

EV's Greening Garbage Trucks reports contain profiles of most of the alternative fuel fleets in the US, including names of the fleet operators and contact information.

Just a few of the Cities that *Love* their NG Garbage Trucks include...

Smithtown, NY: [www.cleanenergyfuels.com/pdf/nytimesrelease.pdf]

Lake Jackson, TX: [www.ci.lake-jackson.tx.us/minutes/council/councilminutes_020507.doc] Pg. 5

Fresno, CA: [www.valleycleancities.org/2_cities_set_pace_against_pollut.htm]

Sunnyvale, CA: [www.sunnyvale.ca.gov/200206/racs/02-253.asp]

Oakland, CA: [www.oaklandpw.com/Asset995.aspx]

Los Angeles, CA: [www.lacity.org/SAN/ens-4d_clean.pdf]

Many of these cities have written council resolutions to guide their transition to natural gas refuse truck fleets. Their stories can be found at the above websites, along with sample resolutions and examples of project funding and construction.



SINCE NATURAL GAS IS A DEPLETABLE FUEL, HOW DOES USING IT BENEFIT THE ENVIRONMENT AND HUMAN HEALTH IN THE LONG TERM?

While there are less than 60 years worth of natural gas left in the world,⁶ natural gas use today paves the way to use of even cleaner and better fuels in the future.

– **Biomethane:** Trucks equipped to use a compressed gas fuel and refueling stations equipped to provide such a fuel will soon be able to take advantage of a renewable form of natural gas. "Biomethane" is made by capturing and refining the biogases that escape from landfills, sewage treatment plants, solid wastes and agricultural wastes. Production of this fuel is expanding. Its use has two major advantages: it prevents escape of what would be potent greenhouse gas streams from these sites and, when used to power vehicles, it reduces their emissions of CO₂ and NO_x compared to gasoline or diesel.

– **Hythane:** Natural gas trucks can also use "hythane," a fuel being produced today at the refueling station level by extracting hydrogen from natural gas and creating a cleaner blend usually comprised of 80% natural gas and 20% hydrogen.

– **Hydrogen:** Pure hydrogen can be delivered at the gas station level by extracting all the carbon from the natural gas fuel, using existing technology.

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Energy Vision, is a national not-for-profit environmental research organization that analyzes and promotes ways to make a swift transition to pollution-free renewable energy sources and to the clean, petroleum-free transportation fuels of the future. EV works with local governments, environmental groups and citizens to develop local initiatives.

⁶ See the Energy Information Administration's report regarding the total supply of natural gas remaining in the world, *Worldwide Natural Gas Supply and Demand and the Outlook for Global LNG Trade*, http://tonto.eia.doe.gov/FTP/ROOT/features/world_ng.pdf.